

# New Mobility

*How smart mobility  
can make cities and  
regions attractive  
and accessible*



Goudappel

MOBILITY MOVES US



## The world of mobility is changing fast

Technology has more and more of an impact on our lives. The ever-increasing power of computers and faster mobile Internet are creating a society in which “everything” is connected with everything else. That also affects how we move around. New means of transport, new transport services, and different methods for managing traffic are being developed. And people’s behaviour is changing too. What does all this mean for the accessibility of our cities, towns, and villages? After all, we want to be prepared for the future, especially given that these changes are following rapidly one after the other.

## Making the most of new developments

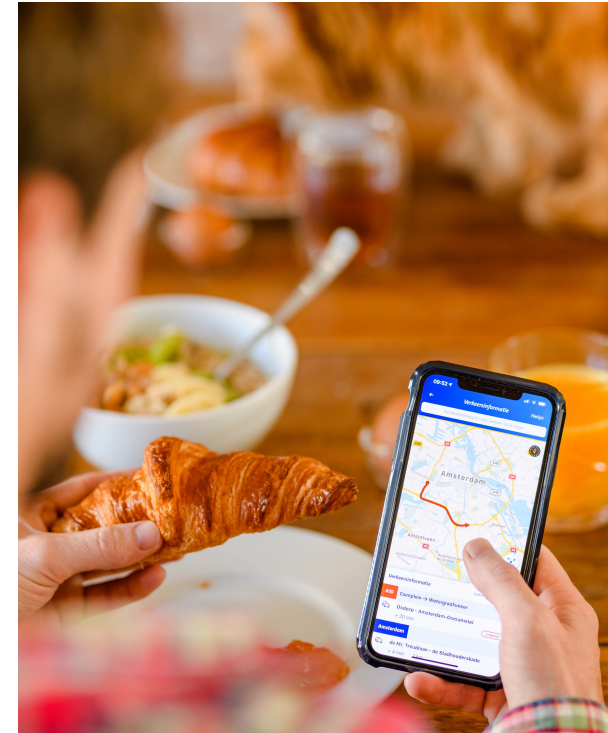
The term “smart mobility” is used to mean various different things. The emphasis is often on all the technological developments that influence how we move around. These are interesting in themselves, but it becomes really interesting if we make the link with our behaviour and the goals we pursue as a society. That’s what Goudappel and Dat.mobility refer to as “new mobility”.

For us, new mobility means grasping the opportunities offered by new technology and services to make our mobility system safer, more sustainable, cleaner, more attractive, and also more efficient. At the same time, new technology also raises questions, and it’s important to understand the risks and the control options to benefit from it to the maximum. That also means thinking carefully about what role you are willing and able to play in shaping these new developments.

*How do we ensure that smart mobility makes our cities, towns, and villages cleaner, more attractive, more accessible, safer, and more social?*

## New mobility is a shared challenge

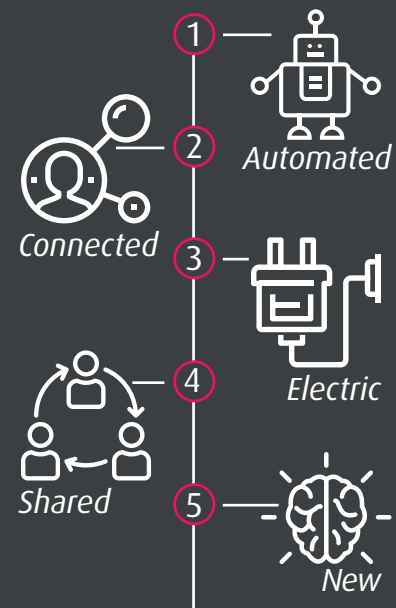
Our aim is to help public authorities, companies, and experts in the world of mobility to think about what form new mobility can take and what that means specifically for their own field and responsibilities. We view this as a shared challenge. The changes are happening so fast that it’s important to join together in discussing, analysing, and experimenting. That will give us a clearer idea of the opportunities and risks. This brochure outlines how we see the developments that are taking place and the overall strategy that we have for tackling them. We are also curious to know what your own strategy is.





# What's coming our way?

We see five major developments coming our way. They can be categorised as **Automated, Connected, Electric, Shared, and New.** They are not independent of one another but are interwoven. A self-driving car is connected to its surroundings, may be powered by electricity, and can easily be shared. Data on how we move around and where we are, provides important raw material for all of these developments. What new policy challenges and dilemmas raise these developments for you?







## Automated

One of the five major developments is the advent of automated transport. This not only involves cars that can operate themselves more and more, but also the introduction of self-driving “pods”, platoon of trucks, and driverless public transport. It’s difficult to predict exactly how rapid these developments will be. A lot is already feasible technically, but at the same time there are still many obstacles to be surmounted regarding their deployment in a complex urban environment, as well as in terms of legislation and acceptance by the public. Worldwide, a great deal of work is being done to find solutions to those obstacles, with The Netherlands being one of the frontrunners. The impact of self-driving transport is highly dependent on the extent to which this is private – i.e. everyone has their own self-driving car – or shared. In the former case, it may result in an increase in mobility and in the latter less mobility and a smaller footprint.



## Make automated transport meaningful

*Mobility for children with severe disabilities in IJburg (Amsterdam, The Netherlands)*

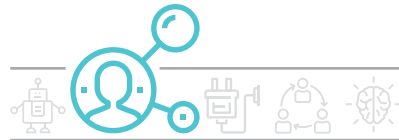
The City of Amsterdam and the Omega care facility are looking for a way to transport children with a severe disability between their residential accommodation and the centre where they receive treatment, a distance of barely 400 metres. The solution may be slow-moving, small-scale, self-driving transport, because

it can be available throughout the day, thus offering the flexibility that this vulnerable target group requires. Moreover, an attendant will be able to accompany the children rather than a driver. We investigated whether the infrastructure at IJburg – a new residential development on a group of artificial islands – is suitable for self-driving transport, and what type of vehicle can meet the stringent transport demands for this target group. At the moment the cost is still too high, but if developments proceed as they are doing already, this type of transport for vulnerable target groups will soon become affordable.

### New challenges:

- Should my infrastructure investments already anticipate the advent of self-driving cars or should I wait a bit?
- Self-driving public transport has positive effects on operation and capacity, but when is a good time to invest in it, and what do I do about our existing staff?





## Connected

The advent of fast mobile Internet enables vehicles to communicate with one another and with the infrastructure, but also with other road users (for example via their smartphone). This connectedness means that we are increasingly aware of how the mobility network is functioning at a given moment, because information is passed on directly from vehicles and people as they move around. Conversely, people can receive feedback so they can optimise their journey and react to one another (for example, a warning that your car needs to get out of the way of the emergency services). Because we are becoming more and more connected, it's also feasible to give people more targeted, tailor-made advice and at the same time increase performance of the road network



### New challenges:

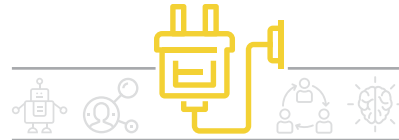
- If market parties increasingly offer in-car, one-to-one traffic management measures, what are the control options for the highways authority? How do we strike a balance between individual needs and the public interest?
- Will we utilise the opportunities offered by connected mobility to differentiate more as regards priority for certain types of transport, depending on time and place? Or will we be hesitant about doing so?

## What happens when all the traffic lights are connected?

### iCentrale

is a Dutch public-private partnership working to develop the traffic control centre of the future. That centre will combine information about various different networks (waterways, the main and secondary road networks, and public transport) so as to enable integrated management. Another important feature will be the provision of short-term predictions which can be used to estimate the traffic situation in 15 or 30 minutes' time based on current information. But even more is possible. Automating the management of traffic in normal situations and utilising human brainpower mainly in the event of incidents means smarter use of both people and resources. It is conceivable that in the future traffic management will be marketed as a service, with the authorities indicating the objectives to be achieved and challenging private parties to achieve them using the latest insights. It's also conceivable that a company that organises large-scale events will take on the traffic management task itself.





## Electric

Improving the air quality in our towns and cities and reducing CO2 emissions are high on the political agenda, leading to a need for cleaner transport. Electric transport powered by a battery or hydrogen would seem to have the greatest potential for meeting that need because many public and private parties are already investing heavily in it. The transition to electric transport will affect our mobility behaviour, for example because driving a car becomes cheaper or riding an e-bike allows us to cover much longer distances. The impact on our energy supply and the need for a charging infrastructure or hydrogen filling stations may be even greater.

### New challenges:

- Will the municipality increase the number of charging equipped parking facilities exclusively for electric cars? Or will it not do so, with the risk that fewer clean and efficient vehicles will use its infrastructure or road network or mobility system?
- How should we prepare for new types of charging systems? Should we already purchase lots of charging points? Or should we wait and see how developments regarding induction and on-the-go charging will turn out?

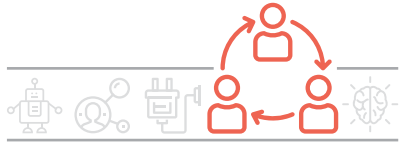
## Will our timetable be different with electric buses?

### Electric bus transport around Schiphol Airport

Public transport clients are increasingly including electric transport in their tender requirements. But what impact will this have on timetables, infrastructure, operation, and investment?

The public transport company Connexxion has purchased 100 electric buses for use around Schiphol Airport. They are cheaper to operate, especially if the number of buses continues to grow and the charging infrastructure can be utilised more efficiently. As with electric cars, the current operating range of the battery is a significant limitation, so there is often a need to recharge in the course of the day. Studies have been carried out on how and where the buses can be charged. How should the locations be redeveloped to make charging possible, and what are the associated costs? How do we ensure that passengers are not inconvenienced by the buses needing to be recharged? Our research suggests that investment is needed in high-capacity charging systems, especially for intensively used bus nodes such as Schiphol-Noord. That will limit the impact on timetable reliability, while at the same time utilising the facility intensively enough to recoup investment.





## Shared

Information about the availability of various means of transport makes it increasingly easy to share them and to pay for its use. All kinds of mobility options can also be offered as a collective arrangement (Mobility-as-a-Service). This involves making a journey together or taking turns using the same means of transport. The advantages of sharing are lower costs for the user, a greater choice of means of transport, and less need for space. At present, shared mobility would appear to be particularly interesting for people who do not yet have a car or instead of having a second car.

### New challenges:

- How do we ensure that private providers of MaaS arrangements contribute to society's aims, such as better accessibility for rural areas or less use of space for parking?
- How do we ensure that the market for MaaS services is open to various different mobility providers? How do we ensure a good balance between data availability and user privacy?

## How do I make a neighbourhood virtually parking-free?

### The Merwede Canal Area

(Utrecht)

The City of Utrecht sees the Merwede Canal Area as a promising inner-urban densification location for 6000 to 9000 new homes. For that new neighbourhood to be a success an innovative mobility strategy is required to ensure it becomes attractive and accessible, and to limit the amount of space required for traffic. A strategy has been developed for the city that encourages walking, cycling, public transport, and shared mobility as the main modes of transport.

This makes it possible to provide only 0.3 parking spaces per house. Anticipating success, the strategy has the necessary flexibility for further conversion of parking facilities. To encourage transport sharing, an online platform is being developed and a mobility hub will be constructed within the area where people can choose from a range of mobility options, such as shared and hire cars, shared bicycles and e-bikes, or just train, taxi, or bus. There will be smart logistics solutions for sustainable forwarding and delivery of (online) orders. In providing these options, account has been taken of the various different target groups living in the area.







## New

New technologies also lead to new means of transport, for example drones and the Hyperloop, but also all kinds of small electric vehicles – such as the electric step, the e-kick scooter, or the Birò microcar – that are claiming its place on the roads. The nature of the existing means of transport is also changing, with the bicycle, for example, also becoming a “speed pedelec”. Some of these new means of transport look set to become important, while others may well just be a fad. Some developments are easily fitted into the current infrastructure, while others require major modifications. Besides new means of transport, there are also all kinds of developments that can bring about changes in transport, such as 3D printing, augmented reality, nanotechnology, and robotisation. The impact of these on our travel patterns may be even greater, but it is also more difficult to predict.



## Who will be allowed on which part of infrastructure?

### Smart zoning, smart regulation, smart management

The advent of all kinds of small-scale types of transport means that we need to decide on the right place for all the various means of transport. Instead of giving each of them a separate label, we should move towards a situation in which we consider mainly their speed and space requirement. In cities

where there is little room to widen or introduce cycle paths, but where many new means of transport are emerging, an obvious step is to reduce the speed of cars. That will make it easier to have many more modes of transport on the carriageway, but how do we ensure that that's safe? Mixing also offers additional space to accommodate the growth in bicycle traffic. Where that isn't possible, bicycle paths may need to be widened or newly constructed to allow them to be used by new types of transport. Consideration also needs to be given to the shared use of bus lanes by self-driving vehicles.

### New challenges:

- What requirements do these new means of transport impose on the infrastructure? Which means of transport do I want to accommodate and which do I not?
- How will logistical flows change, and how will this impact the shackles of supply chain, such as encouraging combined loading and unloading?





## Data as a raw material

Most developments depend on data to a greater or lesser extent. At the same time, the developments themselves also contribute to the availability of an ever-increasing amount of data, for example because more and more sensors and communication capabilities are being built into cars. The available data is increasing because people (via their smartphone) and apparatus (traffic lights, means of transport, parking spaces, cameras) are increasingly connected to the Internet. All these new data sources give us an ever-improving understanding of how the traffic and transport system functions and of how the different categories of travellers behave and what they think. This information makes it possible to guide traffic more effectively and to manage the infrastructure even better. We can also offer more and more information that is tailored to the needs of people who are on the move. The constantly increasing amount of data produced also means that we have to think carefully about how we handle it, who owns it, and for what purpose it is collected.





## Optimism

There is reason for optimism because the developments outlined above offer all kinds of opportunities for

- » Making mobility safer and cleaner
- » Offering people more choices and greater convenience
- » Improving the quality of life in our cities, towns, and villages
- » Making mobility cheaper and more affordable
- » Achieving our climate objectives
- » Sharing means of transport
- » Making less mobile persons more mobile, or keeping them mobile for longer
- » Responding more effectively to mobility needs

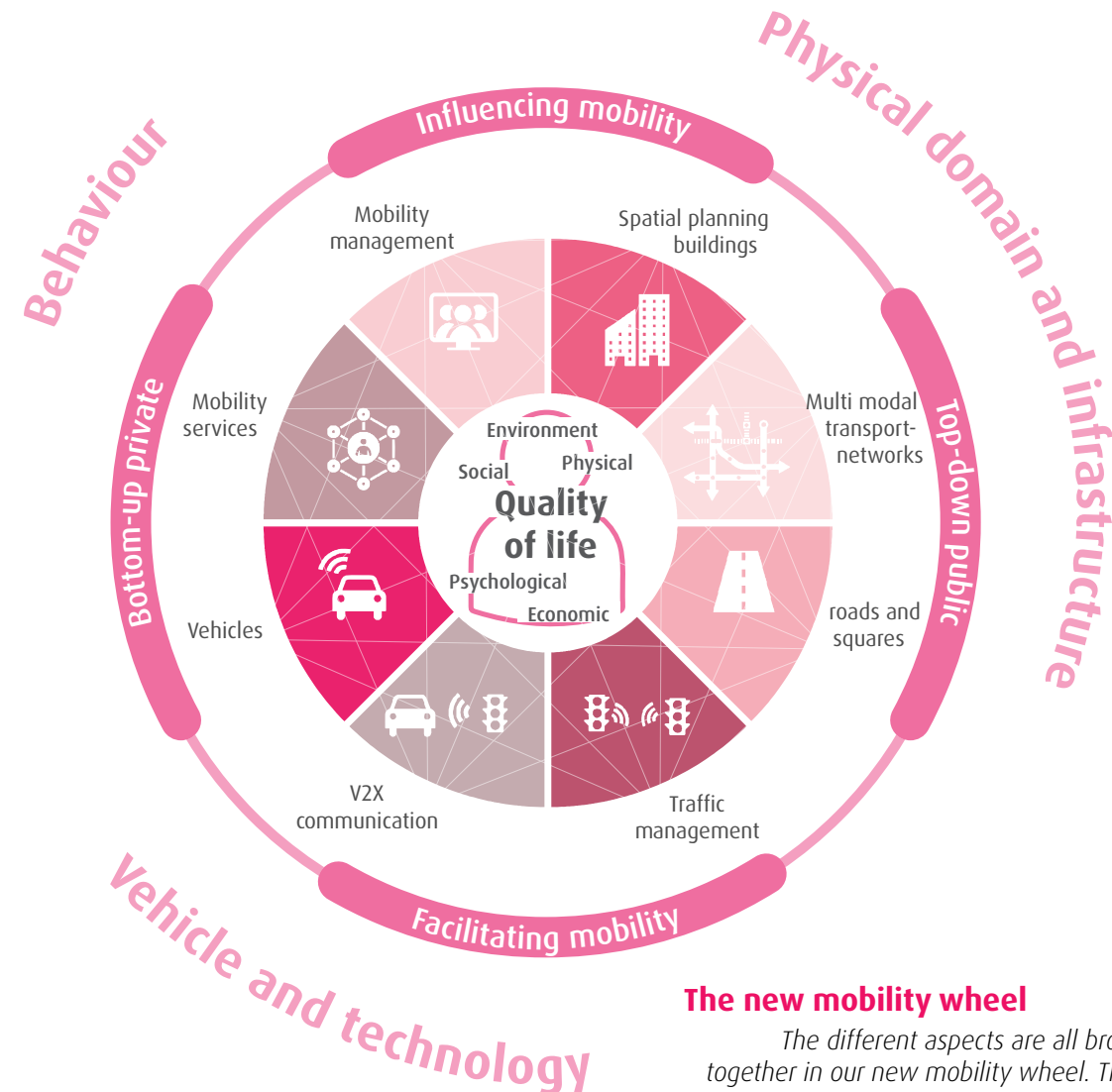


## Uncertainty

However, there is also uncertainty about how developments will turn out and about the risks involved. There are many difficult questions that we need to join together in answering.

- » Does everyone in fact benefit from this new technology and from new transport services?
- » Hasn't clean technology and new mobility come too late?
- » Is society ready for them, and can we keep up with them?
- » What needs to be done now, and what can wait?
- » Do technology and new mobility in fact make our cities more attractive?
- » What about privacy, now that there is more and more data?
- » Who is guiding technological development and to what end?
- » Can the technology underlying new mobility be abused?





### The new mobility wheel

*The different aspects are all brought together in our new mobility wheel. This shows a range of new and existing options for shaping mobility in combination with the various roles that parties can assume.*

## Our view of new mobility

***New mobility is about deploying optimism and addressing the risks and uncertainties.***

*Technology, new services, and data are not an end in themselves but a means to An end*

Commit to them if they support achieving societal goals, but be careful if that's not really clear. Adopt a positive but critical approach to new technology, data, and services. Start by looking at the societal challenges and travellers' needs and then determine the opportunities provided which support these challenges and needs.

*Changing roles are just as important as technology*

New mobility also means new stakeholders, for example parties that collect data. Some developments are partly taking place at a high level, where the municipality or province has less influence. At the same time, there are also people who undertake all kinds of initiatives themselves in the field of new mobility. This means that parties take on different roles and can steer, or need to respond, differently. Sometimes it means top-down setting frameworks and sometimes providing scope for bottom-up developments. Balancing this effectively is perhaps even more important than realising the actual technological advancement.

*Examine behaviour and technology close together*

The impact of new developments is also highly dependent on how people deal with them. It's therefore important to examine behaviour and technology close together. Only when technology is accepted it will have an impact, both positive and negative. Conversely, we can look at how we can get technology and new vehicles to respond better to demands that already exist. To change behaviour you also need to know current behaviour. Data on current patterns plays an important role in this.

*New mobility is also low tech*

Encouraging walking and cycling contributes to many of societal goals when it comes to attractive cities, towns and villages, clean air, and good health. Traditional ways of achieving these such as good design and spatial planning policy are still important. It's about finding new combinations of old and new. How can technology, data and new services, together with traditional methods, persuade us to cycle and walk more?



## Our view of new mobility

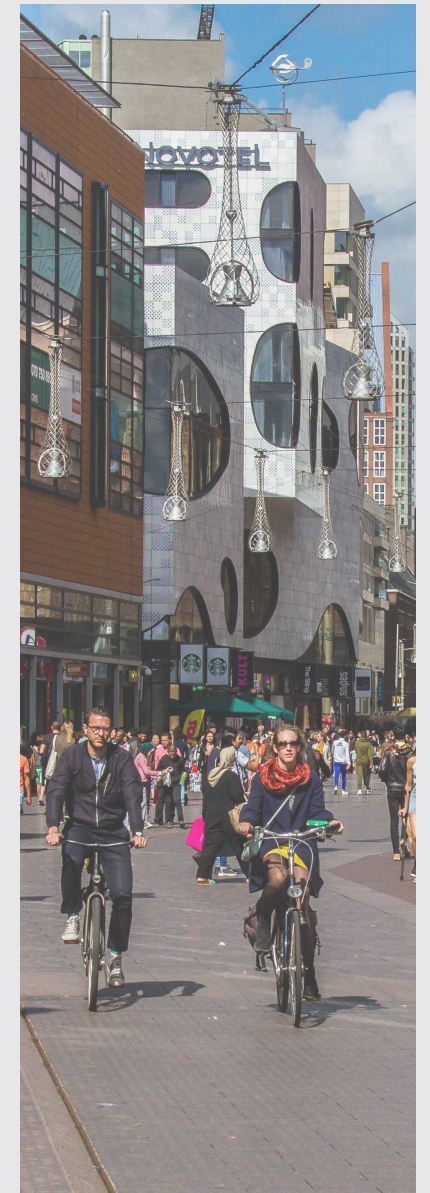
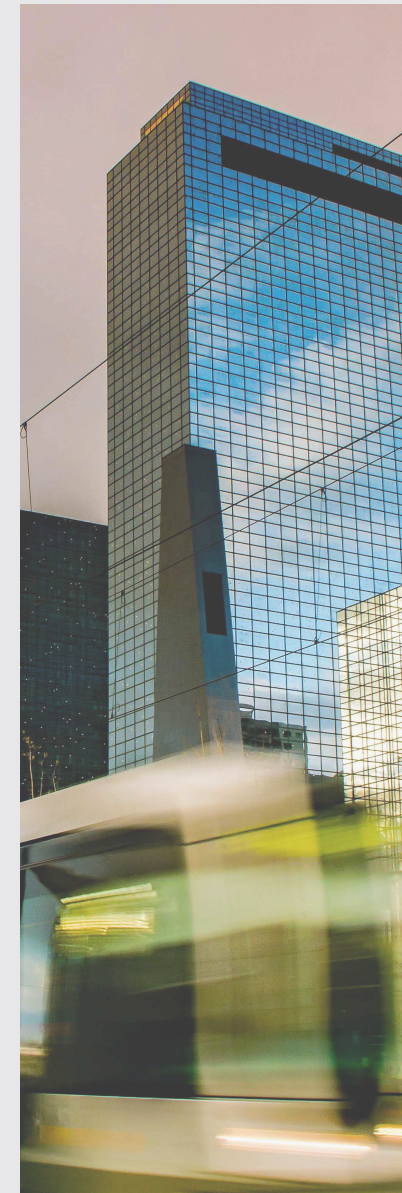


### *First get the data in order and only then optimise traffic control*

The greatly increased amount of data on mobility offers opportunities for managing the traffic and transport system in a much more targeted manner. However, the quality of the data is not always equally good, and it is not easy to combine different data sources. It's also important to be aware of what information is not (yet) included in the data – because it is more difficult to measure, for example the traveller's experience – but may well be relevant. Even if we have made the switch to high-quality data, it doesn't always mean that we now have useful information on which to base policy. This requires sharing analysis of the data with relevant stakeholders.

### *Start by building a "community" and the impact will come automatically*

The transition to a world that genuinely relies on smart mobility systems is not a technical issue but involves a major societal change. Within that change you have to deal with resistance, failures, uncertainties, learning, discoveries, and successes. But the key point is that in this process we all need one another. So first build a "community" comprising everyone involved in a particular development, including users. It's only if you do that, that an impact on the real world comes within reach





# What is my role to be?

New developments also mean thinking carefully about what role you will take on, especially if the technology is being developed by other parties. We use the analogy of waves to indicate which different roles you can play. The main message is that you always have a choice!

## Let the wave flow over you



A party can make full use of the power of a new

development. The advantage of taking on this role is that the opportunities and innovative capacity of disruptive technology or new mobility services are exploited to the full. The disadvantage is that you surrender a great deal of control. In recent years, for example, more and more parties have come on the scene providing real-time travel information (for example Google Maps, TomTom and various multi modal traveller information services). This is convenient for travellers, who thus have greater control. At the same time, though, these services also influence traffic and may result in more traffic on routes where that is undesirable for quality-of-life reasons.

## Stopping the wave



A new development can also be

stopped, at least temporarily, for example by prohibiting it. Take UberPOP, for example, a ride-hailing service which has been prohibited in the Netherlands, but also the shared bikes that Amsterdam has taken off the streets because the city's public space was being swamped by them. The advantage of this role is that you can 'buy time' so as to safeguard public interests or even to prevent the undesirable development altogether. The disadvantage is that it puts a stop to innovation and it is often merely a temporary solution. You also do not always have the option of banning something yourself and are dependent on others (the state, the EU).

## Riding the wave



You can also ride the wave. You then use its power

but you move smartly so as to go in the right direction. The advantage of taking on this role is that the power of technological development is exploited and at the same time public interests are safeguarded. The disadvantage, just like in actual surfing, is that it's extremely difficult to find the right moment to grab the wave. That requires a great deal of up-to-date expertise and a flexible organisation. The advent of all kinds of initiatives to smartly link supply and demand for public transport in rural areas using apps and flexible route choice is an example of this. However, it is by no means always successful, for example because it is too complicated for the potential users.

## Generate the wave yourself



Public authorities themselves can play a major

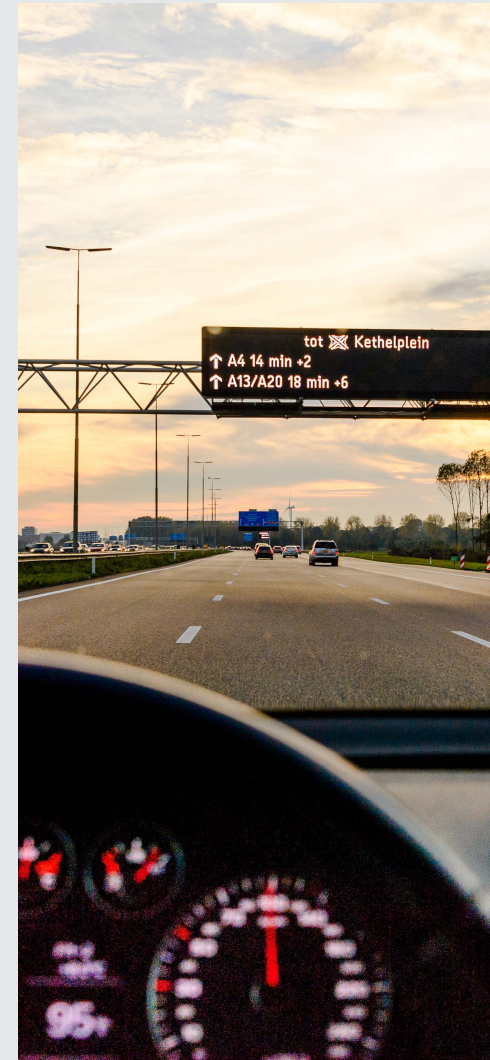
role in promoting innovation. This may involve investing in a new technology or creating the preconditions for accelerating a development. The construction of high-speed railway lines is a classic example of investment in new technology. Tax measures (such as tax relief, or higher parking charges) are examples of adjustments made to the preconditions so as to encourage, for example, electric driving or shared mobility. Finally, public authorities can also invest in research so as to advance a certain technology, as is currently the case with automated driving. The advantage of an authority generating the wave itself is that

it can direct disruptions, with public interests being safeguarded. The disadvantage of this role is that the costs are sometimes high and the benefits are not yet clear.

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Roles may differ depending on the task and the organisation. It can sometimes be a good idea to wait, while at other times a pro-active approach will be far more effective. A more active role on the part of public authorities would seem to be particularly promising as regards promoting clean mobility and shared mobility, given that these developments can provide an answer to many of the challenges facing society.

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## 1. Vision & strategy

First of all, it's important to make room within existing frameworks for exploring new mobility. This requires explicit attention within the planning process, ranging from claiming space to experiment and specifying promising developments, through to stating who is responsible for innovation.

Examples of what we offer:

- » Trend workshop
- » Vision and strategy development e.g. regarding shared mobility
- » Development of Smart and Sustainable policy programmes.
- » "Smart Mobility" course

## 2. Tools & interventions

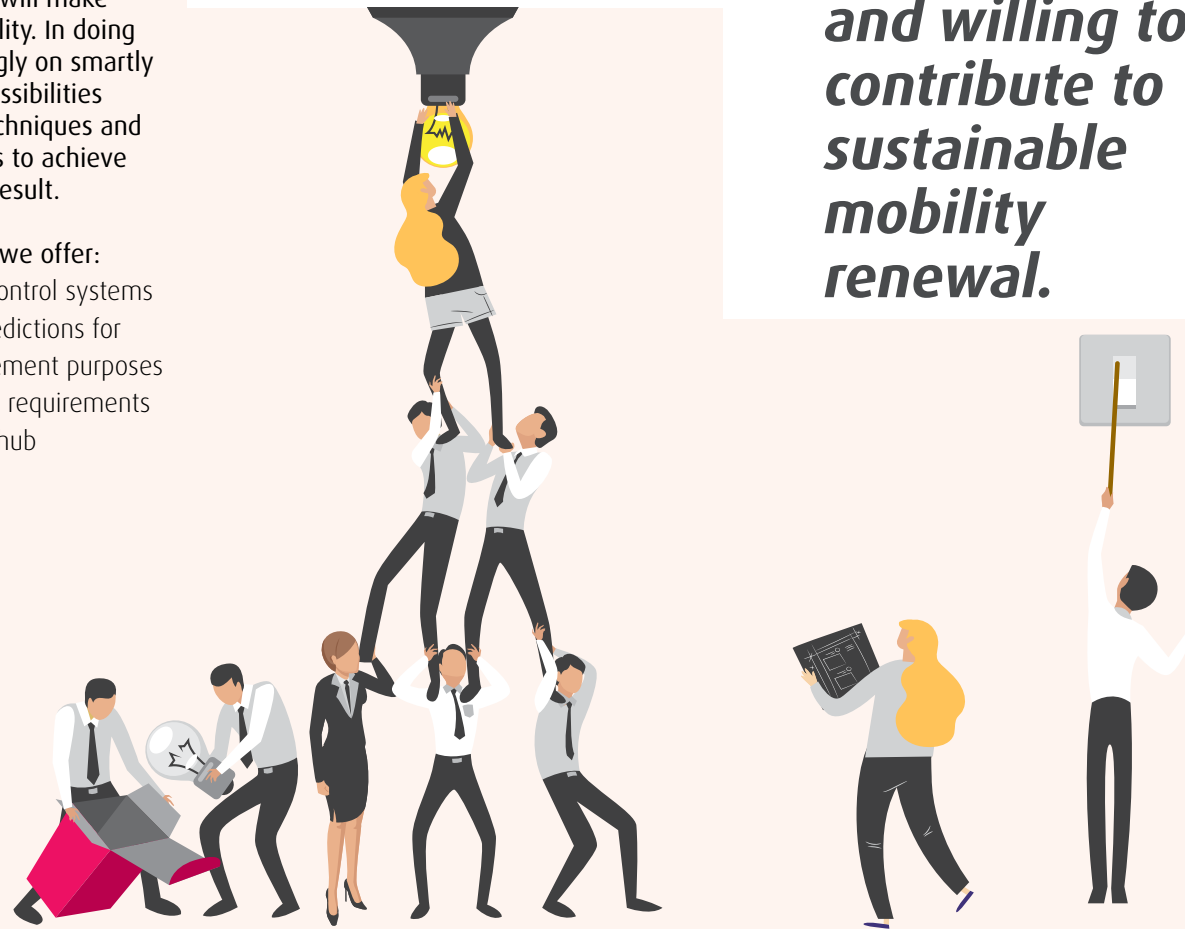
Based on that vision and strategy, we are able to develop methods and propose interventions that will make that strategy a reality. In doing so, we focus strongly on smartly combining new possibilities with traditional techniques and interventions so as to achieve the best possible result.

Examples of what we offer:

- » Smart traffic control systems
- » Short-term predictions for traffic management purposes
- » Programme of requirements for a mobility hub

# What is our role to be? ?

*There are four ways in which we are ready and willing to contribute to sustainable mobility renewal.*



## 3. Impact & research

We map out the impacts of new mobility as well as possible. We do that with the aid of data analysis and the new generation of traffic models, but also by facilitating experimentation, evaluation of tests, and investigating how travellers react to new developments.

Examples of what we offer:

- » Evaluation of Smart Mobility measures
- » Disaggregated traffic modeling
- » Advantages of network-wide traffic management
- » Key figures for electric charging
- » Monitoring pedestrian flows
- » Transport value study of self-driving vehicles
- » Impacts of MaaS

## 4. Implementation & community

Existing structures aren't always suited to new developments. We ensure that obstacles are removed. In concrete terms, that can be achieved by understanding the costs and benefits and where to start, but also by thinking about what you can do yourself and what you should leave to others. This means involving people inside and outside your organisation in new developments, both frontrunners and those who prefer to wait and see.

Examples of what we offer:

- » Strategies for deploying charging infrastructure for electric driving
- » Designing and setting up a successful experiment
- » Operating effects of zero-emission buses
- » Connecting up frontrunners with one another



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