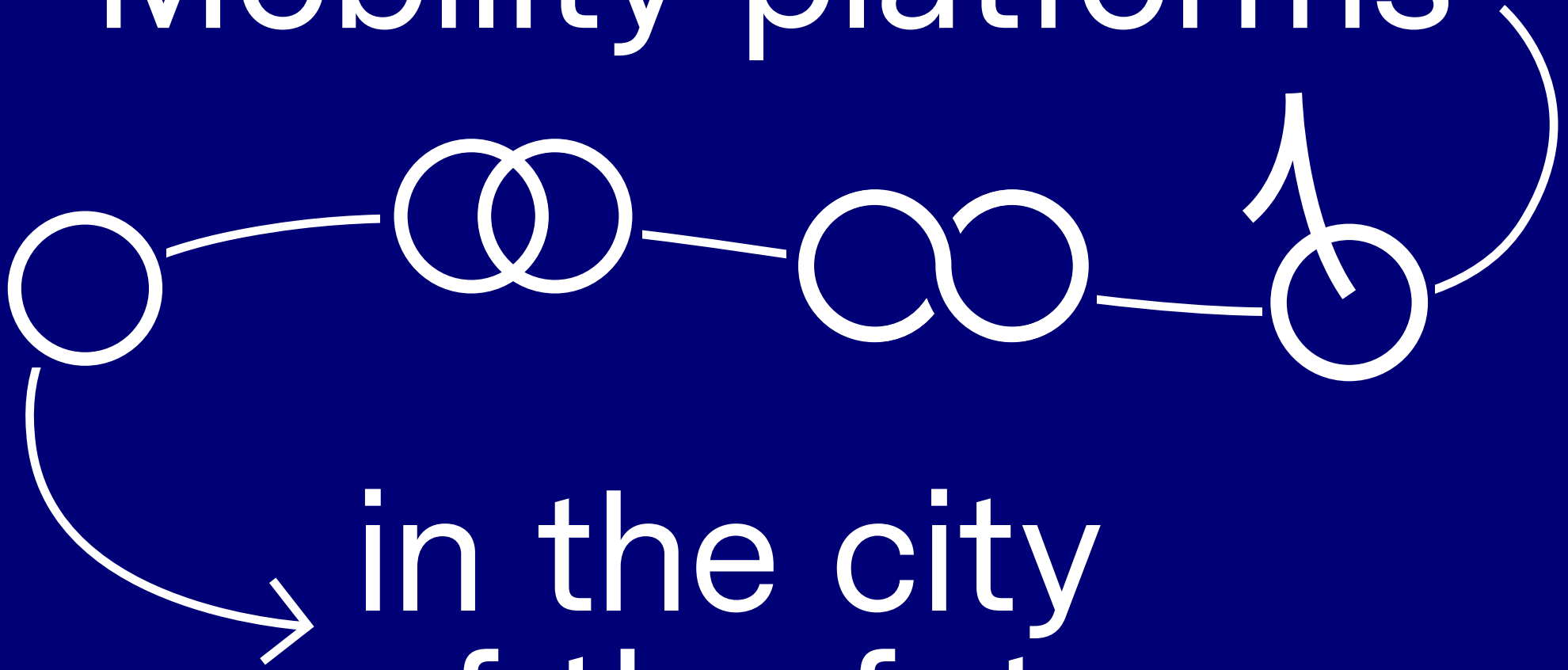
Mobility platforms



in the city of the future

An exploratory study of public values and possible futures

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1 Introduction

"12,000 people—zero cars." That was the sensational headline to describe Merwede, the neighborhood that will soon be part of a large-scale development project in Utrecht, the Merwede Canal Zone (Merwedekanaalzone). Merwede has been praised internationally as an example of sustainability due to its prioritization of low CO_2 emissions.

Merwede will not be completely car-free, but there won't be many cars to be seen on the street. Parking will be available for only one in three households. Moreover, there will be good bicycle and public transport infrastructure, a car-sharing scheme, and an app that offers residents access to various modes of transportation.

This will be a major change for many of the future residents of Merwede, the first of which are expected to arrive in a few years' time. Not only will they be moving to a new environment, they will also have to deal with a new transport system. For some, this will only mean a different route for their daily bicycle commute to the train station. For others, it will involve discovering a platform and entirely new ways of getting around.

Merwede is not alone. Cities such as Amsterdam (Sluisbuurt) and The Hague (Binckhorst) are also constructing new neighborhoods in which urban development comes together with the introduction of a low-traffic transport system. There are also plenty of examples from outside the Netherlands, from Freiburg's sustainable model district (Vauban) to Ghent's "living streets" (leefstraten), from the "20-minute neighborhood" in Portland, Oregon to the "15-minute city" in Paris.

The role of new technology is often center stage in discussions about the mobility of the future, which varies from self-driving cars to frictionless mobility with Mobility-as-a-Service (MaaS). Digital platforms, with their ability to connect supply and demand, play an important role in these new forms of transport. One example of a MaaS platform is Whim, which operates in various cities and gives users access to mobility services through subscriptions. Whim's goal is to become the Netflix or Spotify of mobility, with the tagline "One app for all your transport needs."

Although mobility platforms such as Whim claim to lead to a more efficient system, they raise ethical questions about privacy and the use of data. For example, Whim collects information about the travel details and internet behavior of its users to give the company insight into their travel habits and personal

preferences. The debates around mobility platforms also touch on more traditional policy issues, such as accessibility for people with disabilities, noise pollution, and air pollution. Is a platform like Uber, for example, affordable for all target demographics in the city? Does a greater number of taxi services lead to congestion or even violations of environmental standards in certain parts of the city?

Mobility platforms are not streaming services: they form part of the physical and social infrastructure of a city or neighborhood. As well as including cars, bicycles and taxis, the density of that infrastructure is made up by other modes of mobility such as trams, trains, motorcycles, vans and lorries. A mobility platform must therefore be seen as part of an urban transport system.

Technological innovations often promise big improvements for our lives. It can be all too easy to seek out a technological fix for every problem that might arise, even if that solution is not always the most suitable and even if that means some problems are overlooked. Which problem, exactly, does a platform innovation such as Mobility-as-a-Service help to solve?

Such questions aren't asked often enough in the debate on mobility and new technology: the solution is well known, the problem not so much.

With this report, we hope to contribute to this debate and to help shape new policies in which more care is taken in defining, prioritizing, and comparing objectives for urban mobility platforms. We do this by putting public values first. Public values are normative concepts that describe both the impact on and democratic control of an affected public.

Public values are often abstract and difficult to connect with concrete situations. For this reason, it can be difficult to have a frank, open debate about them. We are taking several analytical steps to develop tools for this. In what follows, we will begin by elaborating on why mobility platforms are unlike Netflix or Spotify but rather are intertwined with the urban transport system. We do this by introducing the term "mobility arrangement" and explaining how this arrangement relates to mobility platforms. We then introduce an assessment framework for public values, drawing on research from platform studies, transport geography, and urban planning. To make this framework more concrete, we have developed four future scenarios, each of which prioritizes different public values. Next, we elaborate on the application of the framework to the scenarios, after which we conclude this report with some recommendations for policy and debate. To illustrate the challenge more clearly, we also introduce two case studies: one about two recent (almost) car-free neighborhoods in the Netherlands (Merwede and Sluisbuurt) and one about the lessons we can learn from Scandinavian experiences with mobility platforms (Kutsuplus and UbiGo). These are included at the end of this report to give a more detailed picture of the issues under discussion here.

Cities face a twofold challenge. On the one hand, there is the difficulty of making the transport system fairer, more sustainable, and more efficient in meeting the needs of a city. On the other hand, digital platforms already occupy an important place in the city, and their role in the city's future shows no signs of diminishing. Informed debate and policy decisions are needed. In this report, we offer tools for viewing both of these challenges in conjunction with each other and for thinking about a future based on public values.

Want to learn more?

Boffey, D. (2020). **Forward-thinking Utrecht builds car-free district for 12,000 people.** *The Guardian,* March 15, 2020.

Pangbourne, K., Mladenović, M. N., Stead, D., & Milakis, D. (2020). **Questioning mobility as a service: Unanticipated implications for society and governance.** *Transportation Research Part A: Policy and Practice, 131,* 35-49.

New questions about urban mobility

The urban transport system of the future will probably look different from what we're used to—more space to live, cycle, and walk, less space for bulky, privately owned cars. With the national and city commitments to climate change mitigation and reducing emissions, transport will also be less reliant on fossil fuels. Depending on the choices made by local governments, digital platforms can, to a greater or lesser extent, have a role in this development.

Urban mobility in transition

Monofunctional areas generate a lot of traffic. After all, you have to travel if you want to move from one function (living) to another (work, education, recreation). Paris is currently using the concept of the "15-minute city." Anything a resident might need is within a 15-minute travel radius (whether by foot, bicycle, or public transport)—from childcare to supermarkets, libraries to gyms. Such a variety of functions is often accompanied by high-density construction, which can support facilities and make investment in public transport financially viable. This usually means less space for cars, whether they are stationary or in transit.

In thinking about mobility in the city of the future, we use the term "mobility arrangement": the relationship between the use of space, available mobility services, and the mediation between them. For instance, this mediation could occur through an online platform, or through a lease contract between an employer and an employee for a fixed commute or occasional use of the platform Uber. This definition thus consists of three elements:

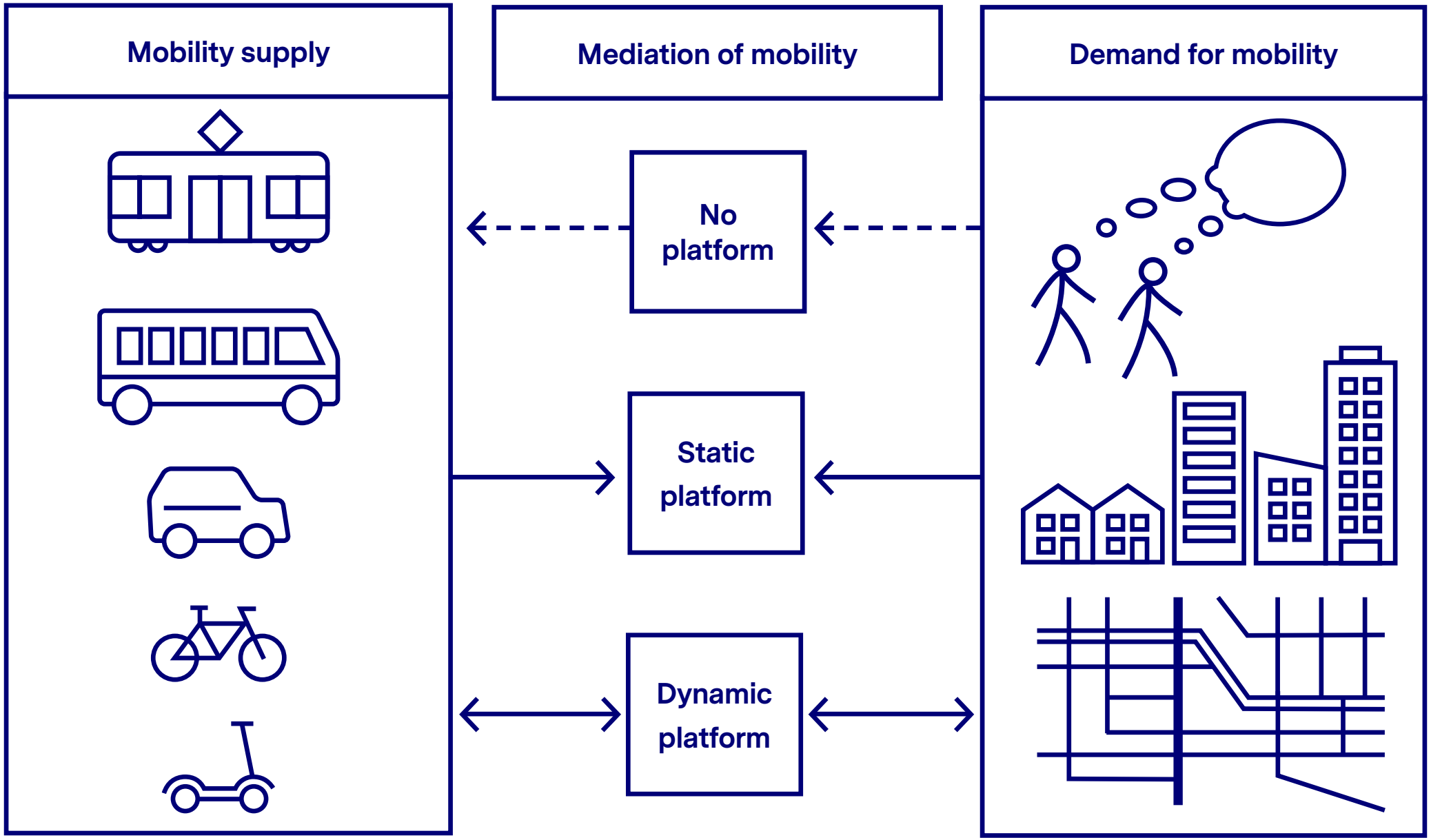
1. The use of space: the density and functions of the use of space and the resulting demand for mobility.

2. The available mobility services: the range of modes of transport (modalities) needed to meet the demand for mobility.

3. The mediation between mobility supply and demand.

In this report, we take part of the demand for mobility and the supply of modalities as a given; the context is a relatively dense city with a diversity of functions and a low parking standard, where active efforts are made to reduce CO_2 emissions. Our primary focus is on expanding the understanding of the third point - the mediation between mobility supply and demand. In some cases, such as with cycling or walking, a mediating platform is hardly necessary, if at all. In the case of high-capacity public transport infrastructure—such as trams, metros, and trains—interfaces, such as a journey planner, are indeed required, but these have a minimal impact on supply and demand.

Mobility package



Walking, cycling, and public transport will form the backbone of the low-carbon urban transport system of the future, but the extent to which they can replace private-car use is uncertain due to our current dependency on the car, dominant cultural values, and the car being a symbol of modernity.

Digital platforms that provide access to mobility services (such as MaaS) and vehicles (such as car-sharing programs) can play a mediating role in this transformation. But while the emergence of these digital platforms can lead to opportunities, it also raises new questions that are not always on the radar of city planners and traffic engineers. The field of platform studies can help us come to terms with these issues.

The rise of platforms

IIn their book *The Platform Society*, José van Dijck, Thomas Poell, and Martijn de Waal define platforms as (re)programmable digital architectures fueled by user data, in which the demand of users and the supply of service providers come together. Digital platforms enable new practices (such as mobility on demand) but can also put pressure on public values. That means that debate, and possibly even regulation, is needed. For example, who owns the data for that on-demand trip? Mobility platforms often emphasize the value of their service to the user, but they are much less explicit about how their service affects those who do not (or cannot) use their service (or even those who may be hindered by their service). In short, they are not explicit about public values.

The debate about public values and platforms is not only complicated because of those issues that arise for which we do not yet have the conceptual tools; it is also complicated due to the fact that decisions are often made with the help of an algorithm that controls the mediation in the platform. Think of how fares rise when there is increased demand—so-called "surge pricing." Platform providers are often reluctant to make their algorithms public, which makes it difficult to assess which values are being prioritized. Does Google Maps take into account the interests of a residential area when a user is redirected through it to avoid a traffic jam? And when, exactly, does Uber determine that it is busy enough to increase the price of a ride?

Reverse technology assessment

The growing popularity of platforms frequently leads to political debate, such as when city dwellers are inconvenienced or when regulations are broken. Platforms often scale up very quickly, in part because of their ability to exploit "underused capacity," such as transforming a parked private car into a taxi (UberPop) or a shared car (Snappcar). This often results in public discussions taking place after a service has been rolled out. Only then are regulation or scientific studies possible.

Koen Frenken calls this process "reverse technology assessment." It's a reversal of the way innovation is normally implemented. In the case of medicine, for example, research is often conducted and verified by clinical trials, which is followed by public debate. Only after the subsequent regulations and policy are established is the medicine made available.

Platforms don't follow this logic. Moreover, they can adapt to new situations very quickly, the result being that both public debate and policy might become reactive. In other words, it's only after a new service has been rolled out that citizens and politicians will be able to think about it. In this report, we argue that the urban transport system of the future can benefit from a more proactive attitude of citizens and decision makers.

A proactive attitude assumes that goals and priorities are clear. That doesn't necessarily mean having a blueprint at hand with ready-made solutions—that would be too restrictive and too inflexible. It does mean, however, that there is a clear sense of public values and what to do with them. But this raises an obvious question: what are public values?

Want to learn more?

Frenken, K., & Pelzer, P. (2020). **Reverse technology assessment in the age of the platform economy.** *Built Environment, 46* (1), 22-27.

Mukhtar-Landgren, D., & Smith, G. (2019). **Perceived action spaces for public actors in the development of Mobility as a Service.** *European Transport Research Review, 11* (1), 1-12.

3 Assessment framework for public values

Studies and policy documents often invoke public values but are rarely explicit about what they are and which public values are important in which context. To begin, we can clarify what they are not: namely, private values. In other words, public values do not only concern a particular group or organization but rather the entire public (or all people in a particular area). Thus, in this report we define public values as normative concepts that describe both the impact on and democratic control of a relevant public. This relevant public has an interest in safeguarding public values or will suffer the consequences if public values are not safeguarded. Philosopher John Dewey notes that "the public" is not predetermined, but emerges when a problem—such as the consequences of digitization—arises.

Public values are not stable, but require a continuous process of democratic debate and investigation. "Tools of inquiry" play an important role in this: these are instruments that help to explore the possibilities and consequences of different choices or approaches. Below we discuss a tool of inquiry for urban mobility platforms: an assessment framework for public values.

Assessment framework

As a basis for debate, policy, and the regulation of mobility platforms in the city of the future, we have developed an assessment framework in which the most important public values are summarized. Our work is based on an extensive survey of scholarly literature. The assessment framework is visualized in Table 1 (pg. 9). The framework consists of four categories, and different public values fall under each of those categories:

1. Service: values that focus on the mobility service being offered.

2. Climate impact: values that describe the impact on the environment.

3. Well-being: socially oriented values concerning the consequences of mobility on people's well-being.

4. Democratic control: democratic values that describe the public consequences of mobility concepts.

→ Table 1 **The assessment framework for public values**

1 Service	2 Climate impact	3 Well-being	4 Democratic control
Freedom of movement	Renewable energy	Health	Privacy
Freedom of choice	Proximity richness	Social interaction	Accountability
Accessibility			Adaptability
Affordability			Legitimacy
Reliability			Transparency
			Ownership

Click here for the complete assessment framework for public values.

Want to learn more?

Kool, L., Timmer, J., Royakkers, L. M. M., & Van Est, Q. C. (2017). **Urgent Upgrade. Public Values in our Digitized Society.** The Hague: Rathenau Institute.

Te Brömmelstroet, M., Nikolaeva, A., Glaser, M., Nicolaisen, M. S., & Chan, C. (2017). **Travelling together alone and alone together: mobility and potential exposure to diversity.** *Applied Mobilities, 2* (1), 1-15.

Scenarios

4

We don't know what mobility will look like in fifty years. There are many uncertainties—about technology, about our shared preferences, and about the way we will organize our work. But the future is not a wave that will break over us without warning. We can make choices about what we, as a society, consider important and how we want to organize that society. Pilot projects can teach us a lot about new forms of mobility: this is where solutions become concrete and user experiences tangible. At the same time, pilot projects offer only limited insight into what the mobility of the future might look like. For that reason it's important to think more imaginatively.

Scenarios are one method to explore what's in store for cities and where our priorities lie. Usually made up of four internally consistent storylines, scenarios present a few possible futures that differ in terms of desired values or uncertainties. The aim is not necessarily to choose one scenario, but to compare and contrast them to better understand what might happen in the future.

A distinction is often made between context scenarios and policy scenarios. Context scenarios deal with variables outside the influence of the author or designer. Think of climate change or the shifting political landscape, for example. Policy scenarios deal with possible futures that the creator of the scenario can influence. By comparing the different scenarios, important choices, challenges, and trade-offs are made clear—just like the assessment framework, policy scenarios are therefore a tool of inquiry.

In this report we use policy scenarios based on a relatively dense city with a diversity of functions and fewer parking spaces. Each of the scenarios also has some kind of climate policy, such as a carbon tax or an individual climate budget. Within this context, and based on the assessment framework, clusters of public values have been identified that underpin the four scenarios (see Table 2).

Subsequently, we've elaborated on the different scenarios, combining the most important public values with different forms of digitization and mobility solutions, as well as different governance philosophies. Given that there are always trade-offs that have to be made, this exercise identified both low and high priority public values for each scenario.

The remainder of this chapter is dedicated to explaining the different scenarios, which have been produced according to a consistent procedure:

- a description of the hypothetical scenario;
- a table including the most prescient criteria;
- visualizations that bring the scenario to life in two contrasting ways in the city of Utrecht.

→ Table 2 **The public values with high and low priority for the four scenarios**

	Together	ECO	Travel Unlimited	Simple
High priority values	Ownership	Renewable energy Health Accessibility	Freedom of movement Freedom of choice Adaptability	Affordability Accessibility Privacy Accountability
Low priority values	Dependent on the layout at the neighborhood level	Freedom of movement Freedom of choice Privacy Ownership	Privacy Accessibility Accountability	Freedom of movement Freedom of choice

Want to learn more?

Pelzer, P., & Versteeg, W. (2019). **Imagination for change: The Post-Fossil City Contest.** *Futures, 108*, 12-26.

Snellen, D., Hamers, D., Tennekes, J., Nabielek, K., Van Hoorn, A., & Van den Broek, L. (2019). **Rehearsing the Future.** The Hague: PBL Netherlands Environmental Assessment Agency.

Travel Unlimited

In the *Travel Unlimited* (TU) scenario, mobility is offered via a privately owned platform. The platform is both a travel planner and a travel booker: think Google Maps meets Whim. The users' freedom is central. They can always move using whatever mode of transport they want, provided it's included in their subscription.

In *Travel Unlimited* there are many mobility options offered by various commercial entities—car sharing schemes, taxis, and integrated chains of other modes of (public) transport such as trains. Physically active modes of transport, such as cycling (with your own bike) and walking, are listed in the travel planner but are not promoted. The platform provider is averse to government regulation and ensures that highly profitable services are prominently displayed in the app. New mobility services can also be found on the platform soon after they appear on the market, allowing them to be easily tested and scaled up. These innovations benefit from an interactive feedback system, in which users are continuously sharing their experiences and making suggestions for improvement.

The type of use varies. Some people can no longer get by without TU and plan every journey with it, from the morning commute to the occasional trip to the beach (TU premium). For others, TU acts primarily as a supplement—via a shared car, for example—to the transport they already have (TU small). This option is less cost-effective per journey, and you have a reduced choice of transportation options.

In this scenario, there is an additional fee on high-emission modes of transport (such as renting a large car for one person), which means these options are expensive and only accessible to those with a high income. There is a lot of emphasis on ride pooling and various forms of public transport, which is significantly cheaper than having and maintaining a private vehicle. On paper, at least, there is a lot of freedom of choice—but only for those who can afford it. A common way to receive a discount on journeys is to pay with your personal data. Granting the platform permission to access and sell a user's data can lead to a discount of up to 30 percent. In this case a user's data is linked to other services, possibly resulting in higher health insurance premiums if a user walks or cycles too little.

The government has a relatively limited role in this scenario apart from taxing CO_2 emissions. The user experience is secured within the platform, where mobility services and drivers are continuously rated. When users deem a new mobility innovation unsatisfactory, it is unceremoniously removed from the platform. The inhabitants of this city are seen as users, not citizens. The mobility platform's algorithm is self-learning and self-managing, allowing it to more efficiently couple supply and demand. No one knows how this process works, exactly—traveling during rush hour is, in any event, rather expensive. There is limited coordination at the national or local level; there are regular traffic jams, with occasionally excessive noise and air pollution.

Scale	Access?	Mobility services	Integration of services	Platform	Organization
City, growing into a large-scale international platform.	Everyone, whether privately or through an employer.	Wide range of services. Offers separate modalities and the ability to complete trips from A to B.	Local mobility offerings are integrated into the platform.	System functions thanks to a complex algorithm that optimizes efficiency.	Left to the market; government sets (limited) boundaries.

Travel Unlimited

Travel Unlimited

Together

With *Together*, the city relies on a patchwork of various mobility schemes. In some neighborhoods, residents have set up a mobility cooperative; in others, they have outsourced the development and operation of the mobility arrangement to a private party. As a result, there are significant differences from neighborhood to neighborhood in terms of the types of mobility on offer, the comfort level of the travel experience, and the amount of control the residents have over their mobility.

In principle, the municipality subsidizes and supports all neighborhood initiatives, even if they differ greatly. Whatever their differences, each initiative must, if it is to be eligible for subsidy and support, comply with several simple rules regarding renewable energy and thresholds for air and noise pollution. One inspiring example is the neighborhood that set up its own mobility cooperative, which is governed by an elected committee. The committee is elected every four years and makes the most important decisions about the platform. The cooperative owns a fleet of electric cars and shared bicycles and operates a taxi service that supplements the existing public transport. All residents have access to it, the users are primarily elderly or people with disabilities. In addition to mobility, the platform was quickly used for sharing tools or other items among neighbors and for offering a babysitting service by teenagers. The platform is only accessible to local residents, which can be frustrating for visitors or those who live just outside the neighborhood's boundaries.

A student quarter offers a completely different example. Because many students rely upon bicycles as their main form of transport, they have little use for a platform and supplemental mobility services. But they chose to submit a proposal to the neighborhood council anyway, suggesting that they rent their otherwise unused parking spaces to visitors and that they offer a car-sharing scheme for residents from other neighborhoods. Initially, a group of economics students wanted to translate the income into a dividend for the residents, but the municipality put a stop to that. Now the extra income is used to throw regular parties for the neighborhood. In this scenario, residents have a real voice in the decision-making process, though it requires a good deal of their time, effort, and commitment. Not everyone has the time and the interest in this scheme, however; some people just want to be a mobility consumer. There are, for that reason, large differences in participation levels both within and between neighborhoods. In some areas mobility cooperatives are flourishing; in others, the municipality or a private party has had to intervene to guarantee a minimum level of accessibility. Car sharing works well at the neighborhood level. It's relatively cost-effective and makes optimum use of limited space. Because the subsidiarity principle is central, it can be difficult to make decisions at the city level that, for example, safeguard the interests of visitors to the city.

The municipality has a limited regulatory role through the subsidies it offers to the neighborhood initiatives. This is a highly decentralized system, resulting in large differences. In some neighborhoods the residents have full control, while in others mobility is mainly outsourced to private parties. It's a challenge to coordinate mobility at the city level, due to this decentralized model of transport provision.

Scale	Access?	Mobility services	Integration of services	Platform	Organization
Neighborhood.	Neighborhood residents and occasional visitors.	Differ depending on the district.	Access to local mobility offerings differs depending on the initiative.	Logistics depend on the neighborhood.	Initiative developed by the neighborhood and is supported by subsidies from the municipality.

Together

Together

ECO

***ECO* focuses on meeting the targets set by the 2015 Paris Agreement on climate change. City dwellers are severely limited in the amount of fossil-fuel derived energy they can use for transportation.**

As a resident, one needs to be a member of the *ECO* platform to make use of any travel modality other than walking or cycling. The municipality set up the platform, of which, in practice, almost the entire city is a member. The data is encrypted and is only shared with third parties to improve the existing service. Each month, residents are asked to complete a survey on their current employment, their level of fitness, and their preferences. Based on this survey, residents receive "mobility points" to spend every month. The government knows a lot about residents, but they offer a well-tailored package in return. There are exceptions for those with disabilities or for caregivers, to name only two examples. For the average city dweller, however, private-car use is an exception, especially if the car runs on fossil fuels. Residents cannot amass unused mobility points, though they can be used for buying local products, among other things. All transport in the city is monitored, bringing CO_2 emissions in the city down to near pre-industrial levels: the air is clean, and there's hardly any traffic noise. Users are kept informed by the government about the consequences of their mobility choices, and a variety of incentives are used to stimulate healthy and ecologically sustainable behavior. Some people feel unsafe because of the constant monitoring.

The municipality initiates and manages the mobility platform. Private mobility providers are welcome on this platform, but only if they meet strict requirements. As a whole, the transport system is extremely efficient, with continuous, dynamic coordination between different modalities. Traffic jams are rare. Citizens have little influence outside of municipal elections, which can lead to volatility in the transport system, especially if new parties or councillors are elected.

Scale	Access?	Mobility services	Integration of services	Platform	Organization
City.	Everyone, after completing the questionnaire. Visitors with a day pass.	Sustainable mobility offer separate modalities and complete trips from A to B.	Private transport is integrated with local mobility offerings in the platform.	System functions, optimized for sustainability, because of accurate tracking of users.	Municipality has a leading role.

ECO


JCDecaux
Deze straat heeft vorige maand
3 ton CO_2 minder uitgestoten
punten pakken
punten pakken
hél hél hél

ECO

Simple

With *Simple*, the range of mobility options is limited, but access is evenly distributed and users' privacy is well safeguarded.

An anonymous, easy-to-use app grants users access to (electric) cars and bicycles, which can be picked up at mobility hubs (mainly on the outskirts of the city) or more centrally located public transport hubs. Sometimes the cars or bikes are gone. In that case you have to walk to another hub or choose another means of transport. There's always someone available in the hubs to assist users, especially those with less digital literacy. It's also possible to make a reservation without the app by visiting the store.

This transport system is easy to use, open-source, and the limited data that is collected is handled carefully. Encrypted data is used to improve the existing service, but it's not shared with third parties. Residents are limited both in their freedom of mobility and their freedom of choice. Full use is still made of walking, cycling, and public transport, none of which is organized through Simple. As such, users cannot plan their complete journeys using Simple. Yet the service is resilient at the system level: if the power fails, for example, it's still possible to reserve a shared car in-store. Using Simple isn't mandatory, though most people, apart from those with a parking permit or those who mainly move around the city by bike, use it quite often.

The vehicles in the hubs are provided by private parties, but the municipality oversees everything, including the service desks in the hubs. Low-income residents can use their city pass to receive a discount in the Simple app. There is no active manipulation of the supply of and demand for mobility. Value-based management takes place predominantly through the regulation of the hubs rather than through the platform.

Dominant scale level	Access?	Mobility services	Integration of services	Platform	Organization
City.	Everyone, offline and online.	Limited mobility options available at hubs.	Existing local mobility infrastructure is not integrated into the platform.	Open-source system, only collects necessary data.	Simple rules drawn up by the municipality, no active management.

○ Simple

○ Simple

5

Application of the assessment framework and the scenarios

Both the assessment framework and the scenarios are primarily based on a study of scientific literature and policy reports. We interviewed experts and various stakeholders to refine the assessment framework and the scenarios. The interviews also generated more insight into their application. Both tools are context-specific and should be used thoughtfully; it can, for example, be generative to develop new scenarios rather than following the ones laid out in this report. Below, we share four insights from the application of the assessment framework.

1. Making public values measurable

An important observation: to properly compare public values, it's essential that they be grounded in empirical analysis, either quantitative or qualitative. This helps to get a clear idea of the CO_2 effects of different scenarios, for example, or to determine how many people are struggling with affordability or accessibility. This makes the debate and the resulting policy options more precise and concrete. Such an analysis is useful both for the current situation and for anticipating the ramifications of various scenarios.

2. Diversifying ways of knowing

Because numbers and figures aren't easily decipherable for everyone, it's important to show different ways of understanding the scenarios. That is why we've included the visualizations in this report. The development of the images enriched the scenarios not only in form, but also in content. For instance, in order to visualize a scenario in a city, it's important to be as precise as possible about the background of that scenario. We worked with graphic designers to achieve that level of detail.

In order to appeal to people from different backgrounds, diverse ways of knowing are important not only for the dissemination of a project's findings, but also for its production. For this report, we mainly spoke with academics, along with policymakers and

consultants. We had much less contact with city residents or community groups. More research is needed, then, as these perspectives can offer insight into the needs of the ultimate users of mobility platforms.

3. Emotional distance

Another important observation emerged from a discussion about the PBL Netherlands Environmental Assessment Agency's report, *Rehearsing the Future.* It's important for participants in workshops to have some critical distance, which should enable them to reflect on the value of a project for the city as a whole (and not only them personally). Of course, it's impossible for people to completely set aside their personal preferences and biases, but we noticed that our respondents often thought about how they would experience the mobility of the future as individuals. They seldom took public values into consideration. When it comes to policymakers and decision makers, such personal, individual considerations are not always desirable.

4. The conflation of means and ends

Finally, a discussion of critical distance raises another issue that struck us during our meetings (and is an important part of the wider debate on mobility platforms): the confusion of means and ends. Terms like "chain integration" or "level playing field" are often mentioned as goals, while in fact these are means to achieve public values, such as reliability or freedom of choice. The assessment framework for public values can help to make this distinction clearer, thereby enabling an honest debate, whether that's in a small committee meeting or in the public sphere.

Conclusion

6

Ideas around urban mobility are evolving. There is more appreciation for public space and travel modalities that place less of a burden on both the city and the planet. We are also witnessing the growing importance of digital mobility platforms. In order to steer these developments in the right direction, a careful debate is needed that leads to an up-to-date policy that safeguards public values. That's where our assessment framework and the subsequent scenarios can help. We conclude this report with three considerations for the democratic and policy-based search for mobility platforms in the city of the future.

Data and futures literacy

Technology is often seen as too complicated for the average person to understand. There's a risk in that, because questions about public values can all too easily be left to a handful of experts. Everyone in a city, from civil servants to citizens, must develop data literacy: an awareness of the new questions raised by digital technology. This can also prevent a blind trust in technology. After all, digital platforms are just one of the factors that play a role in urban mobility. That's why it's important to combine data literacy with what we might call futures literacy: the ability to imagine what is both possible and desirable in the future.

In imagining possible futures, especially futures that steer clear of technological determinism, the consideration of public values becomes ever more central. Scenarios can play an important role here, as they explore the future, much like pilot projects or experiments. But while in their tangibility pilot projects are important for offering concrete lessons, they are often limited when it comes to the number of participants and the breadth of possibilities they explore. Scenarios are ideal for identifying a wide range of possibilities. They are a valuable addition to the many mobility experiments currently taking place.

Different neighborhoods, different approaches

In this study, we took as our model a high-density city with a relatively few parking places: in a sense, the city before the arrival of the car. It's important to distinguish between existing neighborhoods and new developments. In existing neighborhoods, it's more difficult to radically change the transport system all at once. Residents are used to their mobility habits; they may have a parking permit or be reluctant to switch to a new app. Things are different in new developments,

where residents have consciously chosen a low-traffic neighborhood or are reconsidering their mobility habits in light of so many other larger, structural changes. Moreover, new development affords the possibility to immediately implement shared mobility on a much larger scale, especially if it's included in a program of requirements.

Of course, the world does not only consist of relatively dense, mixed-use cities and neighborhoods that are easily accessible by public transport and have a low parking standard. The digitization of mobility is equally important in monofunctional, postwar developments. The issues that arise here will likely be of a much different nature, because there are far fewer restrictions on private car use. Further research is needed, however, and the assessment framework for public values can be useful in this regard.

Policy scales and experiments

This report primarily concerns the city and emphasizes the role of municipalities and initiatives at the level of the neighborhood. But that's only part of the picture. Mobility does not correspond neatly with administrative levels or boundaries. Train timetables, for example, are often organized nationally, even though they are crucial for urban accessibility. This stratification also applies to the handling of platforms and data, which affects policy at both the national and supranational level.

The importance of administrative levels other than the local level does not mean that cities or neighborhoods should simply wait for directives from national or supranational governments. As with, say, parking fees or environmental zoning, it is possible to take a city-specific approach to mobility platforms. This is possible during the decision-making process, as the city of Utrecht did when it experimented with citizen advisory panels about a broad range of issues such as its cycling policy. Such an approach could also work for considering the future role of urban mobility platforms. Municipalities often have quite a bit of influence here, such as granting access to pick-up points or public space (comparable to the idea of authorizing taxis) or by setting strict conditions in procurement procedures.

In addition to the design of this democratic search process, the organization of ownership also requires attention. Who owns the digital infrastructure and all the data that is generated by it? According to the idea of data commons, the community should jointly draw up rules for access and use. Careful democratic control can go hand in hand in the use of data for analysis and can even guide mobility behavior. This is yet another example where data and technology are not taken for granted, but rather are interrogated so that they serve the needs of society. It touches on the question posed in 1966 by British architect Cedric Price, whose words are still relevant today:

> *Technology is the answer, but what was the question?*

Cases

The same, only different: Sluisbuurt and Merwede

In the Netherlands, there are currently two new metropolitan areas with an innovative perspective on mobility that are quite far in their development stages: the Sluisbuurt in Amsterdam and Merwede in Utrecht. The projects have a lot in common: a low parking standard (0.3), high density, a comparable number of houses (5500–6000), and the same time frame (both are expected to be completed in ten to fifteen years). Moreover, there is a lot of public debate surrounding both neighborhoods on issues such as river crossings (bridge or ferry) to ensure better accessibility and the expected increase in traffic in adjacent neighborhoods. While both cities aim to realize a comparable vision in their respective neighborhoods, this vision can be achieved by varying means. Below, we explain some of the similarities and differences.

Merwede © OKRA, BURA Urbanism

De Sluisbuurt © gemeente Amsterdam, LUMA

First similarity: High density ensures new perspectives on mobility

The development of Merwede and the Sluisbuurt reflect a societal change in the thinking about high-density construction. In both projects, the planned number of homes was adjusted upwards to match the expected growth ofthe ciy. For example, Amsterdam initially was considering a range from 3500 to 5500 homes for the Sluisbuurt, but the city council ultimately opted for the upper limit of 5500. Due to this higher density, less space will be available for cars, and thus there will be fewer parking spaces. In Merwede, environmental impact assessment reports have concluded that a conventional development scheme for homes with one parking space would exceed the legal limits on traffic generation. Shared mobility solutions thus play a central role in both plans.

Second similarity: Digital solutions lag behind bricks-and-mortar operations

In both projects, the accessibility of transport options via digital platforms is still limited. At the moment, most of the cities' attention is devoted to organizing the preconditions for mobility, such as the placement and allocation of parking spaces. The risk here is that digital platforms become only an afterthought and that they play little to no role in city planning. With an integrated approach, a digital platform could, for example, help to safeguard a neighborhood's air quality or prevent congestion by regulating incoming and outgoing traffic. Additionally, digital platforms foreground issues that are usually not central to area development, such as data sharing and accessibility for various mobility providers. This requires additional agreements between the municipality, mobility providers, the platform provider, and residents. Both municipalities aspire to work with an independent mobility director to guide this process.

Third similarity: The mobility system must be up and running as soon as the first residents arrive

In both the Sluisbuurt and Merwede, a mobility system with limited parking availability is being implemented on a scale that's never been tried before. Municipalities, developers, (future) residents, and various other stakeholders must therefore experiment and are bound to learn from their mistakes. At the same time, there appears to be no room for error: the relevant parties have insisted that residents should experience good accessibility without car ownership as soon as they've received the key to their new home. The system needs to be reliable from the beginning. But it also needs to be able to adapt to changes in demographics, use of space, and

behavioral patterns. The challenge is how to ensure that residents have high-quality accessibility in the long term while also leaving room for new solutions and perspectives.

First difference: spatial integration of a low parking standard

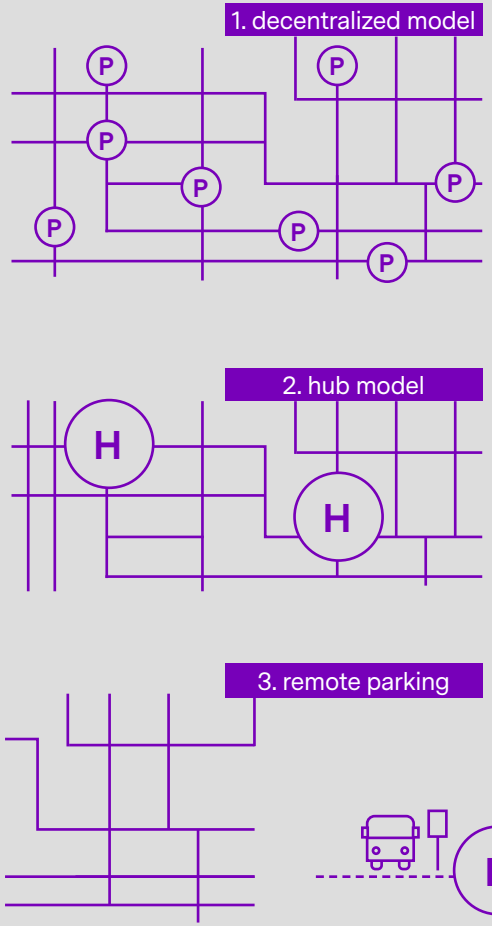
Both neighborhoods have a parking standard of 0.3, but that doesn't mean that parking is organized in the same way. We've encountered three ways in which parking can be organized: (1) a decentralized model with parking spaces spread throughout the neighborhood, possibly in parking garages; (2) a hub model with concentrated parking in mobility hubs (parking garages with extra services); and (3) remote parking, where the car is accessible via a public transport connection.

In Merwede, a hub model was chosen in combination with remote parking (two to three kilometers from the neighborhood). For the Sluisbuurt, the municipality of Amsterdam has opted for decentralized parking combined with central hubs. Both cases have an impact on street life and access to means of transport. The car is no longer at the front door, but in a parking garage around the corner or in a hub within cycling distance. This also makes a difference financially. According to independent studies of the Sluisbuurt, the hub model ranks the highest in terms of user comfort due to the affordability and reliability of shared mobility (despite a greater distance between home and parking space). It's also highly ranked in terms of financial viability. The distribution of parking and the availability of shared mobility and public transport are important variables in the design of a platform, which makes booking and renting these methods of transportation possible for residents.

Second difference: municipality-owned land vs. a public-private partnership

Merwede is characterized by a public-private partnership involving a total of seven landowners. The municipality of Utrecht has joined with six private landowners to form an owners' collective, which is responsible for the development of the mobility concept. This means that an agreement between these seven parties is necessary to fully implement the mobility concept. Nevertheless, the municipality owns about a third of the land in the project area, making it a key player in any public-private partnership. There is also, of course, the statutory role played by the municipality, such as the establishment of a zoning plan.

The situation is different in the Sluisbuurt. There, the municipality is the sole landowner and has a leading role in setting up the mobility arrangement, including the mobility platform. More land ownership means that the municipality bears more financial risk, however. As the sole commissioner of the mobility platform, it has more control than if it were collaborating with other parties. Both the municipality of Amsterdam and the municipality of Utrecht can choose to sell land for development at a later stage. However, the municipality of Amsterdam is less dependent on the approval of partners for the development of the mobility platform than the municipality of Utrecht. The former can regulate the planning for the development of the Sluisbuurt entirely by itself, as well as monitor and adjust the functioning of the transport system within the neighborhood.



Lessons from Scandinavia

In Sweden and Finland, two socially conscious pilot projects for mobility services have been launched in recent years: UbiGo (Sweden) and Kutsuplus (Finland). Where UbiGo set up a complete MaaS service for 190 participants from 83 households, Kutsuplus experimented with a new form of public transport. Both projects took public values such as sustainability and accessibility into account, though both were unable to establish themselves sufficiently to be able to offer a lasting service. What can we learn from these projects?

© Kutsuplus

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The pilot projects

Between 2012 and 2015, the Kutsuplus pilot project took place in and around the Finnish capital of Helsinki. The service consisted of small, nine-passenger vans, which ran routes within nine kilometers around Helsinki on request. An algorithm determined these routes based on the real-time demand of users. Passengers were picked up and dropped off at bus stops, thus offering users a service somewhere between public transport and a private taxi. The price of a ride was slightly above the price for a similar ticket on public transport.

UbiGo started on a smaller scale and ran between 2013 and 2014 in Gothenburg, the second largest city in Sweden after Stockholm. UbiGo invited a select group of households to participate. During the pilot project, the service was only available to these participants, although in 2019 UbiGo was relaunched as a public service in Stockholm. The project offered the participating households a tailor-made subscription that granted access to a range of travel modalities, including public transport, taxis, and a car-sharing and rental service.

Studies of both projects showed that users were very satisfied with the services. UbiGo, for example, appeared to encourage people to use alternative means of transport to their car. It was not a financially attractive alternative for everyone, however, and at times users were dissatisfied with the platform's professionalism and ease of use. Kutsuplus users also rated the service highly. They saw it as a good addition to existing transport options in the city and as an affordable alternative to taxis. Some were dissatisfied with the availability of the vans and the limited area that they served.

Five lessons

1. Provide clear cooperation agreements

Agreements made with local partners are important for the progress of a pilot program. For example, Kutsuplus used taxi vans from a local taxi company, which also looked after the drivers. As part of the official organization of Kutsuplus, the taxi company thus had control over the scope of the project—it could, therefore, refuse to run a service to the Helsinki airport, as this was an important route for the taxi company itself. This complicated operations for Kutsuplus and limited freedom of movement of the project's participants.

2. Make privacy central from the start

Both UbiGo and Kutsuplus used a digital platform and algorithms to determine routes and give users access to the service. In the case

of UbiGo, users could only log in to the website through a plugin with Facebook or Google. Users were, therefore, obliged to use their Facebook or Google accounts. The link with these commercial platforms made the pilot project and its users vulnerable to unwanted data sharing. Kutsuplus, on the other hand, offered its users the option to book and pay without an internet connection, thereby increasing the security and the accessibility of the service.

3. Adaptability

In both projects, the platforms needed to be able to adapt to the changing needs of travelers. Kutsuplus and UbiGo offered customer support to receive feedback and questions from users. Users were also asked by researchers about their experiences with the pilot. Flexibility was necessary in order to adjust to unforeseen circumstances. For example, Kutsuplus made its service more accessible by offering a variety of payment options and supporting offline reservations via text. Moreover, pilots do not always provide information about how a mobility service would operate on a larger scale or for a broader target group.

4. Optimize the business model for sustainability

With UbiGo, we encountered a paradox that we also find in other new mobility initiatives: a mobility platform that claims it wants to reduce private car use but offers car rentals at the same time. Such a platform can achieve its sustainability goals, as overall car use (including rentals) remains limited. Ironically, however, decreasing car use also means a loss of income. The business model must therefore be able to withstand this loss as a result of promoting sustainable transport. In fact, given the importance of sustainable mobility, it will ultimately be beneficial if there is less car use and more travel by foot, bike, or public transport.

5. Pilot projects are important, but they have their limitations

Understanding the impact of a mobility platform requires more insight into who uses the service and how travel behavior changes over time. For example, UbiGo only selected participants who regularly traveled by car and lived in a certain part of the city. In selecting participants, mostly self-styled innovators and early adopters signed up. Kutsuplus, on the other hand, intended to serve a broader group. UbiGo was unattractive to people who rarely used a car because the fare was high with little use. For others, the shared car service was not available close enough. Both projects show that it is difficult to organize a service that is suitable for everyone. Moreover, pilot projects do not always provide information about how a mobility service would operate on a larger scale or for a broader demographic.

Assessment framework for public values

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Public value	Description
Service	This dimension refers to the direct impact available mobility services have on the mobility behavior of citizens. The values involved can be categorized as specific to the mobility sector and therefore as substantive, service-oriented values.
Freedom of movement	The availability of different transport modalities and their spatial proximity. In relation to a digital mobility platform, freedom of movement refers to a platform that combines transportation services and offers door-to-door trip planning through different modes of transportation.
Freedom of choice	The possibility for mobility service users to make their own informed decisions about how they want to travel: in terms of mode, route, and time. Users have access to information about available travel modes and routes, as well as expected travel time.
Accessibility	The possibility for people, regardless of their age, digital literacy, and physical abilities, to use mobility services and thereby participate actively in society. In relation to digital mobility platforms, this refers to accessibility for all levels of digital literacy by, e.g., providing non-digital support and service personnel.
Affordability	The financial means required for an individual to access transportation. On the public level, it refers to the sustainable finance model for the arrangement, whether through a private, public or private-public financial agreement. A digital platform can support dynamic pricing, creating the possibility to change prices depending on time, place, and user specificities, but needs to safeguard affordability nonetheless.
Reliability	The availability of specific mobility services if needed and as promised. This refers to punctuality and the offer of an alternative travel mode in case of delay, among other things.
Climate impact	This dimension refers to the long-term impact our mobility practices have on the environment. The values involved can be categorized as substantive, socially oriented values.
Sustainable energy	Having minimal or no CO_2 emissions can contribute to the limitation of climate change. For this value, modalities that use human or renewable energy (walking, biking, electrical vehicles) are important, as are collective transport (bus, train). In relation to digital mobility platforms, this refers to the pricing and promoting of different sustainable or less sustainable mobility options.

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Proximity richness	The local availability of facilities and the density of the built environment related to it, with the goal to reduce the need to travel, especially the need for motorized modes of transportation. In relation to digital mobility platforms this refers to the possibility to encourage short-distance transport and discourage long-distance travel.
Well-being	This dimension refers to the short-term impact mobility practices have on the well-being of citizens. The values involved can be categorized as substantive, socially oriented values.
Health	The physical and mental health of citizens (individual health and public health). In relation to digital mobility platforms, this value refers to the availability and promotion of healthy travel options.
Social interaction	The potential for social interaction in city space by being able to see, hear, and talk to each other due to safe and walkable spaces and a lack of noise. In relation to digital mobility platforms, social interaction potential refers to the possibility for users to communicate online by sharing information, collaborating or engaging in collective action.
Democratic control	This dimension refers to the democratic norms to which actors have to comply when it comes to safeguarding values. The values involved concern these norms and processes and can be categorized as procedural values.
Privacy	The right of users and other actors to decide how their data is used and who can access it and the guarantee that data is collected, stored, and processed in a secure way. In relation to digital mobility platforms, this value refers to confidentiality, safety of the collection and storage of data (or minimization of collection and storage), sharing certain data only with authorized entities or users in the network, and using personal data according to the law (e.g. GDPR).
Accountability	The presence and level of meaningful human control over the processes and outcomes of the mobility platform, in order to prevent the emergence of a responsibility gap. In relation to digital mobility platforms, this value refers to the implementation of a tracking condition (system responds to moral reasoning and contextual changes) and a tracing condition (system is designed to grant the possibility to retrace outcomes to humans or organizations in the chain of action).
Adaptability	The flexibility to change policy measures after analysis and monitoring have determined that the effectiveness of the policy action is compromised and intentions and outcomes are not aligned. In relation to digital mobility platforms, this value refers to the implementation of analysis and monitoring mechanisms through an independent body, in order to adapt the digital platform environment as well as the structuring algorithm if needed.

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Legitimacy	A clear and understandable explanation of the rules that apply on a platform and a justification of how power is exercised in an equal and consistent manner. It refers to what actions are legitimate and which are not. In relation to digital mobility platforms, this includes a justification of the use of (personal) data and an explanation about the decision-making process and the power balance between parties involved.
Transparency	The availability of and access to information on costs, agreements, and performance of mobility services. Transparency ensures clarity for users on which public values are safeguarded or harmed in order to make an informed decision about which services to use and, eventually, trust. In relation to digital mobility platforms this refers to transparency about the functioning of the technological system.
Ownership	The way in which diverse groups of citizens are represented in the planning, design, and evaluation of a city, including its infrastructure. In relation to digital mobility platforms, ownership refers to the ability of users to have a say in the outlook of a platform (e.g. by providing feedback) or to have access to the data that are collected on the platform.

Colophon

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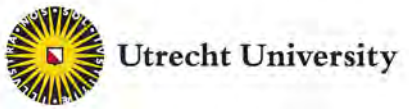
An earlier version of the assessment framework of public values was developed in an unpublished essay by Luca Bertolini, Marco te Brömmelstroet, and Peter Pelzer. The full version of the assessment framework, including elaboration and references, is documented in a paper that is available upon request.



An exploratory study of public values and possible futures