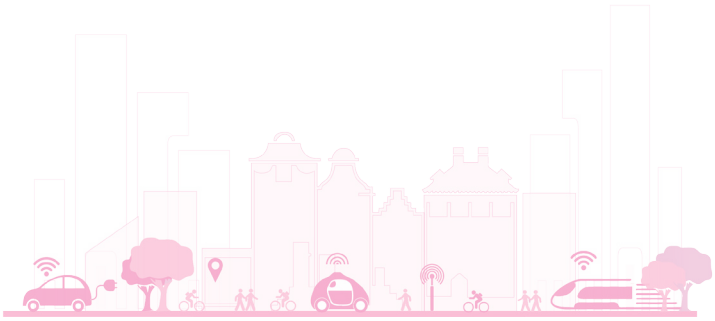
Perspectives on



The Future of Mobility

in Amsterdam

amsterdam smart city

City of Amsterdam

Smart Mobility in Amsterdam

This white paper is an invitation to join the discussion on the way innovations in mobility and new transport concepts can be applied in Amsterdam

26 March 2018

Perspectives on

The Future of Mobility

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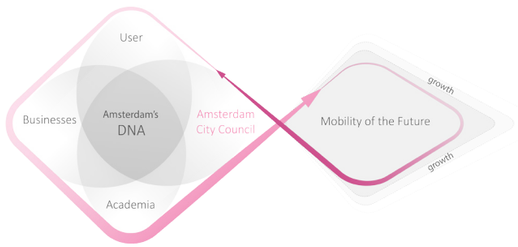
Amsterdam is prospering, the city is growing, new homes are being built, new companies and talent continue to relocate here, and the city is becoming increasingly popular with tourists. The Mobility Survey (Mobiliteitsverkenning, published by the City of Amsterdam on 31 October 2017) concluded that extensive measures are required to maintain accessibility and liveability in the city; the challenge is substantial and urgent. If residents, visitors and businesses continue to travel as they do today, all forms of transport combined will grow by between 20% and 40%, and traffic will grind to a halt.



Collaborating on the mobility of the future, based on Amsterdam's core values

On the one hand, the city's expansion calls for new, intelligent modes of transport for people and goods. On the other hand, it is important to look ahead at how these technological developments will impact the liveability of the city. This means the City of Amsterdam needs to anticipate the arrival of new technologies and modes of transport in a timely manner. In this role, the municipality needs to act as a facilitator that leverages innovation, creates the right regulatory environment and collaborates with different parties to reorganise mobility in Amsterdam. We should also be conscious of privacy.

More proactive and user-oriented ways of working, increased flexibility and new forms of collaboration between the public and private sectors (including start-ups), universities and research institutes are required to make future-proof investments and interventions, instead of fixing problems later. This white paper has been drawn up in collaboration with partners from the Smart City network, and reflects the experience gained through the Smart Mobility programme and the Implementation Agenda for Mobility and the Mobility Survey.

The paper presents future perspectives for ways in which mobility in Amsterdam might develop. We will cover the following: (I) What ambitions and challenges should mobility contribute to in this expanding city? (II) What might the future of mobility look like in Amsterdam and what transitions are important? (III) What is the potential for technological innovation and new mobility concepts in this transition? (IV) What do we currently do well, and should therefore continue to do? And (V) in the near future, what do we need to do as a city in order to take the next step? For the formation of a new programme agreement, we're inviting companies, universities and research institutes, and government bodies to join the debate on the innovations in mobility and the new modes of transport we would like to introduce in Amsterdam. Now is the time to start this dialogue about how to organise the mobility of the future in Amsterdam – in a way that suits the city's character – and the decisions and investments that will be required. The perspectives outlined in this white paper offer inspiration to drive this dialogue.

I Ambitions And Challenges

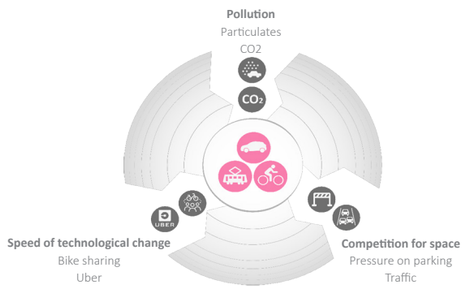
A strong, liveable and sustainable future for Amsterdam

Our aim is to maintain Amsterdam's status as a dynamic, international place to live and work, an attractive tourist destination, and a testing ground for innovation. In the competition between international cities to offer the best location for residents, businesses and talent, Amsterdam is a unique meeting place, offering diversity, good amenities and a high quality of life. As an economic engine and the most important urban area in the Netherlands, we aim to keep Amsterdam among the top five urban areas in Europe.

Good accessibility – with smart connections within the city and with the rest of the country and world – makes an important contribution to Amsterdam's attractiveness for residents, visitors and businesses. And in the city, we value social diversity and inclusivity, which means providing everyone with equal access to good liveability and transport.

The city's growth is set to continue. The increasing crowds put accessibility, road safety, liveability (including air quality) and social cohesion under growing pressure. If no action is taken, this will have repercussions on the quality of life and Amsterdam's economic strength. By 2030 the number of trips made daily will increase significantly (by 20 - 40% compared with 2015). This will not only result in congestion, but also in logistical problems with the supply, removal and transit of increasing volumes of goods, pressure on parking availability, and unsafe traffic situations.

If no action is taken, the quality of life will decrease, primarily due to the increasing competition for space. In the Mobility Survey, Amsterdam City Council examined the potential challenges and solutions for maintaining the accessibility and liveability of this growing city in detail. The transition to a sustainable and more adaptable city with a cleaner economy is already underway. Innovation provides opportunities for entrepreneurial activity, an improved living climate and equal access to mobility services.



Challenges for the growth of mobility

II Looking ahead

The transition to sustainable, personal mobility

Although long-term developments and innovations are uncertain, we can be certain that the way we move goods and people around in the future is set to change. This means that in order to offer a solution to the challenges of a growing population and to accommodate the arrival of new technologies and modes of transport in the future, we will have to organise our mobility differently. Firstly, a shift in user behaviour is needed. Secondly there are implications for how city and regional infrastructures will look in the future. Looking ahead, it is evident that by 2030 new technologies and innovations in mobility will have rapidly succeeded each other. We will manage mobility at a regional level, centred around a well-functioning system for the Amsterdam Metropolitan Area. This allows us to intelligently manage the mobility of specific groups of users and the transport of goods to make the best use of timing and limited space. In addition, mobility will be organised entirely digitally, allowing residents and visitors to choose the optimal combination of transport for a specific trip, from a broad selection of collective and/or individual modes of transport. Mobility will thus be more accessible and affordable for everyone.

In 2030, access to the city will also be selective. The space available for transport will be limited, providing as much space as possible to accommodate the increasing crowds on the streets. Goods transport will also be healthier and cleaner. This will contribute to ensuring that every Amsterdammer lives in a clean and liveable neighbourhood by 2030. This means, for example, that we will embrace pedestrians and bikes in Amsterdam even more than we do today. In the future, cars will remain an important form of transport, but we will experiment with selective user access to the area within the A10 ring road for vehicles belonging to specific target groups, and offer scope to experiment with self-driving vehicles for new forms of mobility, for example collective transport (such as taxi pooling) and for parcel delivery. Cars and public transport will use renewable energy and will produce no harmful emissions. As far as possible, cars parked in the centre, will disappear from the street. The traffic will be absorbed in the region, with good parking facilities at strategic traffic intersections and main arteries into the city, with seamless transfer options to collective and personal modes of transport. In the city we will provide more underground car parks to remove as many parked cars as possible from the street. The transport network will be efficient and cost-effective, combining well-coordinated public and individual modes of transport. The entire city will be readily accessible to everyone. This is essential for social cohesion, creativity, innovation and entrepreneurship in our city.

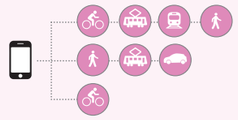
In 2030, traveller behaviour in the city will have changed, and the infrastructure – both physical and digital – will have been widely adapted to changes in mobility. As a result, not only will we be able to make mobility more sustainable and more tailored to individual requirements, but we will also improve the quality of public space. In newly developed areas, such as IJburg, Zeeburgereiland, the Zuidas or Havenstad, we hmade the infrastructure future-proof, with a focus on smart and sustainable combinations of different forms of transport

Starting point for the debate: Transition to sustainable and personal mobility

To answer the challenges presented by the city's growing population, and to anticipate the arrival of new technologies and modes of transport, we need to make choices now about how to organise our mobility more sustainably and personally in the future. We want to retain what's already working well, such as our flexibility during large events and our inclusive approach to mobility. We're ambitious about the areas in which we can make progress. We have translated innovations in mobility and new modes of transport into eight transition paths. They are of course closely interlinked, the transitions are in different phases, and each moves at its own pace. The transitions require a change in the behaviour of the people using transport, and also a change in the role of the government: from facilitating the supply of mobility to facilitating the use of mobility. We would like to invite partners in the city to discuss this level of ambition and the possible impact of these transitions will have on the city. Based on this input, we aim to establish a set of guiding principles, which will enable us to shape the mobility of the future in Amsterdam.

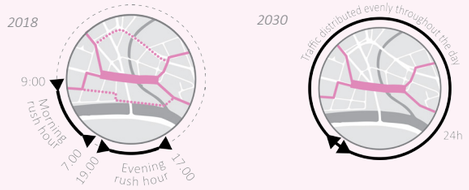
1 Mobility is for everyone

In Amsterdam, inclusivity and the user experience are paramount. This means that everyone in the city should have access to sufficient affordable, high-quality transport. This not only calls for a broad range of transport options, but also investment in public transport and infrastructure.



2 Mobility is personal

Transport in Amsterdam will be completely personalised. The different modes of transport available – and combinations – will be geared to the needs of specific user groups. On-demand transport has, for example, has taken off, and as a result of the complete digitalisation of traffic management, real-time data will ensure that users always receive accurate travel advice at the right time.

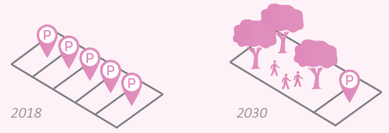


3 Mobility is better distributed throughout the day

Using intelligent vehicles and infrastructure, and digital solutions, we will ensure that traffic is more evenly spread throughout the day and over different routes. In 2030, despite the major increase in mobility, congestion will not therefore have increased. This will require greater awareness of the way we travel, changes in travel behaviour, and changes to the way we run the 24-hour economy.

4 Mobility is comfortable

The passenger experience and their requirements will come first. This means that travel times will remain acceptable, with comfortable modes of transport and facilities, and digital tools for seamless transfers between different modes of transport.



5 Mobility requires less space

Infrastructure, such as roads, parking spaces, and rail, take up a lot of space. In the future, the infrastructure – both physical and digital – will be adapted to be more flexible and provide pedestrians and cyclists, for example, with more space, and improve the quality of public spaces. This means that the number of on-street parking spaces will be reduced. This will require us to change our travel behaviour; to share more often (transition 7), become smarter about when we travel (transition 3) and become smarter with logistics planning (transition 7).

6 Mobility is based on sharing

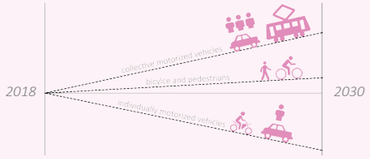
The increased use of sharing-concepts such as car sharing, taxi pooling, and bike and scooter sharing schemes, has led to reduced vehicle ownership. For motorised transport, this means that in the near future 80% of all trips made in Amsterdam will use collective modes of transport (car sharing, taxis and public transport). This provides extra space in the city, but requires a change in our mentality and our travel behaviour.

7 Mobility of goods is smart

Transport of goods will also be more sustainable. Goods will, for example, be combined for transportation to and around the city, with the last stage of the delivery in the city made by small, clean electric vehicles, via waterways, and with robots for parcel delivery.

8 Mobility is clean, healthy and safe

New technology will also have helped to make motorised traffic in Amsterdam cleaner and more sustainable. All motorised traffic in the city will use renewable energy sources and produce zero emissions. This transition is closely related to the energy transition, which will have wide ranging impacts on the city. Currently the largest share of trips within the ring is already made by bicycle or on foot. This will continue to increase in the future. Changes to infrastructure and the smart application of technology will make traffic in Amsterdam significantly safer, and the number of road traffic accidents will decrease year by year.



As a result of the transitions to sustainable and personal mobility described here, we will also achieve a more sustainable and healthy shift in the modal split: the proportion of passengers using different forms of transport. In 2030, of all journeys made in the city, 35% will be by bicycle (currently 27%), 20% on foot (currently 18%) and 45% by motorised transport (currently 55%), of which 80% by forms of collective transport (currently 40%).

III The potential offered by new technology

If you grow up in today's world, you are used to ordering the things you need on demand, like a film on Netflix, music on Spotify, a taxi through Uber or a pool taxi. Ordering services and paying for them is becoming cheaper and easier. This transformation is also taking place in the mobility sector, in the form of Mobility as a Service and mobility tailored to individual requirements. Connecting different modes of transport (including cars, trains and bikes) with the internet provides opportunities for the development of new platforms to handle supply and demand. Different modes of transport can be cleverly connected, shared and used. This smarter approach to mobility will contribute to an improvement in the distribution of traffic throughout the day and across the network. Driverless vehicles or mobility on demand (such as shared taxis) offer transport opportunities for routes on which public transport is uneconomic.

Businesses, universities and government are rapidly working together on these types of innovations in the field of mobility, and investing heavily in the development and adaptation of intelligent and clean technology. Currently, innovations are primarily focussed on:

- **The intelligent application of data (such as the Internet of Things and real-time insight);**
- **Smart vehicle technology (such as self-driving vehicles);**
- **Smart concepts for more individual and integrated approach to mobility (Mobility as a Service);**
- **Smart implementation of physical and digital infrastructure (including telecommunications networks and digital payment systems);**
- **Clean technologies (such as electric and zero emission vehicles).**

New concepts for individual and collective transport, and for the transportation of goods, can increasingly be seen on the street. Less visible, but having just as big an impact, are technological advances in the area of digitisation: Smart Mobility. The possibilities offered by IT, data, open data sources, and telecommunications are endless. Due to the large growth in opportunities for gathering data, we are in a better position to track and analyse the movement of people and goods around the city. This knowledge can be used to organise mobility more effectively, allowing us to better match demand from specific target groups with a broad selection of transport options.

Technological developments and innovations in mobility alone will not solve the enormous challenges by themselves, but will play a key role in achieving more sustainable and personalised mobility. New technology offers opportunities for:

- **Good accessibility requiring less space and creating less disruption**

Through new technologies, such as the introduction of quieter and more efficient cars, sharing concepts and mobility chain advances, it is possible simultaneously to improve accessibility and limit the impact on the environment. Digital solutions can help us to improve the distribution of supply and demand, which helps reduce congestion and the demand for space.

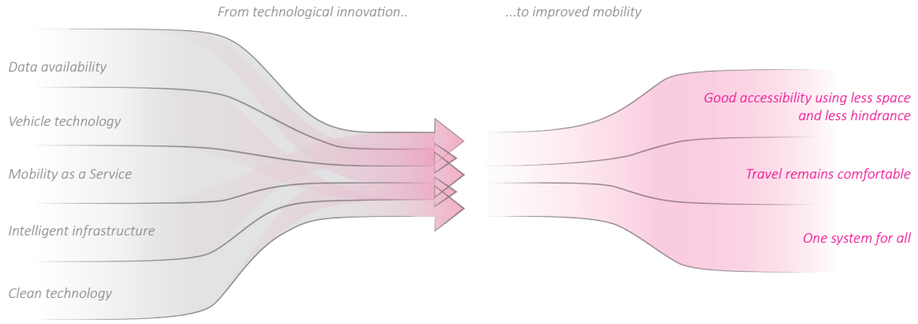
- **Experiencing travel as pleasant and productive**

Because we are always online, we are now able to work or communicate anywhere, and travel time can therefore be pleasant and productive. This calls for a comfortable vehicle, suited to the activity, and a seamless transition between different modes of transport. The experience and the passengers' needs come first.

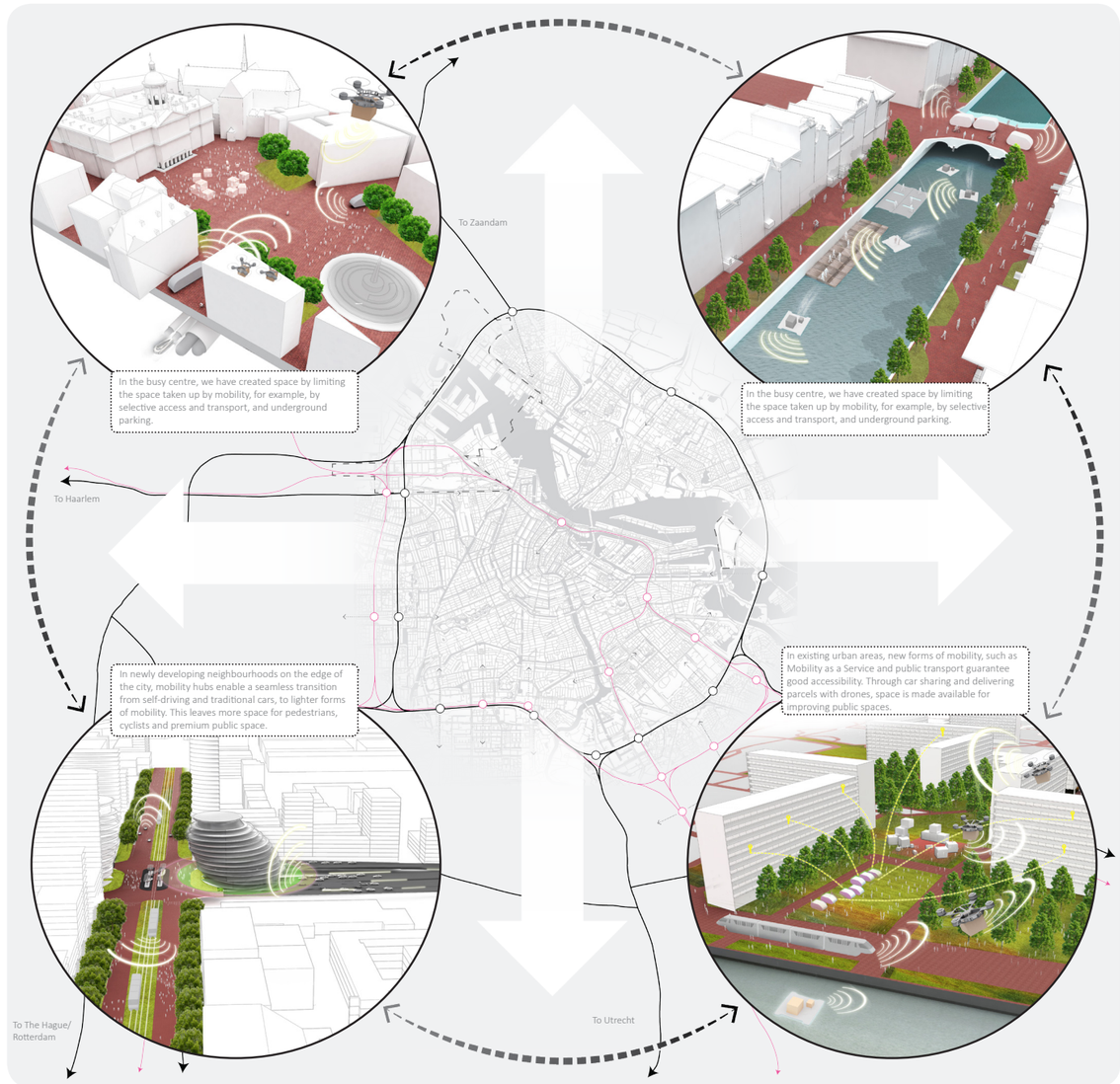
- **One system that offers everyone an equal opportunity to use it**

New technology offers the potential to develop a mobility system that is accessible to all, and which offers transportation concepts that are tailored to the needs of different users. New forms of transport, such as the increasingly automated car and e-bikes, make travelling increasingly accessible to diverse target groups and contribute to maintaining social cohesion within the city.

While new technology offers opportunities, the introduction of innovation also brings risks. As technological developments are new and evolve rapidly, it is difficult to predict in advance where exactly they are heading and how they will be adopted by users. For example, without intervention from the government, self-driving vehicles could bring traffic to a stop. The launch of new transport concepts also presents risks for road safety, cyber security and privacy. It is therefore important that we anticipate these developments well in advance, so that the introduction of new technologies can be carefully managed.



Scenarios Amsterdam 2030



IV We're heading in the right direction

In Amsterdam we have already made substantial progress, for example through the implementation of various research, experimental and pilot programmes that examine how mobility solutions can be applied. These include the programmes for Smart Mobility, the Mobility Implementation Agenda, Electric Transport, and Urban Logistics. We work closely with the public and private sectors, as well as universities and research organisations, within the Amsterdam Metropolitan Area. Some examples:

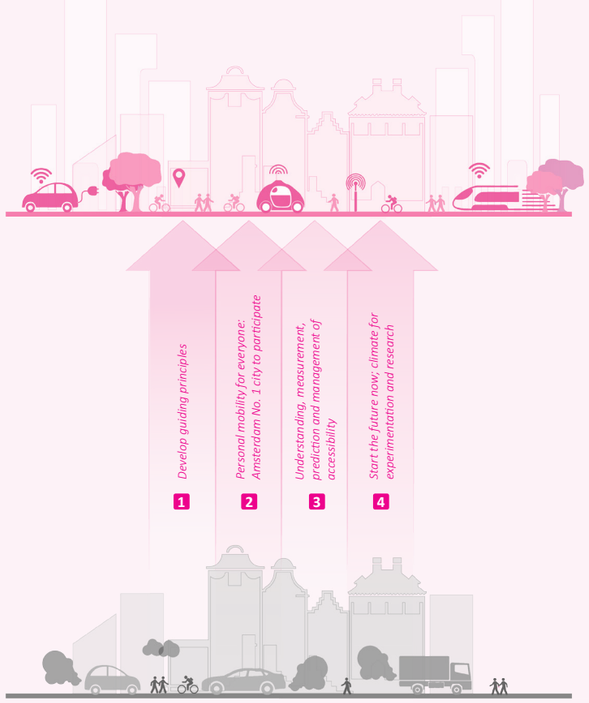
- **Amsterdam is testing and designing 'Mobility as a Service'. Examples include experimentation with targeted transport for people with limited mobility, the implementation of Mobility as a Service (MaaS) concepts for employees who commute to and from the Zuidas business district and, in cooperation with residents of the busy city centre, the implementation of MaaS concepts that contribute to reduced vehicle ownership and the smart use of space.**
- **We are researching opportunities for self-driving vehicles for residents and employees.**
- **The North-South Metro Line is equipped with the latest smart technologies that will be rolled out across the metro network.**
- **Via Amsterdam's Crowd Monitoring System, smart traffic management systems are used during events.**
- **Around the Amsterdam ArenA, technological innovations such as 5G are being used to keep the area accessible during busy periods. With UEFA Euro 2020 in view, this area is a living lab for experimentation with smart mobility.**
- **We are investing heavily in infrastructure, public transport, new transport concepts, and increased flexibility in the use of space for mobility (such the reorganisation of traffic around Muntplein and the introduction of 'bicycle streets' such as Sarphatistraat).**
- **Amsterdam is a front runner in the stimulation and facilitation of electric transport.**
- **We have a 'bicycle mayor' and we are the cycling capital of the world.**

The advent of companies such as Uber, the launch of concepts such as bike sharing, and a delivery services using robots or drones by Domino's Pizza and Amazon are just a taste of the impact that technological developments will have on mobility. But more is needed to achieve sustainable mobility tailored to the needs of the user, with a controlled introduction of technology. It calls for government to provide direction and act swiftly in anticipation of developments, for companies to introduce innovations, and for room to be created for initiatives by residents.

V We need to take the next step now

We have a strong ambition and urgent need to transition to sustainable and personalised mobility. The growth of the city calls for new solutions to keep it accessible in the future. To maintain a liveable and attractive city, a sustainable transition strategy is required, for the electric and clean transport of people and goods in the future. The transition in mobility won't happen by itself and will depend on other transitions in the city being addressed. For example, the mobility transition is affected by the energy transition, the transition to a circular economy and innovations in urban development. We also need to make structural preparations for the future in anticipation of the advent of new technologies and new forms of transport tuned to individual needs.

This will require new ways of working and collaborating, with a move from a supply-oriented approach, to an approach concentrating both on catering for different groups of users and urban logistics and on accelerating innovation. The focus should not lie on technology alone, but also on changing the behaviour of users. New revenue models (how will we finance our mobility in the future when, for example, income from parking declines?) and possibly new regulations will be needed. Uber, Airbnb and FlickBike are examples that show clearly that a different approach is already required today.



How are we going to achieve this? Four steps towards sustainable and personal mobility

1 Establish guiding principles to be ready for the future

In response to the digitisation of the mobility market, new roles are needed for the market, government and users. Innovations come in quick succession. This calls for guiding principles that can be used as a common starting point in shaping the mobility of the future in Amsterdam and in the development of concrete urban planning. These guiding principles will also help to establish the roles of different groups in the transition. The government can play a role in protecting Amsterdam's core values and the privacy of users during the transition. And in the cooperation between the private sector, universities and the government, these guiding principles can help in generating and implementing innovations in mobility. We aim to establish these guiding principles in cooperation with partners in the city; the eight transition paths for sustainable and personal mobility outlined in this white paper are the starting point. We will discuss areas of friction and jointly translate the principles into solutions that have a positive impact on the city.

2 Focus on personal mobility for everyone; making Amsterdam the number one sharing city

In Amsterdam we are committed to tailoring mobility to the requirements of individuals and goods. For example, by moving investment into transport geared to the mobility needs of specific users, instead of simply expanding the road and public transport network, personal mobility that provides tailored solutions will grow. Mobility hubs have great potential. The starting point is that everyone should have access to affordable, good-quality mobility options. By building on the concept of 'Mobility as a Service', 'seamless travel' will be stimulated together with the implementation of shared services. We will gear policy and develop frameworks to enable people to travel seamlessly, and to facilitate access to mobility digitally. As a city, we will use data to ensure that all forms of personal and group mobility work together to keep the city accessible and liveable. We're also experimenting with transport for specific groups, with the budget and format adjusted to the user. Shared-service concepts, such as car sharing, can help to cut vehicle ownership and thus reduce pressure on public spaces. Our ambition is to make Amsterdam the global leader for shared-service solutions that have a positive impact on the city and society as a whole.

3 We measure, predict and manage congestion and accessibility digitally

To anticipate the demand for mobility, we first need a better understanding of how people and goods move around the city – the 24/7 digital management of congestion, liveability and accessibility. Open data from providers of, for example, mobility and telecommunications, as well as insight into the needs of the traveller are required. Amsterdam is committed to actively collect data from providers and users. Ultimately this is also important for the user. Improved analysis of traffic flows and congestion prediction will enable us to anticipate and invest in the most effective measures. Improving our congestion predictions will allow us to control it better, for example, through the introduction of user access for freight, through distributing mobility more evenly throughout the day and throughout the city, or by charging for access. Digital technologies can assist with this, such as the use of cameras and sensors to distribute traffic or provide insights into the occupation of taxis, in order to limit the number of empty taxis on the road. Better insight also helps prevent problems from occurring, instead of having to find solutions retrospectively.

4 The future starts now; room for research and experimentation

Embrace experimentation and research that could contribute to innovations that support sustainable and personal mobility. Through experimentation we promote Amsterdam's core values of creativity, innovation and entrepreneurship. We enable businesses and start-ups to develop new business models and make it possible for entrepreneurial citizens to participate in and explore new initiatives. By investing and participating in experiments, the City of Amsterdam and its partners are able to measure the impact of innovation and control potential risks during their launch. If Amsterdam is to lead the field, the City Council needs to keep renewing the conditions and frameworks, in order to create the circumstances needed to accelerate and implement successful innovations and transport concepts on a larger scale in the city

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