

04 | 2014

City of
Amsterdam

PLAN Amsterdam

Cycling culture in Amsterdam A new approach to mobility



Designing networks and parking
A major task for the urban designer



The Reckless Cyclist Dispelling the myth



Grootstedelijk fietsbeleid maken en ontwerpen Kennis in de praktijk brengen met Nederlandse samenvatting

Cycling policy and design Putting knowledge into practice



infographics Amsterdam has a total of 810,000 bicycles. As not everyone in the city cycles (75%) this means more than one bike per person.
Source: Onderzoek Verplaatsingen in Amsterdam, Gemeente Amsterdam, 2012
infographic: Beukers Scholma

map Map of cycle parking hotspots; thousands of bicycles are parked at main railway stations, shopping areas, leisure and entertainment areas every day. Parking space is a problem which needs solving.
Map: Physical Planning Department

- ① Central station
- ② Dam square area
- ③ Munt square area
- ④ Rembrandt square area
- ⑤ Leidseplein
- ⑥ Weesperplein
- ⑦ Albert Cuyper area
- ⑧ Amstel station
- ⑨ RAI station
- ⑩ Zuid station

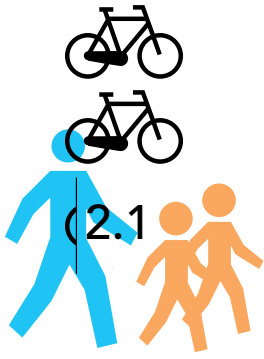
City Centre
The Pijp district



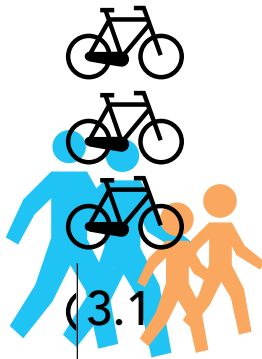
one-person household



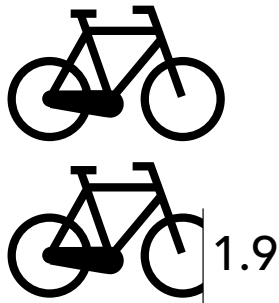
two adults without children



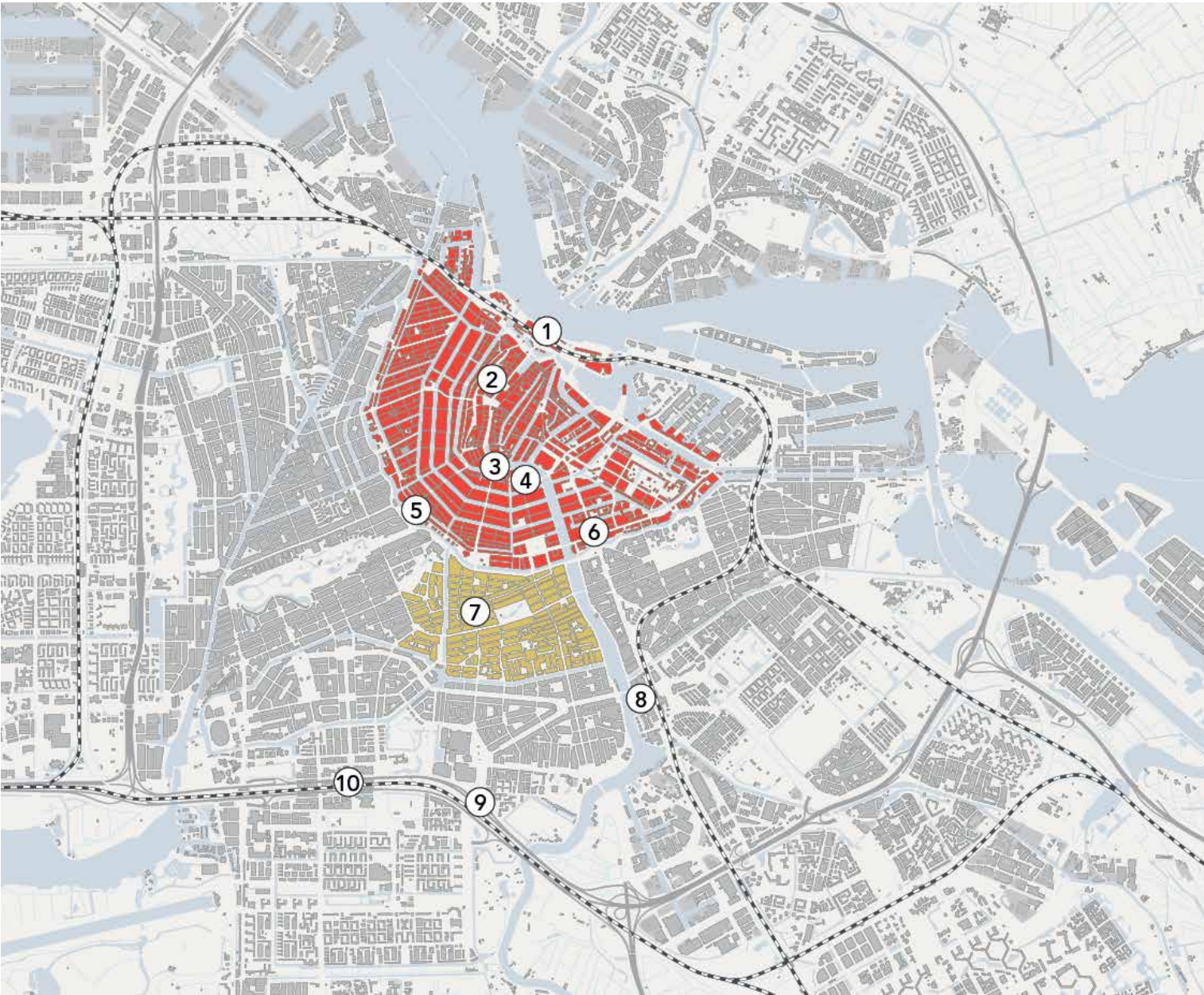
single parent with child



parents with child(ren)
living at home



average per household



1 The city's enforcement service remove bikes which are parked illegally and take them to the Bicycle Depot at the Western Harbour Area, a few miles outside the city. Here, many acres of bicycles are waiting for their rightful owner to reclaim them, but usually to no avail – 78 percent of the 64,575 bikes which ended up here in 2012 were never picked up.

Foto: Edwin van Eis

City of bikes

The Authors

Ruwan Aluvihare
Marco te Brömmelstroet
Iris van der Horst

Credits

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Editorial, management and production

Ruwan Aluvihare, Jorien Heemskerk, Sandra Langendijk, Hubertine Peters

Design

Beukers Scholma, Haarlem

Main cover image

Doriann Kransberg

Maps and photography

see the captions

Maps and graphics editors

Monique Verstappen, Bart de Vries

Lithography and printing

OBT-Opmeer, Den Haag

Translation (Dutch to English)

Frank van Lieshout

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planamsterdam@dro.amsterdam.nl or tel. +31(0)20 2551550. A free subscription can be requested by sending an e-mail to: planamsterdam@dro.amsterdam.nl.
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In Amsterdam, most people travel by bike, and for good reason. In larger towns – with more than 10,000 inhabitants – a cyclist will on average reach his destination 10 percent faster than a car driver, according to statistics from the Nederlandse Fietzersbond (Dutch Cycling Federation). Plus it's calmer, cheaper, you don't have any delays or traffic jams to contend with and you get to really take in the city.

Amsterdam people are well aware that cycling is the most efficient mode of transport in their city. More than sixty percent of journeys within the A10 Ring Road are taken by bike. That means 493,000 cycle trips per day. The recent increase in bicycle use has been at the expense of the car. It's a scenario which didn't look all that likely forty years ago. In the 1960's wide arterial roads leading into the city centre were built. In the early 1970's plans were developed to extend and expand this network. However, this led to large scale and violent protests, as the cycling Amsterdam people wanted to keep their city livable and safe.

As you will read in the first article in this issue of Plan Amsterdam, mobility has seen a massive increase in Amsterdam since the 1960's. This has had a substantial impact on the city's infrastructure, notably the realisation of a cutting-edge cycle network. Although the bicycle is an important reason that the city is still easily accessible, there are also some downsides. Parking has become a real problem. If you look around, you'll see the city's clogged up with parked bikes everywhere. It's a problem that needs dealing with. Building underground parking garages is a solution which can save a lot of space over-ground, as you can read in the second article. This article also delves deeper into the cycle infrastructure. The third article considers the behaviour of cyclists; research which is vital for the design of custom infrastructures. Amsterdam cyclists have a bad reputation for being real rogues in traffic. Joint research by the University of Amsterdam and the city council shows a rather more nuanced picture. Enjoy your read.

The editorial team



Cycling culture in Amsterdam

Iris van der Horst ivdhorst@pmb.amsterdam.nl

A new approach to mobility

Many people visiting the Netherlands are amazed by the huge popularity cycling enjoys here, particularly in Amsterdam. From the 1970's onwards an intricate combination of public pressure, policy making and physical planning design has ensured that, despite the steep increase in car traffic, the bicycle has not been forced off the road and has developed into a fully fledged and essential part of our mobility in Amsterdam. The city now faces the challenge of facilitating even more growth in an already complex and busy historical setting.

On average, all the residents of Amsterdam together cycle 2 million kilometres every single day. They take cycling so much for granted that it took an American, Pete Jordan, to write the history of cycling in Amsterdam.

Take-off

Surprisingly enough, cycling became popular fairly late in the Netherlands, Pete Jordan writes that this only happened when bicycles became cheap because of hyperinflation in Germany after World War 1. Before then it was regarded as a recreational pastime for the rich. However, when it finally took off, the uptake was massive. In the roaring twenties the bicycle is estimated to have had an 80 percent share in the modal split. This means that 80 percent of every mobile kilometre was completed by bicycle. The use of bicycles kept growing until well into the late 1950's. By that time there were about 400 bike-parking facilities in the city centre alone, with a total capacity of 70,000 parking spaces.

The first comprehensive bicycle census in Amsterdam was held in 1930. Carried out by 3,000 students, 250 intersections were monitored on a single day from 6.30 am until 6.30 pm. On the section from Leidsestraat to Leidseplein the students counted 30,000 cyclists during the day; 1100 of whom passed by between 8.45 and 9.00 am!

There is no one single explanation for the popularity of cycling in the Netherlands. Cycling simply seems to fit the relatively flat Dutch landscape, the distances people need to cover are relatively short and the Netherlands have for a long time been an egalitarian society with a strongly social-democratic culture.

Car loving city

In the 1950's, the car was gaining ground and car ownership was growing rapidly. Marking it as a turning point in his history of cycling, Pete Jordan writes that on the

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1 Cycle congestion in the 1930's.
Photo: Kees Kolthoff/Stadsarchief Amsterdam



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2 In the 1930's the number of bicycles in the city was high.
Source: Algemeen Handelsblad, 1930



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3 Rozengracht, 4 June 1977. Thousands of cyclists take part in one of the large scale cycle protests held during the 1970's.
Photo: Nationaal Archief/Spaarnestad Photo/Anefo

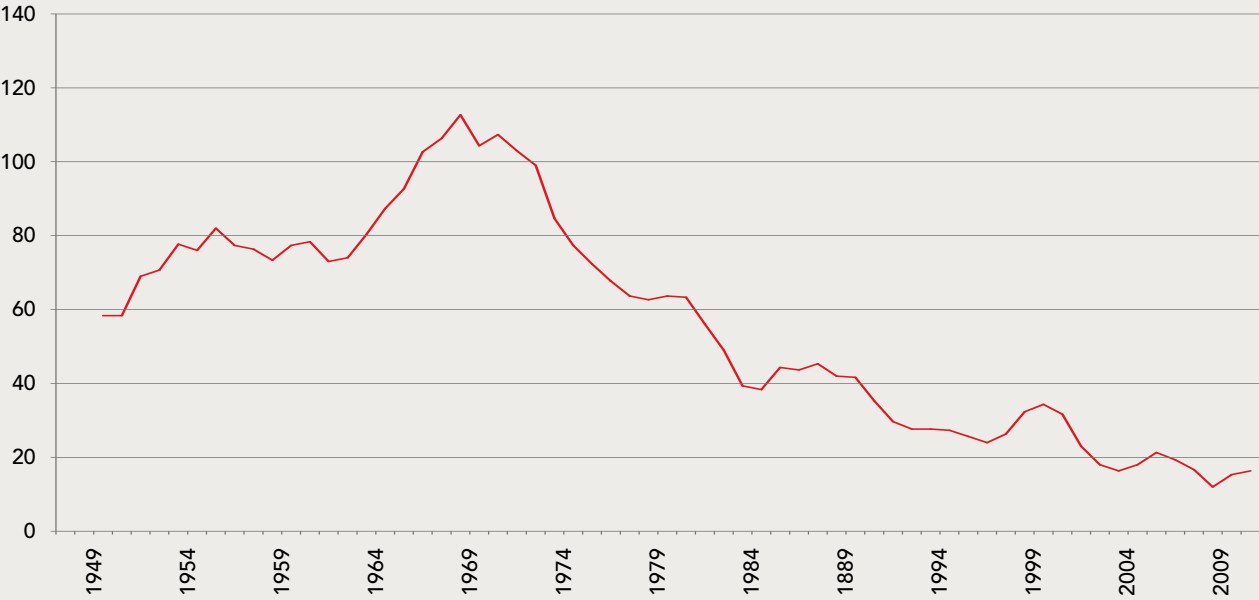


4 Spiegelgracht, May 1979: Members of the ENFB (the Cyclists' Federation) block Spiegelgracht calling for safer streets for cyclists. Although the issue would drag on for years, cars were eventually banned from parking on the street and a separate cycle path was added. This was one of the first victories for the budding cycling pressure movement.
Foto: Photo: Nationaal Archief/Spaarnestad Photo

5 Evolution of fatal traffic accidents.
Graph: Department of Infrastructure, Traffic and Transportation



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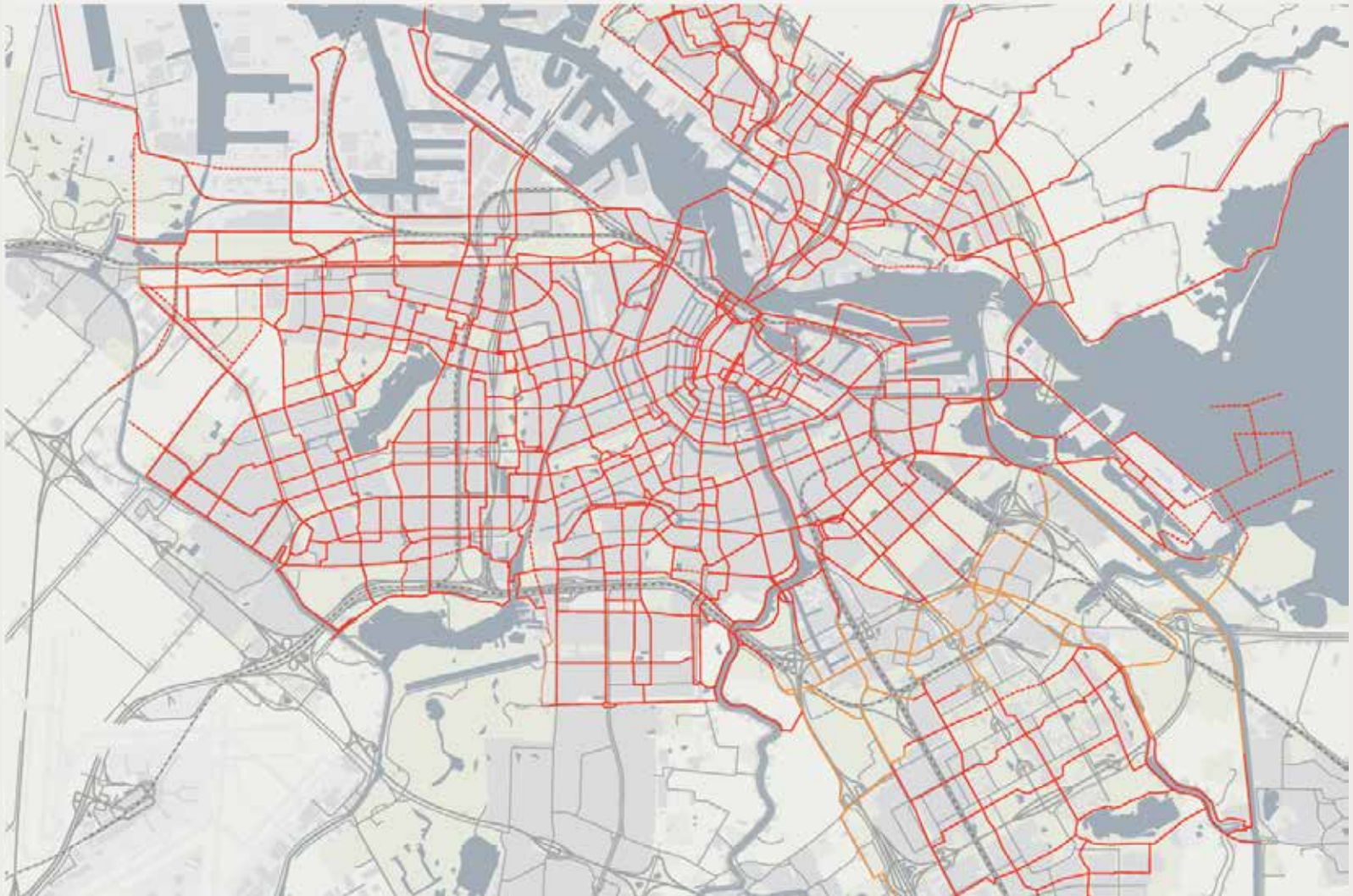


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6 Main cycle network: Today the city recognises the importance of the bicycle as the most valuable part of its mobility. The Amsterdam cycle policy is based on four pillars: road safety; infrastructure; parking; education and promotion.

Map: Physical Planning Department

- Main Cycle Network
- Future Main Cycle Network
- Missing Connection Main Cycle Network
- Outside vicinity of Amsterdam



6

3rd of October 1960 cyclists were banned from Leidsestraat for the first time ever, and Amsterdam was moving towards becoming more of a car loving city.

Between 1960 and 1970 the amount of cars quadrupled. This had a negative effect on road safety and fatality rates climbed. For a short while the outlook for cycling in Amsterdam seemed bleak. However, the Amsterdam residents were determined not to let this happen. During the late sixties and early seventies, a cyclist protest movement gathered momentum, gradually forcing the city council to take more action. In 1978 a new traffic-circulation plan was introduced by the city council,

promising to allocate more space for cyclists and pedestrians by reducing space for cars and car parking.

[The Amsterdam cycle system](#)

Today the city recognises the importance of the bicycle as the most valuable part of its mobility. In comparison to motorised traffic, it requires very little space, it's cheap and clean, it's convenient and quick and it keeps us healthy. Cycle policy has therefore become an integral part of the Amsterdam mobility policy. What would happen if all these people would drive or use public transport for that matter? There simply wouldn't be enough room!

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Coming of age, *taking cycling seriously*

Ria Hilhorst is a senior policy maker at the department of infrastructure of the city of Amsterdam and has been part of the team responsible for Amsterdam's cycling policy for many years. Although she wasn't yet involved in the 1980's, she does remember how it all started with the development of what is now known as the principal cycle network. Hilhorst: "It was tough going in the beginning, because the network had to be created at the expense of the space available for cars. In practice however, it was often the pedestrian space which was reduced." This is something the policy makers now sometimes regret, according to Hilhorst. "In the '90's it became easier because of the referendum that

recommended paid car parking in the city centre. Car parking was gradually structured and reduced, leaving more room for cyclists."

In the year 2000, the city council was required to adopt a new national standard traffic system called 'sustainable safety'. This system introduced two speed limits within built-up areas. A 30 km/hour limit and traffic calming measures such as speed bumps were introduced for residential roads and areas with mixed traffic of cars, bicycles and pedestrians. A 50 km/hour speed limit was set and separate bicycle lanes were made compulsory for main roads and roads for through traffic.

Things have really moved on since the day when cycling traffic was not considered an important issue by traffic departments. Previously, car and public transport policy makers were mostly senior civil servants, whereas those responsible for cycling policies tended to have junior positions. Hilhorst believes that the massive growth in cycling we've seen in recent decades is a great achievement, but there is still more work to be done. "Structural cycling science is scant. There are a lot of unrelated facts and opinions around, and still too little is evidence-based."

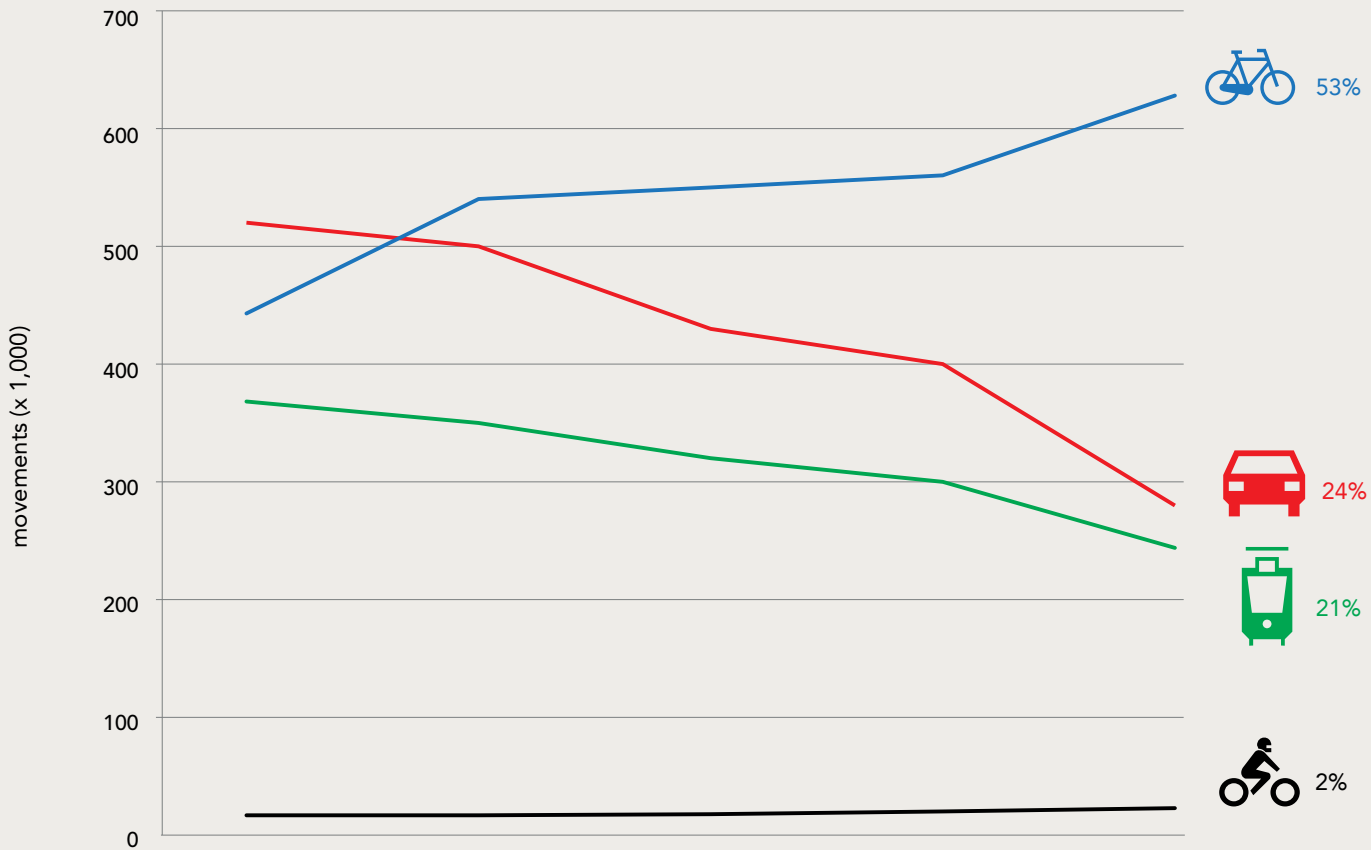


7 The main cycle network provides separate cycle lanes, such as here at Wibautstraat. These cycle lanes offer cyclists a safer, more comfortable and faster ride.

Photo: Physical Planning Department

8 Evolution of the cycle's share in the modal split.

Graph: Department of Infrastructure, Traffic and Transportation



8

The Amsterdam cycle policy is based on four pillars: road safety; infrastructure; parking; education and promotion. The policy has resulted in a network of separate cycle lanes of red asphalt, with a total length of over 500 kilometres; as well as what's been dubbed the principal cycle network: a grid of protected cycle routes throughout the city, which ensures that planners take extra precautions when redesigning a street within the network. The principal network spans another 500 kilometres. About 20 percent of the two networks overlap.

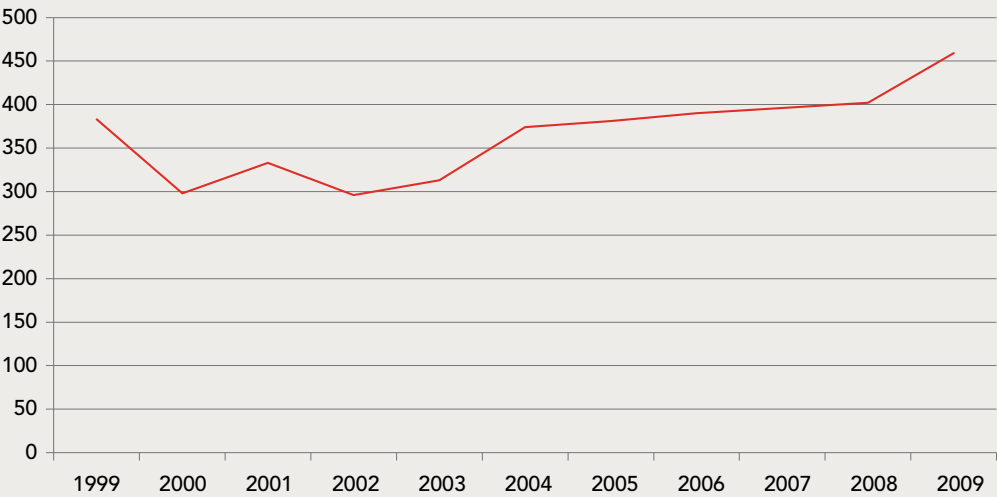
Today, an average of two million kilometres a day are ridden by bike in Amsterdam. Cycling has become increasingly popular again. This is clearly visible in the modal split, which reaches around 50 percent in the city as a whole and an impressive 62 percent within the innercity.

Long-term plan for bicycles

In 2011, the city council initiated a new bicycle plan: the *Meerjarenplan fiets 2012-2016*. The plan focuses not so much on new policy as on tackling the biggest problems that have come about with the increase in bicycle use - a growth of no less than 40 percent over the last 15 years. Identifying bicycle parking as the main problem, the plan has a target to create extra parking facilities for 50,000 bicycles between 2012 and 2020. Most other problems are related to access to major - mostly public transport - facilities. As far as infrastructure is concerned, the plan focuses on road safety and comfort for cyclists, rather than on the already excellent cycle network. These measures range from creating wider cycle lanes and installing waiting-time indicators at traffic lights to removing bollards (which were originally placed as car access barriers) from the bicycle lanes.

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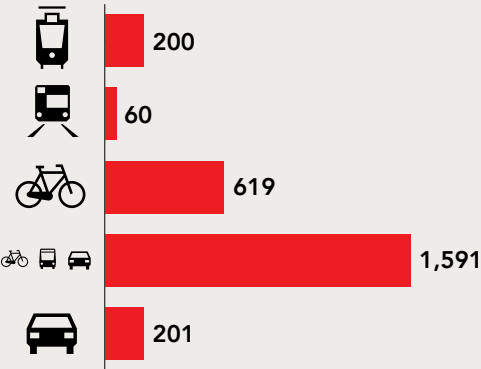
9 Evolution of fatal cycle accidents.
Graph: Department of Infrastructure, Traffic and Transportation



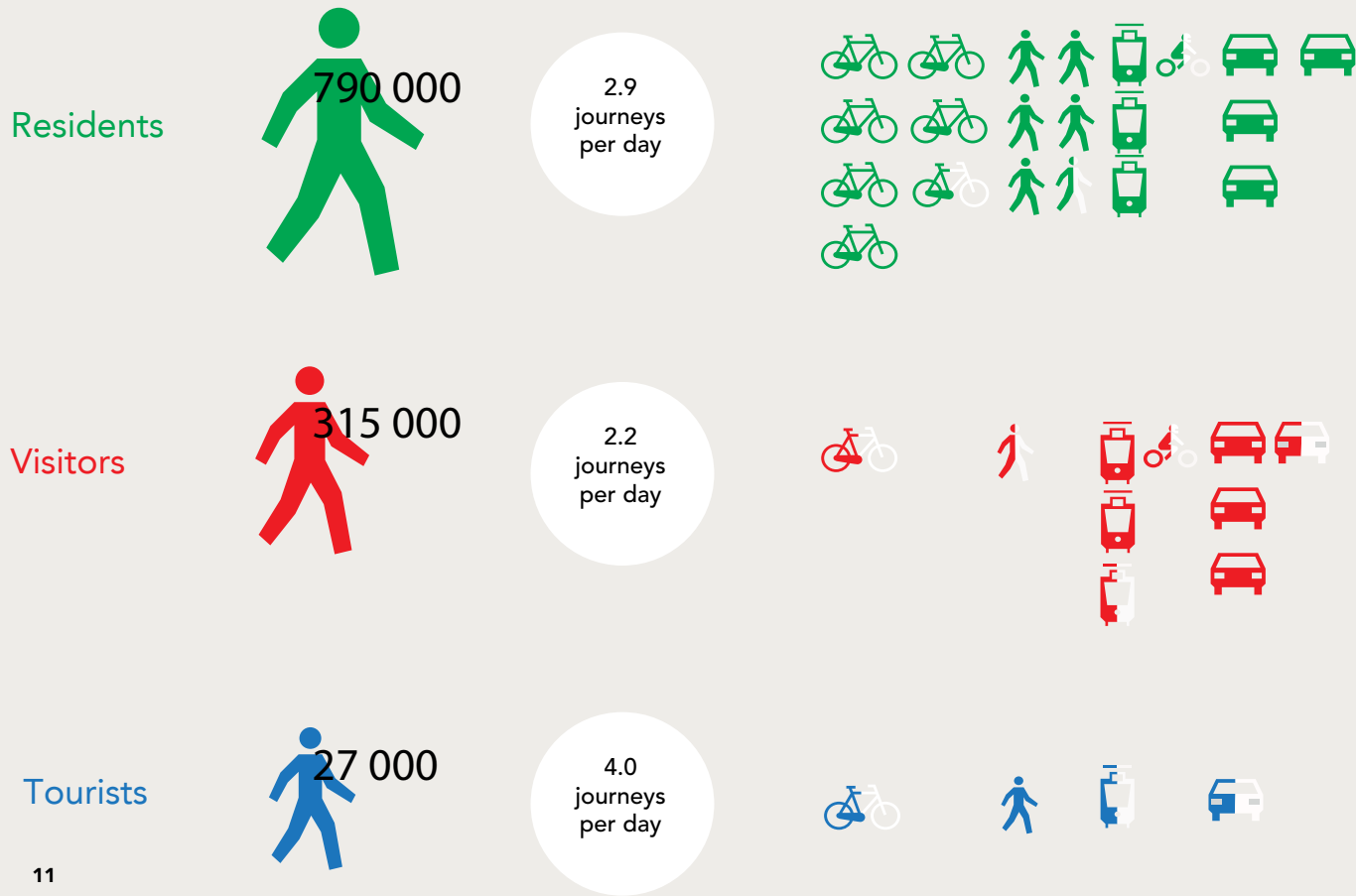
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10 Length of infrastructure per mode of transport.
Graph: Department of Infrastructure, Traffic and Transportation

11 Journeys per usertype. Each symbol represents 1,000 journeys.
Graph: Department of Infrastructure, Traffic and Transportation



10



11

1 Forecast of bicycle parking at Central station and other parking hotspots.

Graph: Department of Infrastructure, Traffic and Transportation

2 Cycles to the fore: at traffic lights without separate cycle lanes, cyclists waiting at an advanced stop line in front of other, motorised vehicles, are more visible, especially for lorries, promoting their safety.

Photo: Doriann Kransberg

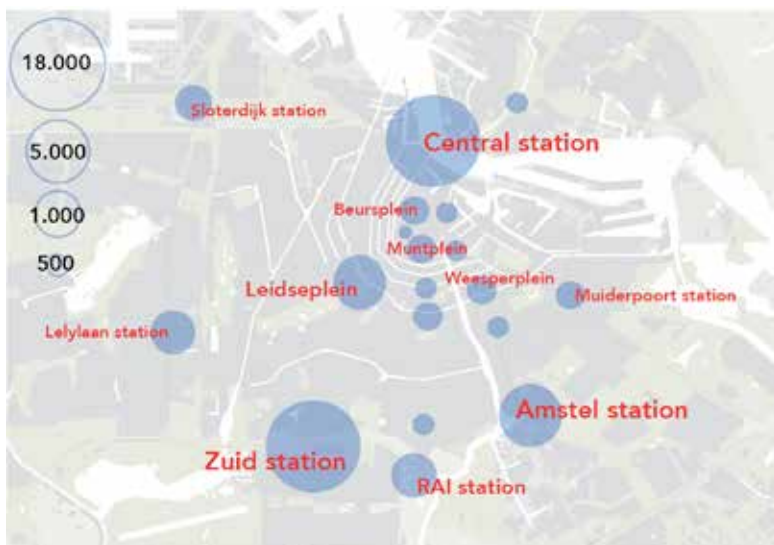
Interpreting the facts

Now a senior policy maker for the department of infrastructure in Amsterdam, Thomas Koorn remembers when he was a junior and work started on developing the new long term plan for cycling in the city. "First, we focused on finding facts," he explains. "This proved to be quite difficult, as there was a large amount of diverse data which was not easy to find, because it showed up in different research

results. Also, the bicycle was not accounted for in the city's traffic model, which is something we are aspiring for now.

"As more and more data was acquired, it turned out that the major problem was not so much that we needed a new policy to stimulate cycling, but rather practical solutions to facilitate the increase in cycling traffic."

The policies promoting the use of the bicycle which were set in motion in the 1980's, combined with the introduction of paid car parking and demographic changes (more people with a higher education) have led to a true cycling boom in the city. This has meant that the focus of the planners has shifted from developing new policies to solving the problems that have been created by the success of the bicycle.



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The new approach to mobility

As the city wants to facilitate the rapid growth in bicycle use in recent years and aspires to even more growth, it needs to rethink parts of its infrastructure. In June 2013 the City Council of Amsterdam agreed to a new mobility plan: *Mobiliteitsaanpak Amsterdam*, proposing a new system of so-called 'Plus nets'. It's a system in which, in general, no more than a couple of different modes of transport take precedence in a single street; for instance, public transport and bicycles, cars and bicycles or public transport and cars. This system will partly replace the principal networks policies that tried to facilitate all the different modes of transport in a

street, irrespective of its width. The new approach calls for clearer and more specific choices: bicycles could take precedence over cars on one street, but be banned to give more room to cars on another street. Finding new ways to design our roads according to this new plan is the challenge ahead of us, one which we need to start tackling head-on. ■

Room for creative design

The new mobility plan does not lay out how the streets are designed

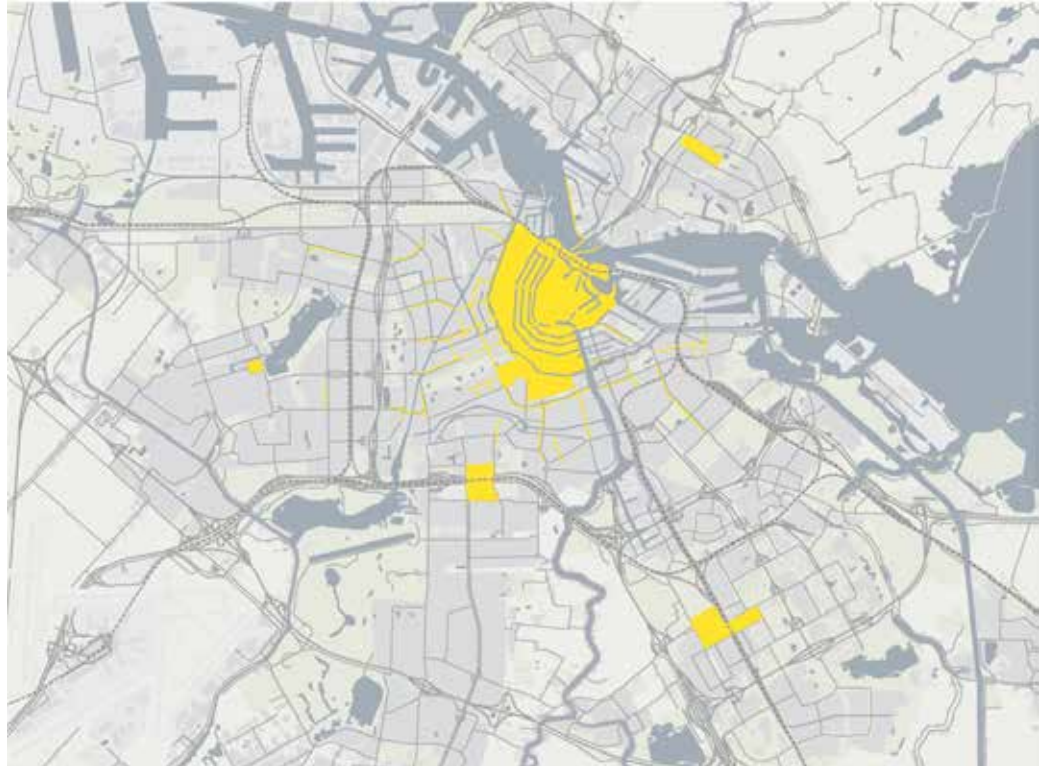
Fokko Kuik, senior policy maker for the traffic department in the city of Amsterdam, is leading the development of the new mobility plan. Kuijk: 'In some streets, the balance of bikes and cars has become critical. It's not uncommon to have ten bikes for every car, and the trend is still growing.' Kuik is convinced that we will not be able to facilitate more growth by simply widening cycle lanes. 'The existing city, especially in densely populated areas, simply does not have the space needed. So we need to find new answers to facilitate this growth.'

The new mobility plan includes a plus net for the bicycle, a network of roads providing cyclists with an even higher level of comfort. However, the plan does not offer a blue-print of how roads should be redesigned. Kuik: "We are in the process of finding creative answers for the physical design. One of the options we're looking into is to develop cycling streets, which are designed specifically for cyclists and which allow cars only as 'guests'. This means car drivers would have to adapt their speeds to the cyclists. In other cities with lower densities this has already proved successful."

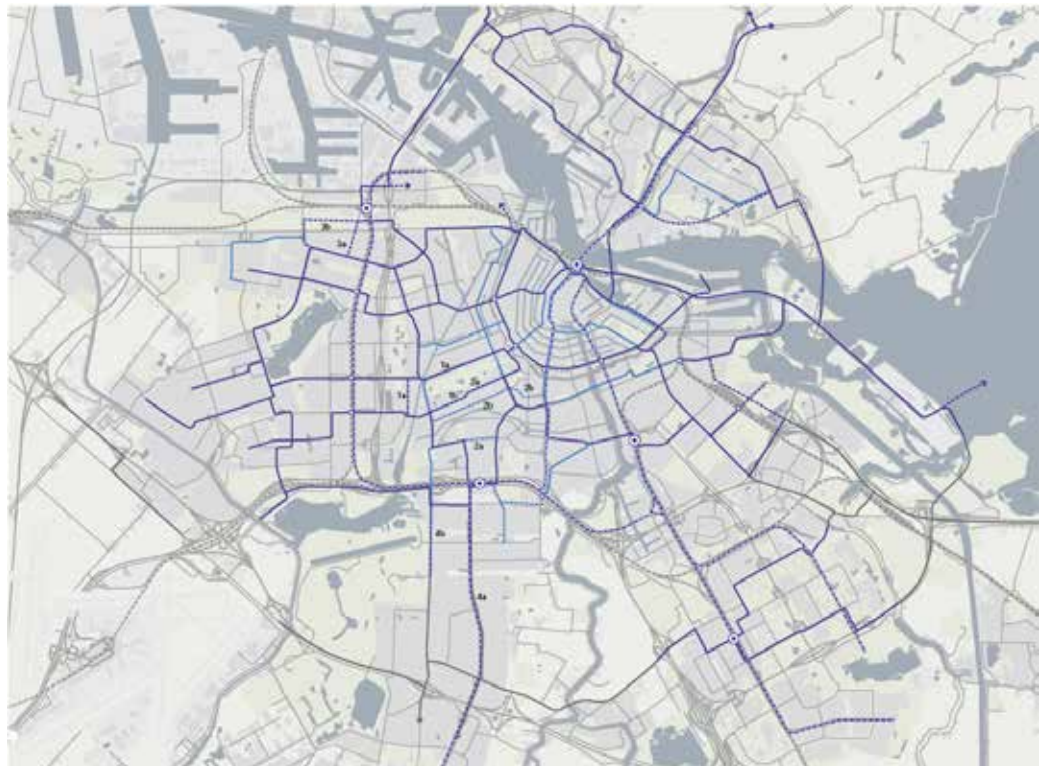
The city is now writing a more detailed report, which can be used by decision makers such as the city's traffic commission to review new plans involving traffic in Amsterdam.

1a-d In the new mobility plan the new system of Plus nets is introduced, replacing the principal networks policies, which tried to facilitate all the modes of transportation in all streets, irrespective of their width. The Plus nets system allows for no more than two modes to have precedence in a single street; for instance, public transport and bicycles, cars and bicycles or public transport and cars. Maps: Physical Planning Department

1a Pedestrians
— Plus net Pedestrians



1a

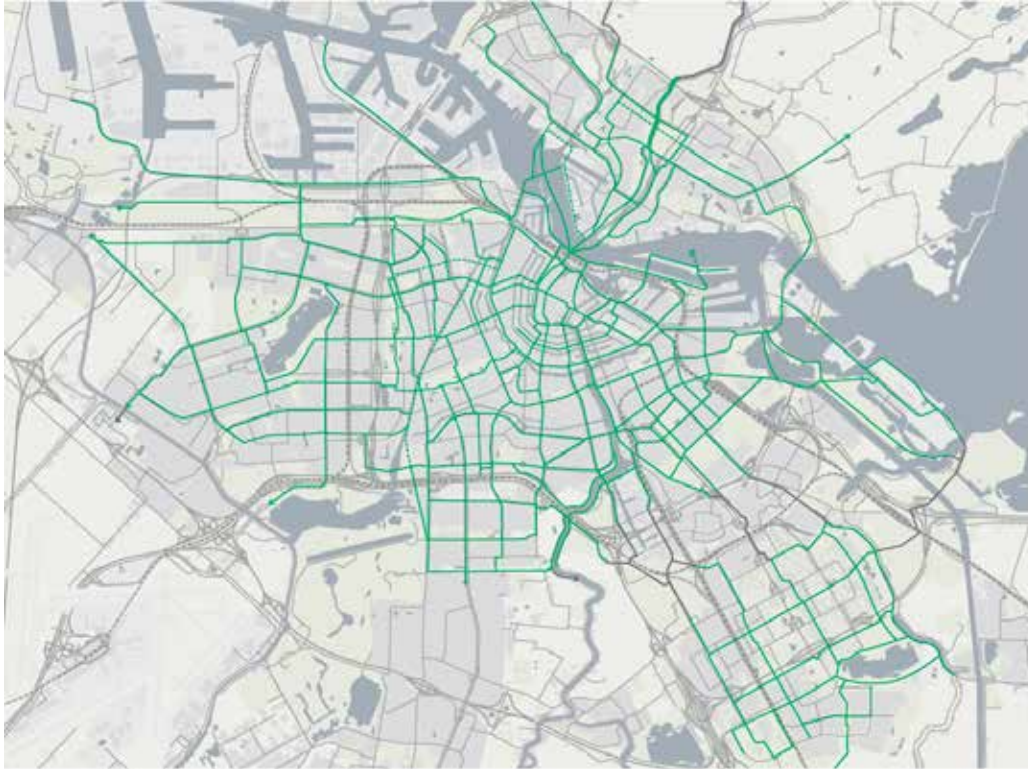


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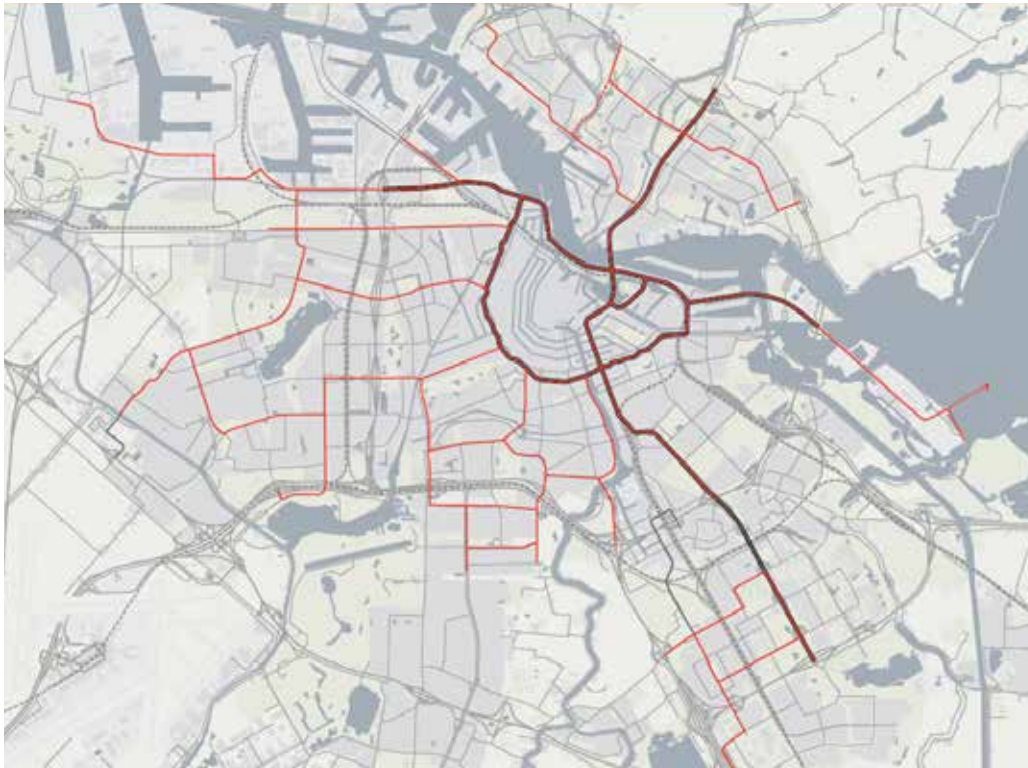
1b Bicycle
 — Plus net Bicycle
 --- Under consideration

1c Public transport
 — Plus net Public transport
 — Other Public transport
 Metro
 --- Under consideration
 1a-3b Possible future public transport options
 Junction

1d Car
 — Plus net Car
 Corridor
 --- Under consideration



1b



1d



'The bicycle has developed into an essential part of our mobility in Amsterdam'



Designing networks and parking

by Ruwan Aluvihare r.aluvihare@dro.amsterdam.nl

A major task for the urban designer

'It seems like the whole world is out on a bike in Amsterdam', according to Australian Backpacker. The magazine has voted Amsterdam 'the best place to ride a bike, from the huge network of bike lanes to the quaint cobbled streets and arched bridges over canal after canal after canal,' awarding it top spot in their list of ten best cycling cities in the world.

There's no two ways about it, Amsterdam is a great city for cycling. Ever since public pressure forced the municipal authority to introduce cycle friendly policies in the 1970's, the design of cycle lanes, bridges and parking facilities has been a primary task for urban designers and traffic engineers. In close collaboration with the policy makers, facilitating the bicycle is now a major part of the city's urban designers' remit. Their expertise is held in such high esteem that they have become an international export product, giving lectures and taking part in training sessions all over the world; whilst the city itself is regularly visited by foreign parties wanting to improve cycling facilities in their own cities.

The network, a first step

The basis for easier, quicker and safer cycling is the design and construction of a sophisticated cycle network with a clear hierarchy of routes. With each new urban development or renewal, the cycle network is

extended and improved. Creating a comprehensive and dense network of main routes is essential, because an easy and fast commute is dependent on how quickly a cyclist can access a main route from his/her home or place of work. The Amsterdam network has proved to be a real success with an average volume of 2.000 cycling commuters per hour on popular main routes. The network is an ongoing project, with extensions every year both within and beyond the city to encourage new groups of users. Recreational use of the network has also increased substantially, both for casual pastimes and for sport.

A spectacular example of a recent network extension is the Nescio bridge, which connects the cycle lanes of IJburg, an urban expansion of (at present) 10,000 dwellings to the east of Amsterdam, with the city. The bridge rises 11 metres above the Amsterdam-Rhine canal to allow ships to pass below it. With a total length of 780 metres

1 A spectacular example of the recent extension to the cycle network is the Nescio bridge, which rises 11 metres above the Amsterdam-Rhine canal to allow ships to pass below it. With a total length of 780 metres and a 1:40 slope, the construction ensures a comfortable climb for cyclists.
Photo: Doriann Kransberg

2a-b Cycle path on Diemerpark (a), connecting IJburg to the city centre, completing a 400 kilometre recreational cycle route on old sea dikes. The cycle bridge (b) connects IJburg to Diemerpark.
Photos: Ruwan Aluvihare



2a

2b

and a 1:40 slope with intermittent flat sections, the construction ensures a comfortable climb for cyclists. The bridge is the latest addition to a total of approximately 150 bridges in the city which are reserved exclusively for cyclists and pedestrians. The new cycle lanes in Diemerpark, adjacent to IJburg, connect IJburg and Amsterdam with the countryside to the east, completing an uninterrupted cycling route of 400 kilometres around the IJsselmeer lake. Another remarkable example is the cycle route which runs through the residential courtyards of the eastern harbour development, connecting the area with the city centre and the local shopping precinct. The designers have created an attractive, green and quick route separated from car traffic, rather than opting to mix bicycles and cars, which is the standard solution in residential areas.

Battle for the Rijksmuseum

An interesting recent occurrence which highlights the power of the cycle lobby was the 'battle for the Rijksmuseum'. The Rijksmuseum is a symmetrical Neo-Gothic building which has an underpass running right through it, connecting Museum Square with the city centre. Before the renovation of the building, the tunnel was part of the cycle network. The building's redesign incorporated a larger entrance to the museum, located in the tunnel. This gave rise to a discussion about banning cyclists in the tunnel, which in turn led to an outcry of national proportions from cyclists and the cycling lobbies. After a year of new studies and research, heated debates played out in the mass media and serious political involvement, the cyclists finally won the day. The Physical Planning Department of the city of

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3 The cycle path through the residential court-yards of the eastern harbor development is another remarkable recent extension to the cycle network. The designers chose to create an attractive, green and quick cycle route separated from cars.
Photo: Ruwan Aluvihare



3

4 Before the renovation of the Rijksmuseum the underpass running through it was part of the cycle network. The discussion about closing it after the building's redesign led to an outcry of national proportions and finally to a victory for the cyclists. The cycle path has now been reinstated and is once more a busy section of Amsterdam's cycle network.
Photo: Edwin van Eis



4



5a



5b

Amsterdam managed to design a new cycle lane which adequately suited the demands of the ambitiously renovated museum, while at the same time pleasing the cycling lobby by ensuring the continuation of this famous cycle route in Amsterdam for generations to come.

Choosing to prioritise the bicycle is gaining more momentum within the municipality and the City Council. A shift towards more space for cycles and pedestrians is evident. A good example is the Ferdinand Bolstraat, a busy shopping street which intersects the entrance to the famous Albert Cuyp market. Currently still dominated by cars, the Ferdinand Bol is now being redesigned as a car-free road. The route along the street is designated as 'Plus-net', the newest and quickest category in the cycle network. When finished in 2017, it should be a dream come true for pedestrians and cyclists.

Parking: a massive challenge

To deal with the ever increasing numbers of bicycles, urban designs incorporate new bicycle parking systems, varying from stands for individual bicycles to mass parking facilities at railway stations, city centre hubs and entertainment venues. As the designers need to know the numbers involved in order to be able to plan the facilities, surveys have been carried out to chart the number of parked bicycles at various moments during the day in different seasons, and to make forecasts for the future. The picture emerging is that the city has to deal with a massive amount of parked bicycles; and with approximately 1.5 square metres needed per bicycle, the size of the problem is huge. For example, 18,000 cycles per day in the vicinity of both Central and South stations, 4,000 on a Friday evening at the popular Leidseplein and 2,700 on the Ferdinand Bolstraat. To actually build these parking facilities is a huge

6 With the ever increasing numbers of bicycles in the city, the urban designs incorporate new parking systems, such as the 'staple', a modern cycle stand. Photo: Cecile Obertop



6

7 Parking facilities should be differentiated according to the type of cyclist catered for; marked parking spaces on the pavement are for short term parking, for instance in shopping streets. Photo: Edwin van Eis



7

8a-b Zuidplein at Amsterdam South railway and metro station harbours one of the first large underground garages for bicycles. It provides 2,500 spaces with a new a) public square above it. Designed to fit into the urban context; with a comfortable entrance with b) travelators, directly on the cycle route, and a pedestrian exit close to the station entrance. Photos: Ruwan Aluvihare (a) / Edwin van Eis (b)



8a



8b

challenge for the city's authorities, but it's one they are determined to take on, as the bicycle is, along with walking, the most sustainable means of transport available. In very dense areas, garages will often be the sole solution, but parking facilities can and should also be differentiated based on the type of cyclist catered for; marked parking spaces on the pavement for short term parking (e.g. shopping streets), parking frames for long term (residents') parking, small ground floor spaces in existing buildings for subsidised residents' parking and large newly built accommodations, such as purpose built underground garages, for major transport and commercial hubs.

Going underground

A transport hub at the heart of the new Zuidas development, Zuidplein at Amsterdam South railway and metro station harbours one of the first large under-

ground garages for bicycles. It provides 2,500 spaces with a new public square above it. It's a good example of how a garage can be designed to fit into the urban context; with a comfortable entrance with travelators, directly on the cycle route, and a pedestrian exit close to and well aligned with the station entrance, the logistics have become part of the natural route to the destination. A second underground garage, on the south side, is currently being designed. According to the prognosis, the area will have to facilitate 18,000 spaces by 2020, predominantly in built form, for commuters travelling daily to and from Amsterdam by train.

A few miles up the road, in the heart of the city, a garage for 2,000 cycles is being designed under the Leidseplein. The positioning of the entrance, adjacent to the main cycle path, and a pedestrian exit at the

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Dividing the space

Just as almost any other city, Amsterdam has a network consisting of main and subsidiary roads. The primary function of the main roads (called distributor roads in the profession) is to accommodate through traffic and heavy transport. Cyclists are allocated their own lanes on these roads, separated from the faster and heavier motorised traffic. The subsidiary roads ('access roads') have a largely residential function. Normally, cars and cyclists share these roads, and the maximum speed is lower. This is the principle on which Amsterdam bases its traffic design.

Making real choices

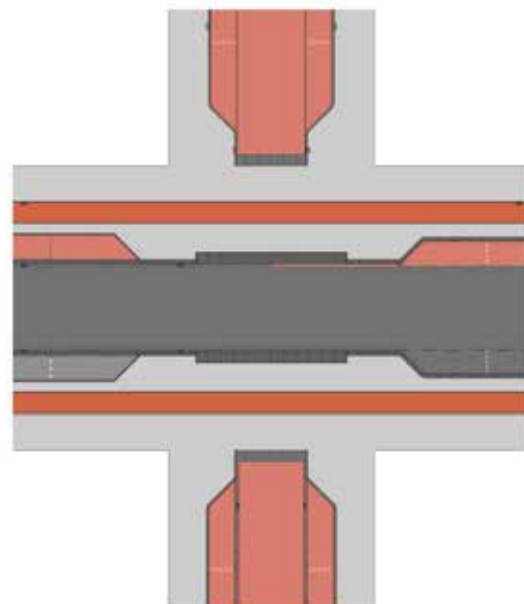
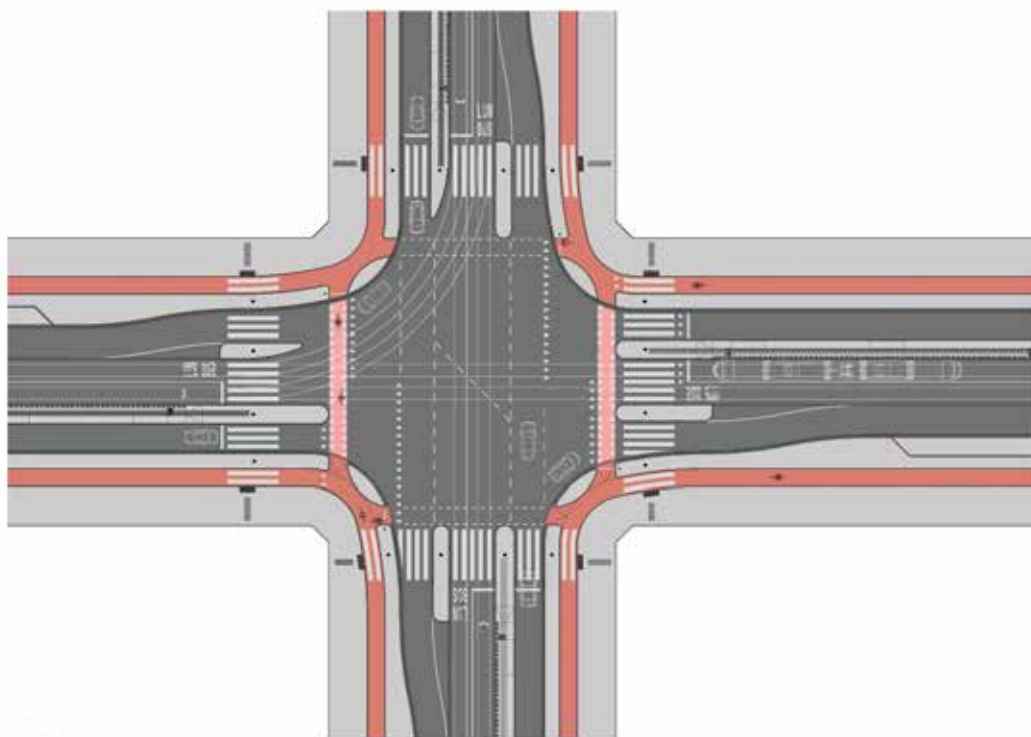
However, in a city such as Amsterdam, it is increasingly clear that this strict division between types of roads with either a transportation function

or a residential function can often not be made. City streets like the Ferdinand Bolstraat, Linnaeusstraat, Rozengracht and Van Woustraat have both a residential and transportation function. They are the type of streets which contribute to an attractive and lively city, yet the many types of traffic combined with shops, catering and entertainment businesses and other crowd-drawing activities leads to problems in the allocation of the limited space available.

In its new plan called Mobiliteitsaanpak Amsterdam, the city has devised a system with so-called Plus nets and a clear order of priorities to divide the space between Pedestrians, Cyclists, Cars and Public Transport, in an effort to make clearer choices for each road or street. The Ferdinand Bolstraat, for instance, is a city street which is Plus

net Pedestrian as well as Plus net Bicycle and will in the near future become a car free street in order to offer the space to pedestrians and cyclists. There are more new insights; it has become evident that the existing strict standards used for designing streets with maximum speeds of 50 km/h or 30 km/h do not always have the desired effect, especially when concentrations of cyclists and pedestrians are very high. The availability of separate cycle lanes cannot always be taken for granted either.

All in all, we have now reached a phase in which rigorous and creative decisions will have to be made for future traffic designs.



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9 One of the busiest hubs in the city, the search for 18,000 spaces at Central Station is in full flow. The temporary Cycle Flat, housing more than the 2,500 cycles it was designed for, is one of the most photographed objects in Amsterdam.
Photo: Edwin van Eijs



9

10a-c Under the Leidseplein, the city's main culture and entertainment area, a garage for 2,000 cycles is being planned. The preliminary design for the garage (a); the existing situation (b) with parked cycles everywhere; and an impression of the future situation with space to relax and enjoy the surroundings (c).
Photo: Ruwan Aluhivare (b) / Artist's impressions: DCAP (a/c)



10a



10b



10c

other end towards the central area of the square will promote easy use of the facility. The garage is part of a strategic plan for a total of 4,000 spaces required for the area, which also includes the adjacent Lijnbaan canal where 600-1,000 cycles could be parked.

One of the busiest hubs in the city, the search for the required 18,000 spaces at Central station is in full flow. The temporary multi-storey bicycle parking facility, which houses more than the 2,500 cycles it was designed for, is one of the most photographed objects in Amsterdam. The permanent solution will be even more spectacular. The space available is minimal, especially because the city wants to retain open water around the so-called Station Island. A definite choice between space for cycles or space for cycles *and* water, has not yet been made. Two possible solutions have been put forward: a large underwater garage for 7,000 bicycles;

or a smaller one, with less water for 4,000 to be housed under a new public square.

What the future holds

Cycle transport technology is on the rise. The apps currently available may not be more than a bit of fun at the moment, but they're already proving very popular and, what's more, functional technologies enhancing comfort and increasing efficiency are just around the corner. Digital navigation is a first step. GPS applications could also be utilised to improve flow by informing cyclists to go faster or slower when approaching traffic lights. Furthermore, the city will research the possibilities for improving garage parking by introducing high-tech systems with information about parking facilities and the availability of spaces in garages as well as at single cycle stands. As the system is based on short term parking (a maximum of one day free of charge), every

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Dividing Time

Providing sufficient space for all traffic can prove to be quite a puzzle, especially where junctions are concerned. They demand not only the division of space, but also of time. In many cases, the cyclist can apply the rules of way, but at busy junctions traffic lights regulate who can go and who needs to stop. At some routes, cyclists can benefit from a 'green wave' of traffic lights.

When the first traffic lights were introduced in Amsterdam in 1932, cyclists were the single largest group of road users and therefore an important group to consider in any traffic plans. In 1942, the cyclists even got their first green wave route. The fact that the amber light is not used in the Netherlands as an intermediate from red to green, is due to the Amsterdam cyclists in the thirties. In other countries, such as Germany or the UK, traffic lights will go from red to amber before going to green. However, the Amsterdam police in the 1930's deemed that the city's cyclists would not wait when shown the amber light, which could lead to dangerous situations.

However, by the high appreciation score for traffic lights waiting-time predictors in a recent poll, there is evidence that cyclists do like to know when they can expect the green light. With the

use of led lights a countdown can be given indicating how long cyclists have to wait for the lights to turn green. Which doesn't mean every cyclist can stay put for the last five seconds!

6 seconds

The minimum amount of time for a traffic light to stay green for cyclists in Amsterdam is only six seconds. Still, in practice this limited amount of time can be stretched – the cyclist can 'use' the green light of a parallel pedestrian crossing, or 'hike along' with a green tram light, as trams can be given precedence over the regular traffic regulation pattern. In addition, sometimes the lights on a cycle crossing turn green twice in one cycle; and with the use of detection the lights can sometimes stay green for longer when this is needed.

In 2007, a 'green wave' set to cycle speed was installed on Raadhuisstraat. Eleven traffic lights have been synchronised in such a way that cyclists in both directions benefit from a green wave of traffic lights if they maintain a speed of 18 kilometres per hour.

Conflicts

The increase in cycling has led to more and longer queues of waiting cyclists and sometimes verbal

or even physical conflicts between cyclists riding on intersecting cycle lanes. What's striking is that these incidents tend to concentrate in rush hour periods. Therefore, instead of looking to implement physical adjustments, it might be better to start by exploring the traffic regulatory possibilities. Traffic lights are extremely suitable in that they offer time-based solutions and the necessary software adjustments are relatively cheap. Extending the green light interval – or shortening the red light interval – for cyclists during extremely busy traffic, can avoid long queues and the frustration of having to stop for a red light twice. Obviously, such a solution will also affect other traffic – traffic regulation will always be a matter of customisation.

The implementation of traffic regulation is informed by the combination of spatial design and traffic policy. It's important to invest in both these components so that people understand how the solution to the traffic light puzzle has been arrived at, and can see why the lights are either red or green in a particular situation, both at busy and quiet times.



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11 Design for a modular float for 150 cycles, which can be used anywhere, anytime.

Image: Physical Planning Department



11

12a-c Two possible solutions for solving cycle parking problems at Central station, pending a definitive decision by the city council. Underground garage (a) for 4,000 cycles; and two designs for an underwater garage for 7,000 cycles.

Artist's impressions: Movares



12a



12b



12c

bike should ideally be chipped to make it easier and cheaper to control parking times. The chip also provides other useful functions for the owner, including traceability and theft prevention. Another possible development is the use of the widely available water surface to facilitate cycle parking – i.e. on floats. These are controversial but probably necessary.

A job unfinished

Unfortunately, the success of cycling in Amsterdam also has its downside. The sheer volume of cycle traffic is overwhelming the city, with frequent bicycle traffic jams at several junctions. Cyclists are increasingly using space outside their allocated area, giving cyclists as a group a bad reputation. At worst, the crowding may give rise to an increase in accidents. We are now at a pivotal point. With new ideas and policies, we can increase the modal split (the share of the bicycle in

distances covered), while at the same time securing safety. This can be achieved, but not simply by expanding the network and broadening existing cycle lanes. As the available space is limited, we will have to devise creative concepts within these confines and keep making clear choices such as the 'plus net' to prioritise the bicycle and maintain safety levels for cyclists. Moreover, we have to investigate and research cycling behaviour to understand it better and devise better policies, just as we have done for the car. The bicycle is an undeniable part of the city's identity and has contributed in large part to Amsterdam's sustainability and its high level of quality of living. However, the designer's job is not yet done – on the contrary, it's getting more challenging every day. ■

The Reckless Cyclist

by Marco te Brömmelstroet, Lucas Harms, Olga Sezneva and Adriaan Rottenberg
brommelstroet@uva.nl / L.W.J.Harms@uva.nl / O.Sezneva@uva.nl / A.Rottenberg@uva.nl

Dispelling the myth

The road behaviour of cyclists and specifically Amsterdam cyclists, is a recurring theme in the public debate. In many of these discussions, the majority of cyclists are deemed to display a strongly anarchic attitude. Although everyone can provide anecdotal evidence to confirm this allegation, there is precious little structural insight into the actual behaviour of Amsterdam's cyclists.

This lack of research is quite surprising, not only because of the pervasiveness of the debate, but also because in many parts of the city, cyclists are by far the majority of road users. How can we design the traffic space for these – very welcome – road users if we don't even know how they actually behave? To remedy this situation, we have charted the behaviour of more than 18,000 cyclists at a selection of junctions, which should give us a clearer picture.

World-wide, including the Netherlands itself, there's a growing interest in the role of the bicycle as a simple solution for a host of complicated mobility problems. Cities vie with each other to formulate ever more ambitious plans, frequently referring to the Netherlands and specifically Amsterdam as the example to emulate. In many ways this is deserved, because through a long-term and consistent traffic and spatial planning policy, Amsterdam has had a continuously high share of cyclists, which is actually still growing exponentially

in some parts of the city. All of which does not mean that there are no more major challenges for Amsterdam to contend with.

Road Rogues?

In the debates between foreign planners and Dutch experts it's always striking how many different stories and theories are suggested to explain Amsterdam's suitability for cyclists; is it the culture, the infrastructure, spatial developments or a combination of all of these? If you then start to examine academic research to try and find a better explanation, you'll discover that there is hardly any structural knowledge about cycling. The few studies available in different academic disciplines are in sharp contrast with the large volume of knowledge about motorised road traffic and increasingly also about public transport. It's a lack of knowledge which concerns all aspects of cycling: who are the people who cycle, why do they cycle and where do they cycle? Where is the share of cyclists in

1 In the debates between foreign planners and Dutch experts, many different theories are suggested to explain Amsterdam's suitability for cyclists. If you then start to examine academic research to try and find a clear explanation, you'll discover that there is hardly any structural knowledge about cycling.
Photo: Lenette van der Plas



1

road use still growing? Which physical factors are experienced as enjoyable? What determines the route a cyclist chooses to take? How do cyclists communicate with other road users and how do they use the infrastructure?

Although the University of Amsterdam is currently researching all of these questions, for this article we will focus on the last one. Our main reason for this is that the tactical decisions cyclists make play a prominent role in the public debate: are Amsterdam cyclists really

such road rogues or is that an exaggeration? Largely based on anecdotal evidence, this debate influences public opinion, thereby creating conditions for cycle policies. A recent example is Dutch journalist and television presenter Jort Kelder, who after a collision with a female cyclist wiped the floor with the protected legal status of cyclists. By doing this, Kelder has indirectly fuelled calls for this vulnerable group to go unprotected by the law. This is why the City of Amsterdam has started a project this year to gain more insight into the actual behaviour of cyclists.

>

2 Are Amsterdam cyclists really such anti-social road rogues as sometimes alleged or is that an exaggeration? Commissioned by the Amsterdam City Council, the University of Amsterdam has started a project to gain more insight into the actual behaviour of cyclists.
Photo: Edwin van Eis



2

3 Museumplein, tourists cycling on footpath.
Photo: Edwin van Eis



3

Design versus behaviour

The way we give shape to our infrastructure determines in large measure the tactical opportunities for cyclists to take. However, cyclists are extremely savvy at finding their own way. If this leads to large-scale undesirable or unpredictable behaviour – e.g. ignoring red lights, cutting corners – the policy reflex is often to correct this behaviour by increasing police controls or by installing physical measures, such as raising the kerb at places where cyclists take a shortcut across a zebra crossing. By means of this research we aim to question this reflex. We think that there might be a lot to learn from cyclists' swarm behaviour and how this interacts with the road design. Due to the exponential growth of the number of bikes, the road design is often not adequate. It looks like some junctions only continue to function by the grace of individual cyclists adopting and sharing new rules of conduct in communication with each other. In his book *To Save Everything, Click Here*, Evgeny Morozov has given a good summary of the added value this offers by stating that civil disobedience is an important signal to learn from: '[it] has a great signalling value, as it can indicate that the law in question doesn't correspond to common belief or morality'. In short, the tensions and irritations witnessed at junctions are an important source of insight and a possible engine for change.

Research design

In collaboration with the City of Amsterdam ten junctions were selected which seemed to show most clearly this discrepancy between design and behaviour and which were practically suited as a focus for our research. Each junction was allocated to a group of three first-year sociology students from the University of Amsterdam. In the spring of 2014, during one hour, the students shot video material, which was then given an extensive quantitative analysis, focusing on the various routes cyclists took to cross the junction (with the use of Copenhagenize Consulting's Desire Lines tool).

In addition, we looked at the correlation between design and behaviour, identifying three categories of cyclists, the same grouping that was used in the Copenhagen research Bicycle Choreography Copenhagenize:

- Conformists: cyclists who stick to all the formal rules and designed routes;
- Momentumists: cyclists who follow their own route and adapt certain formal rules to suit their own ends, without causing any dangerous situations (e.g. turning right through a red sign);
- Recklists: cyclists who recklessly ignore the rules, for instance crossing the road through a red light, and thereby cause conflict with other road users.

4 The tensions and irritations witnessed at junctions are an important source of insight. Ten junctions were selected which seemed to show most clearly the discrepancy between design and behaviour. Source: University of Amsterdam / Map: Department of Infrastructure, Traffic and Transportation



4

Finally, in addition to the research into the actual behaviour of cyclists, the students conducted interviews in the week after the video recordings to gain insight into the experiences and emotions of cyclists at these junctions.

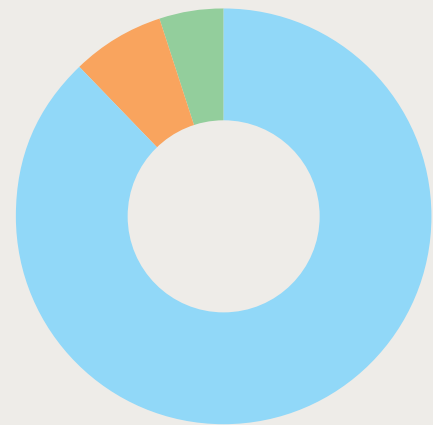
The swarm explored

At all junctions, except at the Elandsgracht, a full quantitative and qualitative analysis has been carried out. Although it was relatively early in the season and most footage was shot just after the busiest peak period, these nine junctions processed a total of more than 18,500 cyclists in one hour. What is immediately striking is the high percentage of conformists. Although the research was carried out during the morning rush hour and predominantly major junctions were researched, this is still a radically different picture from what's often suggested in the public debate, such as a recent article in the Amsterdam daily newspaper *Het Parool* about 'the Amsterdam cycling rogues'. Of the remaining twelve percent the majority are momentumists who negotiate the junctions choosing informal routes – shortcuts – without creating conflicts with other road users. Only 5 percent of cyclists were classified as reckless; they go through red lights and weave between driving cars and trams, causing potential conflicts with other road users. The nine hours of video footage also

5 The collected data refutes the general claim that Amsterdam cyclists are a bunch of road rogues on the loose. Percentage of total number of cyclists (18,543) according to their behaviour: conformists, momentumists, recklists.

Source: University of Amsterdam

- conformists (88%)
- momentumists (7%)
- recklists (5%)



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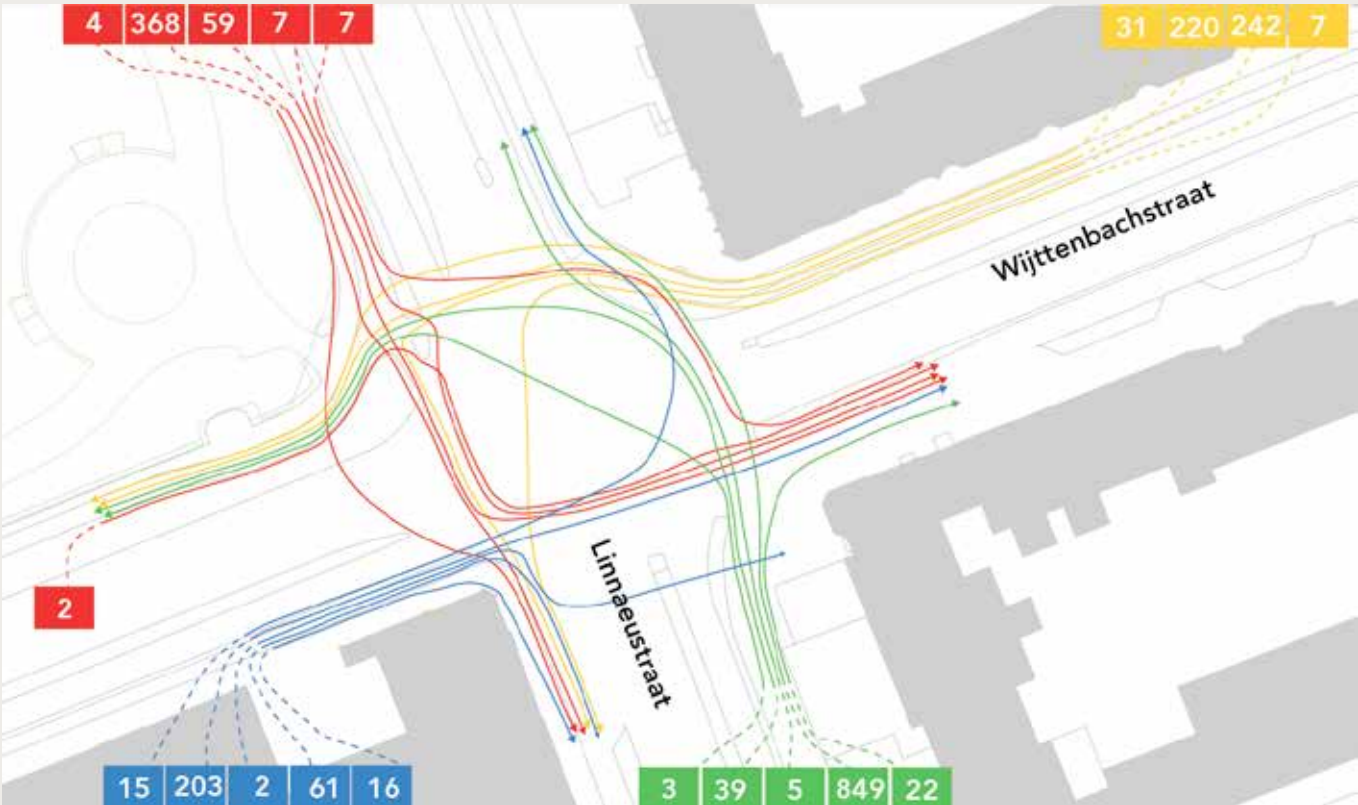
did not show a single incident of verbal or physical conflict between road users. This data then refutes the claim that Amsterdam cyclists are a bunch of road rogues on the loose. It's important to bear in mind that the cyclists were recorded during morning rush hour at relatively major, busy junctions.

The junction's choreography

In addition to these general insights into the conformist behaviour of the Amsterdam cyclists, it's especially important to gain more insight into the interplay between design, formal rules and the behaviour of cyclists. What happens at each particular junction? On the basis of the video material, the various routes taken by at least two cyclists to negotiate the junction were charted. Figure x shows the results of this research for the junction of Mr. Visserplein with Jodenbreestraat. In the space of 53 minutes, 1,854 cyclists passed by at this junction. Unfortunately, the position of the camera didn't allow for the inclusion in shot of the cycle traffic coming from Jodenbreestraat and turning right. The greatest group of cyclists went straight across the junction (F). On Jodenbreestraat these 782 cyclists joined the 48 (H) and 81 (D) cyclists to form a group totalling 911 cyclists. What's very clear from the footage is that the waiting space for the cyclists coming from Jodenbreestraat cannot properly accommodate busy

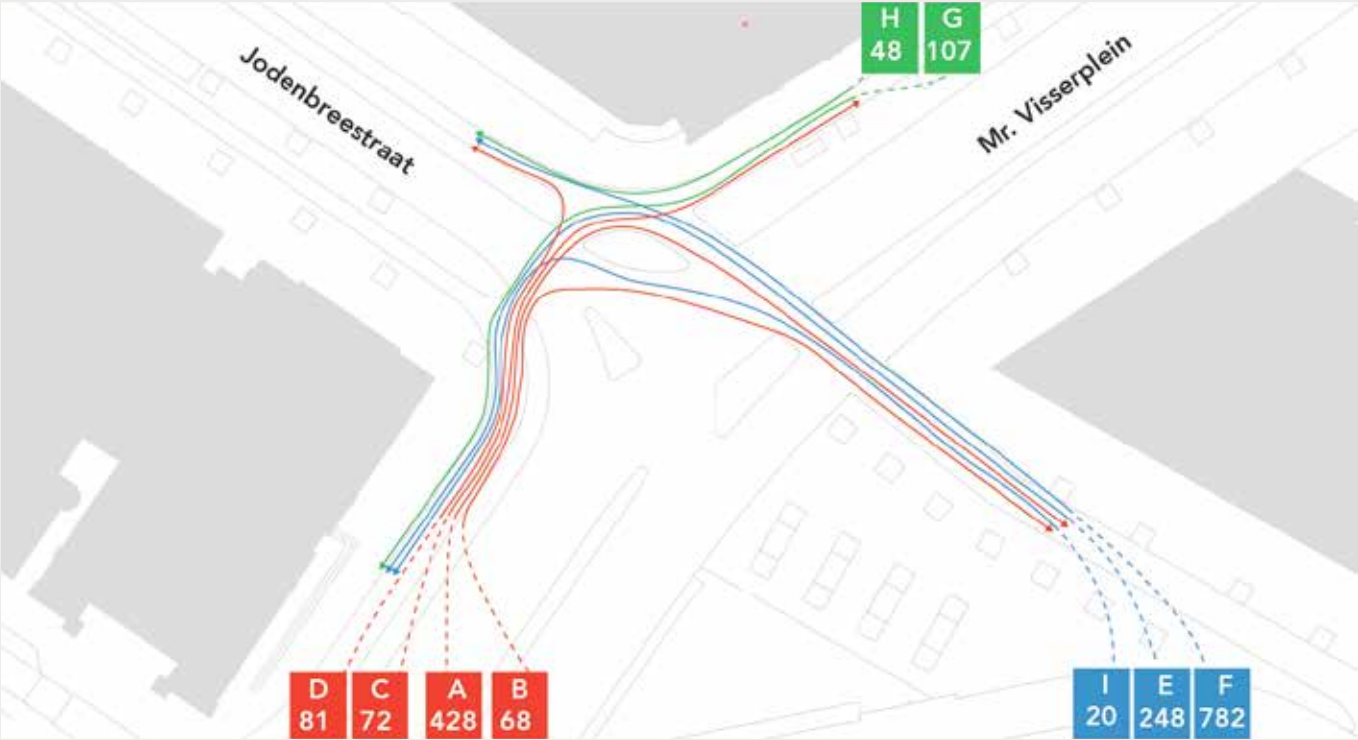
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6 Choreography of the junction Wijtenbachstraat – Linnaeusstraat.
Source: University of Amsterdam /
Maps: Amsterdamize



6

7 Choreography of the junction Mr. Visserplein – Jodenbreestraat.
Source: University of Amsterdam /
Maps: Amsterdamize



7

‘What kind of emotions does the junction evoke?’



periods. That's why a number of cyclists (momentumists) seem to opt for a shortcut (B) instead of the conformist route (A).

This 'cycle choreography' is a form of revealed behaviour, showing the patterns which emerge by combining the individual choices. However, this does not explain how the behaviour forms. Does the cyclist choose the route he wants to take, or does he feel forced to make certain choices? How do cyclists experience the junction, what kind of emotions does the experience evoke? In order to gain insight into those questions, a number of interviews were conducted at each junction. For the junction we're considering here, one of the striking results was that the sometimes chaotic situations were not always experienced as stressful. As one of the cyclists explained: "People often get irritated with each other. I don't feel any stress because of the behaviour of others, although I can see that other people do get stressed."

Designing from behaviour

So what does this mean for junctions? There are a great many factors determining the design of a junction. After all, safety, flow, environmental quality and clarity for all road users have to be guaranteed. It's always a struggle to find a compromise between general guidelines and the local context. The Netherlands has achieved a high level of safety and quality by discussing these considerations in a robust and thoughtful debate, expressed in general guidelines for the design of our roads.

These general guidelines are not easily adaptable to fast and substantial changes in specific situations. Amsterdam seems to be caught right in the middle of such a change, a sudden shift in the traffic's balance. Especially in the city centre the number of cyclists is booming. An added consideration is that because of all the positive effects associated with cycling, it's now part of the political agenda to want to stimulate this growth even further.

Basing design on observations

Being by far the largest group of road users at many locations, the bicycle deserves a more central role in our design procedures. If we can muster the courage to do this, we should base our designs on observations to a far greater extent than we're doing at the moment. Cyclists are flexible and hard to control. It's the interplay between individual rules of conduct which will eventually create the choreography at a junction. There will no longer be one overall choreographer taking charge, rather the individual performers will be in control. In other words, although vulnerable road users must be considered as well, the swarm should literally be given more room to manoeuvre. The lack of space is exactly what seems to be the problem at the moment, creating conflict, stress and dangerous behaviour. By moving the stop line for cars back, creating more green zones for bicycles and designing left and right turns for cyclists which are in a more natural alignment, the junction could become a canvas on which the self-regulating potential of the swarm can be fully realised. ■

Grootstedelijk fietsbeleid maken en ontwerpen Kennis in de praktijk brengen

Nederland is bij uitstek een fietsland, en Amsterdam bij uitstek een fietsstad. Het vlakke Nederlandse landschap en het feit dat fietsen een relatief goedkope manier van vervoer is, speelt hierin zeker een rol. In Amsterdam is er bovendien vanaf de jaren zeventig met succes beleid gemaakt om de fiets steeds meer ruimte te geven. De nadelen van dit succesvolle beleid, zoals parkeerproblemen en gebrek aan ruimte op drukke kruispunten en straten, vormen nu de speerpunten in het nieuwe plan: *Mobiliteitsplan Amsterdam*.

De eerste keer dat er in Amsterdam op grote schaal een verkeerstelling werd gedaan was in 1930. Drieduizend studenten hielden bij 250 kruispunten van 's ochtends half zeven tot 's avonds half zeven bij hoeveel fietsers deze passeerden. Alleen al vanuit de richting Leidsestraat naar het Leidseplein telden zij 30.000 fietsers gedurende de dag, waarvan 1.100 tussen kwart voor negen en negen uur.

In de jaren zestig veranderde er veel met de opkomst van de auto. Het aantal auto's in de stad verviervoudigde in die jaren en het stadsbestuur wilde met brede toegangswegen de stad ontsluiten voor de toekomst. De Amsterdammers dachten daar anders over. Afbraak voor wegen ging gepaard met massale protesten. Ook waren er in de jaren zeventig vele demonstraties waarin de fiets en de veiligheid voor de fietser werden bepleit. Want met de komst van het vele gemotoriseerde verkeer in de stad, was de veiligheid van de kwetsbare fietser wel degelijk in het geding geraakt met een groeiend aantal verkeersdoden tot gevolg. In 1978 introduceerde het stadsbestuur een nieuw verkeersplan met meer ruimte voor fietsers en voetgangers en minder voor auto's en parkeerplekken.

Nadenken over fietsbeleid

Tegenwoordig is de fiets met 62 procent binnen de Singelgracht het meest gebruikte vervoersmiddel. De stad is blij met de populariteit van de fiets: vergeleken met gemotoriseerd

vervoer neemt de fiets weinig plek in beslag en is het een schone en goedkope manier van vervoer. Het houdt de stad bereikbaar. In de mobiliteitsplannen van de stad krijgt de fiets dan ook een belangrijke rol. Het Amsterdamse fietsbeleid is gestoeld op vier pijlers: veiligheid, infrastructuur, parkeren, educatie en promotie. Het resultaat is een netwerk bestaande uit 500 kilometer fietspad in rood asfalt én het Hoofdnets Fiets, een fijnmazig stratenplan van veilige fietsroutes door de stad. In 2011 verscheen een nieuw fietsplan: *Meerjarenplan Fiets 2012-2016*. De nadruk in deze nota ligt op het tackelen van de keerzijde van het grote succes van de fiets: het parkeerprobleem. Tussen 2012 en 2020 komen er 50.000 fietsparkeerplekken bij, vooral bij de trein- en metrostations. Ook een tweede plan is bepalend voor het beleid van de komende jaren. In juni 2013 ging het gemeentebestuur akkoord met het *Mobiliteitsplan Amsterdam*. Hierin wordt een nieuw systeem van 'Plusnetten' geïntroduceerd. De kern van dit idee is dat in straten niet langer ruimte is voor alle verkeersdeelnemers – voetganger, fiets, auto, tram – maar er per straat keuzes zijn gemaakt: bijvoorbeeld voetgangers en fietsers of auto's en trams. Dit vraagt om creatieve oplossingen van de verkeersontwerpers. Een voorbeeld van een Plusnet-route is de Ferdinand Bolstraat, dat een autovrije straat wordt.

Oplossingen ontwerpen

De aantallen geparkeerde fietsen zijn niet mis: 18.000 fietsen per dag rond Centraal Station en Station Zuid, 4.000 fietsen op vrijdagavond op het Leidseplein, elke dag 2.700 fietsen in de Ferdinand Bolstraat. Garages zijn vaak de enige oplossing in heel volle gebieden. Toch moeten er ook parkeerfaciliteiten zijn voor fietsers die slechts voor een kort bezoek op een bepaalde plek zijn. Hiervoor bevinden zich in winkelstraten afgebakende stukken stoep – fietsvakken – voor fietsers die slechts stoppen voor een boodschap. Een belangrijk nieuw hulpmiddel bij het ontwerpen van parkeervoorzieningen is technologie. Dit kan bijvoorbeeld goed

ingezet worden voor het vergaren van informatie over gebruik van bepaalde parkeerplekken.

Fietsgedrag onderzoeken

Door de toename van het aantal fietsers zijn er regelmatig conflicten tussen verkeersgebruikers op kruispunten. Om het aantal fietsers te kunnen laten groeien is simpelweg de fietspaden breder maken geen oplossing, want die ruimte is er niet. Creatieve oplossingen zijn geboden. Meer kennis over fietsgedrag helpt daarbij.

Amsterdamse fietsers staan erom bekend zich ronduit onbeschoft te gedragen in het verkeer. De Universiteit van Amsterdam (UvA) en de gemeente Amsterdam hebben samen het gedrag van ruim 18.000 fietsers op tien kruispunten in kaart gebracht. Drie soorten fietsers zijn onderscheiden:

- 1 de conformisten, die zich aan alle formele regels en ontworpen routes houden;
- 2 de momentumisten, die een eigen route volgen en een aantal formele regels bijbuigen zonder daarbij een gevaar op te leveren;
- 3 de roekelozen, die regels negeren en bijvoorbeeld door rood rijden en hiermee conflictsituaties met andere weggebruikers creëren.

De data weerleggen het algemene beeld van de Amsterdamse fietsers als een op hol geslagen kudde verkeershufters; de meesten houden zich juist prima aan de verkeersregels. Verder concluderen de onderzoekers dat de voornaamste reden is van conflicten, stress en onveiligheid het gebrek aan ruimte is. Een oplossing is bijvoorbeeld opstelstroken voor het autoverkeer niet langer naast, maar achter het fietsvak plaatsen. Fietsers moeten letterlijk de ruimte krijgen.

1 Bicycle wedding.
Photo: Cecile Obertopp



1



2

2 Repairman at Zuid station.
Photo: Edwin van Eis

The Authors

Ruwan Aluvihare (1956)

- Is senior designer at the Department of Physical Planning of the City of Amsterdam
- Studied Landscape Architecture
- Specialises in Landscape and Public Space Design, including the integration of cycling facilities
- Is currently the head designer for the projects in the Amsterdam areas of Leidseplein and Rode loper (Vijzelgracht and Ferdinand Bolstraat) and co-ordinates cycle projects for the Department of Physical Planning
- Did consultations in Buenos Aires and Tanzania about cycle policies and has published various articles about the subject

Marco te Brömmelstroet (1980)

- Has been employed as a researcher at the Faculty of Social and Behavioural Sciences of the University of Amsterdam
- Studied Urban & Regional Planning at Saxion in Deventer, Environmental and Infrastructure Planning at the University of Groningen and Geographical Information Management at the University of Utrecht
- Is involved in research into trends in bicycle use, the effectiveness of cycle interventions and the bicycle-and-train system.
- Currently works on research into added value of scientific theory for strategic planning processes
- Has since 2010 been the proud owner of a cycle shop in Germany specialised in family cycling

Iris van der Horst (1972)

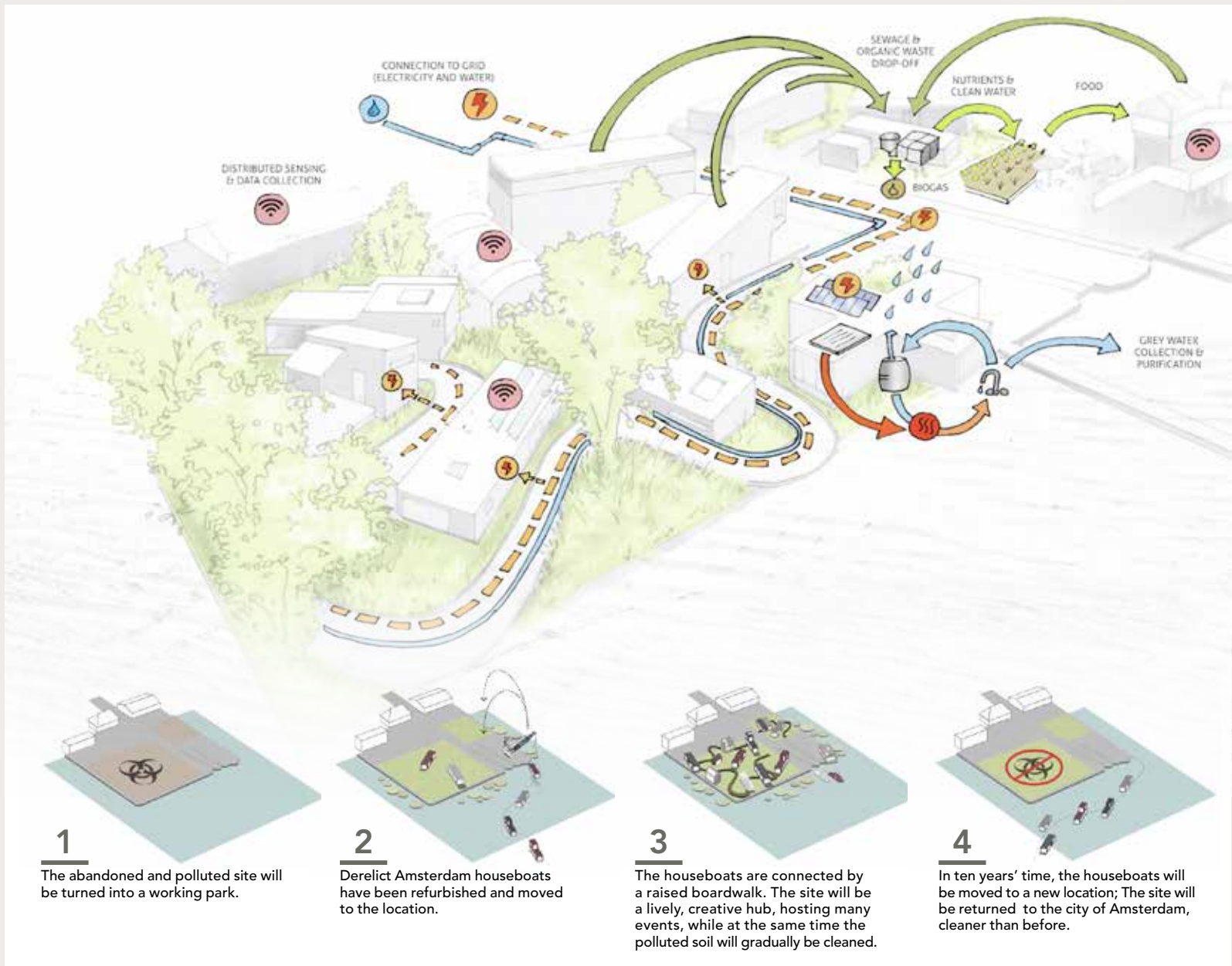
- Has worked for the Project Management Bureau (PMB) of the City of Amsterdam for the last 10 years
- Is currently working as a programme manager on the implementation of the Amsterdam Bike Plan 2012-2016
- Studied Architectural History at the University of Amsterdam
- Has managed many different types of projects, involving early planning stages including the development of initial plans for the Masterplan Northern IJbanks, the implementation and co-ordination of selfbuild housing on IJburg and the co-ordination of building projects at Amsterdam Central Station.
- Has been involved in the high-profile and successful transformation of empty office buildings in the Amsterdam district Amstel III



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Cityscape 04/14

The Circular City



Source: DELVA Landscape Architects, Space&Matter and Metabolic

Urban oasis

The City of Amsterdam strives toward a city with zero waste and sustainable energy. An inspiring example is 'The Ceutel'. This heavily polluted site on a former ship wharf in the north of the city will be transformed into a workplace for creative and social enterprises to create one of the most sustainable and unique urban developments in Europe. The land was secured for a 10-year lease from the Municipality of Amsterdam after a group of professionals (architects, landscape architects, artists, photographers, designers and creative entrepreneurs) had won a tender to turn the site into a regenerative urban oasis.

The site will feature imaginatively retrofitted houseboats placed around a winding walkway and surrounded by an undulating landscape of soil-cleaning plants. It will serve as a new blueprint for urban development, where decentralised technologies, closed energy loops and full recycling of local resources empower urban areas to be self-sufficient.

Eveline Jonkhoff e.jonkhoff@dro.amsterdam.nl