13 New public transport services

Karolina Isaksson

New public transport services have become a key issue for public transport over the last decade or so. *New services* in this chapter include examples such as digital information, journey planning and payment services, but also various types of sharing and ride-sharing services that can form part of or complement existing public transport. The chapter highlights the issues and perspectives on new public transport services that have characterised K2's research over time, from the start-up and establishment phase to today. Links are also made to research from other contexts. Overall, the emergence of an increasingly diverse research domain is depicted.

Early ideas on the opportunities offered by digitalisation

When K2 began in 2013, one of its first tasks was to define a specific research agenda. The starting point was a Future Search Workshop at Luftkastellet in Malmö, which gathered more than 70 people from research, public transport operators and public authorities responsible for transport and urban planning, as well as consultants, industry organisations, politicians and civil society organisations. Proposals for prioritised focus areas for K2 research activities were developed over three days.

One of these areas focused on new public transport services, although 'new services' was not the term used at that time. However, there was interest in questions about how digital technology could be used to further develop public transport and make it more attractive to passengers. One theme related to the development of travel planning services – preferably with payment functionality. Another possible application discussed related to information services aimed at supporting passengers in the event of delays, for example. There were also ideas

about using digital technology to gather knowledge about passenger behaviour and preferences. A further question concerned how public transport in rural areas could be strengthened by means of greater coordination of school transport, travel to work, mobility services, medical travel and leisure travel. It was assumed that information and communication technologies could reinforce the links between different services and help to optimise routes or enable new types of demand-responsive traffic to be implemented. There were hopes of more 'seamless' travel, where digital services would be used to strengthen the whole journey perspective and use public transport more efficiently.

The process of defining K2's research focus did not take place in a vacuum. This was a time when interest in digital technology and its potential to streamline and optimise the transport sector, including public transport, was gaining ground. New concepts for shared travel were established globally, including new types of bicycle-sharing systems and new ride-sharing services, Uber being one of the most widely discussed. On a national level, Samtrafiken, working in collaboration with Storstockholms lokaltrafik (SL) and what was then the Viktoria Institute, had launched Trafiklab in order to develop the work (individually and jointly) of public organisations and private public transport operators with travel information and open data. Travelhack was a recurring event that resulted in concrete ideas and proposals for apps that were intended to make public transport more attractive. At KTH Royal Institute of Technology, research was also conducted into how real-time information could be used to increase bus service regularity in cities [1].

Other initiatives focused on testing and developing new sharing services. In Gothenburg, the UbiGo pilot project was launched in 2013 to design and test a new type of mobility service combining public transport, carpooling, car hire, bicycle sharing and taxis in a single offering. Households participating in the project were given access to an app where they could make bookings and activate trips using the modes of transport that were included [2]. UbiGo, which was a continuation of the pilot study *Den flexible trafikanten* [The flexible road user], gained attention and helped to increase interest in potential applications for digital technology in the field of passenger transport, which also provided important input for K2's research agenda.

A research domain in the making

A total of five major research domains were designated when K2's full operational phase began in 2015. One of these related to information and communication technology and its potential to strengthen public transport. Other major initiatives were launched in parallel at national level. The strategic innovation programme

Drive Sweden aimed to drive the emergence of digitalised and shared mobility solutions for a sustainable transport system. A further initiative was the government's collaboration programme for *Nästa generations resor och transporter* [Next generation travel and transport], which led to what was known as the *KOMPIS project* (Combined Mobility as a Service). Pilot projects were launched within the framework of KOMPIS to strengthen learning about what combined mobility could involve in practice.

MaaS on everyone's lips

A great deal of interest was focused on developments in Finland, where the potential of digitalisation to develop public transport and sustainable travel was high on the agenda during those years. In 2014, the Aalto University student Sonja Heikkilä had written a master's thesis for the City of Helsinki, which coined the term *Mobility as a Service* (MaaS) [3]. According to Heikkilä, MaaS should be understood as a system where mobility operators provide a range of mobility services that passengers can access easily without having to deal with lots of different ticketing and booking systems themselves. In her thesis, she painted a future scenario of more flexible and personalised travel offerings, which were assumed to be a way to maintain the attractiveness of public transport for existing passenger groups, while also enticing car drivers to switch to more sustainable travel practices.

The ideas expressed by Heikkilä in her paper were also expressed in other contexts during these years, including the UbiGo project referred to above. While the ideas were not unique, the concept of MaaS caught on quickly and for several years became the buzzword on everyone's lips in discussions about new public transport services.

Strategic analyses and future forecasting

In 2015–2016, K2 initiated a number of studies of different types of services that were deemed to have the potential to strengthen the public transport offering to passengers. This included the development and use of real-time data to be used in situations when public transport services were disrupted, for example [4]. However, a significant part of the research involved mapping and concept clarification. One example is a strategic outlook on integrated mobility services that was conducted by researchers at Chalmers University of Technology and the Viktoria Institute in collaboration with K2 in 2016. One of the aims was to clarify the relationship between some of the various concepts that flourished during those years: combined mobility, mobility as a service and integrated mobility services

[5]. The analysis highlighted a number of completed or ongoing projects relating to combined and integrated mobility from countries such as Sweden, Germany, the US and Austria. It was noted that different projects had led to different results; and that some had been extended and undergone further development, while others had been discontinued following a brief trial period. The causes were not analysed in detail, but funding and regulatory issues were identified as important issues. The overview led to recommendations to work further with pilot projects and to develop clearer concepts and frameworks in order to facilitate in-depth analyses and evaluations.

In 2016, K2 initiated a project aimed at analysing changing conditions for future public transport, focussing on trends and counter-trends. The project report included a chapter that discussed issues related to intelligent transport systems and digitalisation. Inter alia, it was highlighted how new services based on open data can facilitate rapid decisions for the individual and strengthen the opportunities to combine different travel options, as well as comparing them on the basis of time, cost and other aspects such as health and the environment [6]. New services were primarily referred to as a strengthening force for existing public transport and other forms of sustainable travel. However, other analyses highlighted the fact that much was still unknown about the impact of new services on public transport and emphasised the need for more empirical evidence so that firm conclusions could be drawn [7].

Greater interest in institutional frameworks

During these years, there was also an increase in interest in different types of barriers or challenges that could be expected to affect the implementation of integrated mobility services. In addition to technical issues, focus began to shift towards regulatory frameworks and other types of institutional factors. The fact that these issues began to attract attention in the Swedish context was largely due to the analyses that were now being completed by the UbiGo initiative in Gothenburg, to name but one example. Further analyses on institutional frameworks for integrated mobility services were conducted by researchers at Lund University, Chalmers University of Technology and Trivector between 2016 and 2018 [8] [9]. One specific issue that received increased attention during this period was procurement. A trial was conducted in the Västra Götaland region to find out whether MaaS could be procured as part of public transport. However, it was concluded that MaaS was still too new and immature a phenomenon to be suitable for public procurement [10].

> Technological development per se is not what makes a difference, but rather how new technology is applied in specific social and political contexts. Opportunities for enhanced resource efficiency and sustainability do not materialise all on their own.

Further empirical research and a more diverse picture

Research into new public transport services entered a more empirically oriented phase in the 2018–2020 period. A number of Swedish pilot projects were taking place in order to test and learn more about new public transport services, including those linked to Drive Sweden and KOMPIS. Most of the pilot projects took place in urban environments. One example was the *Modern mobilitet i Barkarbystaden* [Modern Mobility in Barkarbystaden] project in north-west Stockholm. This pilot project included trials of MaaS and driverless shuttles [11]. There were also projects testing combined mobility in rural environments, for instance *KomILand*, which was conducted in western Sweden [12]. Attempts were also made with services to reduce the need to travel. One example was a local workplace hub that was designed and tested as part of the *Mistra SAMS* research programme (Sustainable accessibility and mobility services), where K2 participated as a partner [13]. New services also emerged during these years in an unregulated and unplanned form, such as the hundreds of blue-and-green EU bicycles that flooded the streets of Stockholm in the summer of 2018 but vanished after just a few months. The appearance of shared electric scooters in several Swedish cities in the late summer and autumn of 2018 was a more lasting phenomenon. Both the pilot projects and the commercial mobility services provided new experiences.

Critical approaches

During this period, K2's research developed a more multifaceted understanding of new public transport services. The optimism that had characterised the early discussions was complemented by more explicitly critical understandings and approaches to new public transport services. The K2 projects developed during these years were inspired by the problematising discussions that had also started to develop in the field of international research. Studies were published that asked more fundamental questions about what the ongoing shift to a transport system with increasing elements of digital services could mean for the development of society as a whole and for the possibilities of achieving societal goals of long-term sustainable development [14] [15] [16]. Critical analyses were made of MaaS and the way in which the concept is grounded in the notion that mobility services should be designed to be optimal for the individual, as this does not necessarily overlap with sustainable development at a societal level. Additionally, risks were highlighted with an increased element of digitally supported mobility services under private management, as this could mean that public planning stakeholders

would find it more difficult to gain access to passenger data and other data that would be needed for strategic transport planning and social planning [17].

At the same time, empirical research from the US and elsewhere showed that new ride-sharing concepts such as Uber and Lyft had led to increased use of cars (increases in both the number of trips and the number of passenger kilometres), and that this was true even in areas where public transport was well developed [18]. Swedish scenario studies indicated that there was a genuine risk of similar effects here, too. A K2 report dated 2019 highlighted the fact that digitally supported ride-sharing, sharing and journey planning services could not automatically be expected to promote public transport and other forms of sustainable travel, but could just as easily lead to increased car use, depending on a number of interacting factors and trends in the field of automation as well [19]. It became clear that issues relating to new public transport services needed to be understood and analysed from a broad sustainability perspective, taking into account both environmental and social dimensions, and that there was a need to develop knowledge on governance and planning linked to new services.

What could new services mean for passengers?

Studies were also conducted that related to passengers' perspectives on new services. Examples include analyses of the possibilities of using a combination of information on passengers' geographical positioning, preferred destination, other contextual information and real-time data to develop more advanced travel information that could reinforce the exchange of information between passengers and service providers in the event of unscheduled disruptions [20]. In other contexts, it was noted that issues relating to gender and equality had thus far been conspicuous by their absence as perspectives in pilot projects and research into integrated mobility services, and proposals were developed for how such perspectives could be strengthened going forward [21].

Different perspectives on governance and planning

A number of research projects focused specifically on governance and planning. A key concept in these studies was 'smart mobility', which was used as an umbrella term linking several different phenomena such as intelligent infrastructure, automation, connected vehicles, electrification and new types of shared and combined mobility services [16]. Analyses were made of various potential development pathways in a future with greater elements of 'smart mobility' and MaaS, and the potential consequences for public transport. One example was an article by Smith et al. dated 2017, which discussed three possible scenarios for the

development of MaaS in public transport: a market-driven scenario, one in which public stakeholders play a leading role, and a third that was a mix of the first two. The authors drew attention to the various implications for public transport authorities in the different scenarios: while the market-driven scenario mainly involves enabling third-party ticket sales, the scenario with strong public leadership would mean that public transport authorities themselves would integrate different services and taking greater operational responsibility [22].

Between 2018 and 2020, comparative analyses were also conducted of approaches to MaaS and autonomous vehicles in different cities and countries as a potential part of future public transport [23]. Several studies examined how public stakeholders perceived their room for manoeuvre in relation to MaaS and other forms of 'smart mobility'. Comparisons between Sweden and Finland showed that the approach at the national level was of major importance. In Finland, there was a clear national agenda that involved new legislation to promote the development of a more service-based transport system. The regional public transport authorities did not feel that they had a particularly great deal of room for manoeuvre. They had to adapt to the new conditions, which for them mainly involved acting as partners to private service development companies. In Sweden, the national level had not selected such a clear way forward, which left more room for manoeuvre for the regional public transport authorities to explore possible futures with MaaS. In operational terms, however, public transport authorities found there was limited room for manoeuvre as national regulatory frameworks remained unchanged [24] [25]. Other studies highlighted significant differences between various cities and countries in terms of how active roles public stakeholders at various administrative levels had chosen to take on (or perceived they had the opportunity to choose) in order to steer the innovation and development of new public transport services [26] [27]. 2020 saw the publication of a doctoral thesis on MaaS which was based on extensive empirical analyses both in Sweden and internationally. This thesis developed proposals for governance approaches to make MaaS a clear contribution to a more sustainable transport system [28].

Overall, the studies led to new insights and more critical discussions about situations and contexts in which public transport stakeholders were perceived as providing considerable scope for private companies to set the agenda for the development of future mobility [29]. A number of analyses, both national and international, reiterated the need for more deliberate governance and planning approaches by public stakeholders [29] [30] [31] [32].

From ‘new services’ to broader analyses of future mobility

The emerging empirical evidence and more multifaceted picture provided inspiration for K2’s new research focus for the 2020–2024 period. In the field of *Future Mobility*, new knowledge was to be developed on the opportunities and challenges of new digital technology, as well as the relationship between traditional public transport and new mobility services. This involved broader focus for research into new public transport services. What had previously been described as research into ‘digitalisation’ or ‘integrated services’ now became linked to issues relating to behavioural change, collaborative governance, business models, and impact on public transport provision and physical environments, such as the design of transfer points [33].

Greater emphasis on micromobility

Analyses of different types of mobility services have remained a prominent part of K2’s activities in the early 2020s. This has included further developments of previous studies on information services that can be used to support travelling during service disruptions, and research into digital services in order to influence customer satisfaction. According to the studies, digitally conveyed travel information can enhance public transport as well as the passenger experience in several respects. However, it has been pointed out that this involves costs and other challenges (such as ensuring that complex travel information is conveyed correctly). The studies have also made clear that different groups of passengers have different circumstances for absorbing digitally mediated information, thus stressing the need for targeted adaptations for specific groups, and the remaining need for analogue travel information [34] [35].

One issue that has received particular attention in recent years is micromobility; that is, different variants of light electric vehicles such as shared bicycles and electric scooters. Experiences from the 2018–2019 period showed that new mobility concepts – in particular electric scooters – can be introduced quickly and have a major impact on travel behaviour and the traffic environment. And while new mobility services have been perceived as positive additions by some, they have also posed problems in the form of physical barriers, accidents and sometimes even competition with pedestrians, cyclists and public transport, for example.

Research conducted within K2 as well as and in other environments has included analyses of possible ways of designing and managing micromobility services so that they can complement public transport or otherwise contribute to sustainable mobility. For instance, Fearnely [36] discusses the potential of steering electric scooters by means of geofencing or zoning, or by requiring electric scooter companies to share data and cooperate with public policy and planning organisations. Research has been conducted under the auspices of K2 in order to understand both the temporal and spatial reasons as to why electric scooters are sometimes used as a complement and sometimes have become a competing mode of transport to existing public transport. Research indicates that there are opportunities to manage electric scooter systems, for example, so that they become a complement that reinforces public transport. However, this requires public governance to be designed on the basis of deep insights into both the public transport system and other local characteristics in the cities or other geographical areas in question [37].

Other studies have focused on methodological approaches for evaluating different types of bicycle-sharing schemes [38]. Critical analyses have also been conducted, that discuss different types of values related to mobility and different modes of transport that are promoted by different types of bicycle-sharing services. For instance, Koglin and Mukhtar-Landgren discussed in a 2021 article what will happen to the understanding of cycling if it is increasingly viewed as part of public transport. They noted that bicycle-sharing services are often permeated by norms around fast and efficient commuting to work or accessibility for tourists, rather than meeting the needs of other groups (such as the unemployed, older people, students), and highlighted the need to address tensions between ecological and social dimensions of sustainability [39].

New services for rural areas and small towns

Another theme that has become an important part of the research into new services relates to mobility concepts for rural areas and small towns. Some of the research projects conducted in recent years, within both K2 and other research environments, have involved compiling and further developing results from pilot studies and early MaaS trials in rural areas. Attention has been drawn to both residents' experiences of the services and various types of organisational and institutional challenges linked to factors such as uncertainties about responsibilities and mandates [40] [12]. Essentially, those who have been involved in these types of projects tend to think that MaaS can benefit the environment, local development and the private economy. In many cases, the pilots and trials

from these years were impacted by the pandemic, which have made it difficult to draw firm conclusions. However, the projects have led to new types of dialogue and collaboration on sustainable accessibility among residents and community stakeholders in rural areas, which has been perceived as important. Other research projects have focused on exploring possible concepts for demand-responsive public transport. Analyses have been made regarding opportunities and impacts of replacing existing bus routes in rural areas with a high-capacity route complemented by demand-responsive services [41]. In 2023, a new research project was launched within K2, which focuses on comparing the performance of demand-responsive services from different geographical contexts. This project is expected to lead to more in-depth insights into how these types of services could be included as part of regular public transport, and what is required for them to help reduce emissions and increase resource efficiency and social equity.

Research into experiments and pilot projects

Issues relating to governance, planning and organisational matters have remained important parts of the research on new services and future mobility. In recent years, this has often been done with emphasis on experiments and pilot projects. One example is the research project *Innovationsarbetets organisering: Att lära från pilotprojekt och testlabb* [Organising innovation: learning from pilot projects and test labs], which focused on exploring the criteria for organisational learning in innovation processes [42]. Another example is the project *Att realisera ny mobilitet – samverkansprocesser som formar framtidens kollektivtrafik i städer* [New mobilities in the making – collaborative processes that shape future urban public transport], which explored forms of collaboration between public and private stakeholders in the development and implementation of MaaS and driverless shuttles. One of the key findings of the latter was that the ways in which private and public stakeholders at different administrative levels choose to collaborate during pilot projects often have a lasting impact on responsibility and influence in the further planning of future public mobility [11] [43]. The project also discussed new governance challenges arising from the increased use of digital platforms, including the fact that these often operate on a different scale compared to the scale applied in local and regional public transport planning [44].

Stronger emphasis on social justice

In recent years, K2's research into new services and the future of mobility has also taken on stronger emphasis on social justice. Examples include research into how new services such as MaaS, demand-responsive services, shared micromobility or

digital journey planners can take into account and meet the needs and circumstances of different groups and locations [45] [46]. One thing these studies all have in common is the fact that they provide insights into how new services and micromobility could enhance sustainable and equitable access for more people, but that this is dependent on how the services are designed, how they are priced and how they are integrated with public transport and the transport system as a whole.

New services are no longer new but still require attention

Twelve years after the launch of K2, 'new services' in public transport form an integral part of mobility for many people and are included as part of the operations of both public and private stakeholders operating in the public transport sector. New services are no longer 'new' but something that many of us have gotten used to and take for granted, regardless of whether we think of digital journey planners, mobile ticketing or access to different types of shared mobility services.

The retrospective provided in this chapter highlights a number of different phases and changes of direction in K2's research over the years, from the optimistic expectations in the early years, through the years involving extensive public pilot projects, to a situation in which new services have indeed been established but where private car use remains high. Today, the debate on new services is characterised by a presence of more critical perspectives on the possibilities offered by digital technology, and significantly more developed and nuanced reasoning on possible impacts in respect of the environment, climate and social justice.

Many new insights have emerged during the first twelve years of K2's activities. Perhaps the most central insight is that technological development per se is not what makes a difference, but rather how new technology is applied in specific social and political contexts. Opportunities for enhanced resource efficiency and sustainability do not materialise all on their own. Active and conscious governance approaches are required, along with adaptation to spatial, economic and social criteria. This, in turn, requires insight into the everyday lives and the circumstances faced by people who live or spend time in different types of places. Similarly, an understanding is needed of both governance conditions and the ideas and logics that permeate processes and contexts in which new services are shaped.

Finally, there needs to be a political will to drive development of the transport sector in a sustainable direction, alongside an ability to envision and engage with both risks and opportunities that follow in the wake of new technology.