Smart Mobility & Urban Development in Haven-Stad, Amsterdam
2019 Summer School

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Smart Mobility & Urban Development in Haven-Stad, Amsterdam

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2019
Summer School

Smart Mobility & Urban Development in Haven-Stad, Amsterdam
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Roberto Cavallo
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In collaboration with
AMS Institute (Amsterdam Institute for Advanced Metropolitan Solutions)

City of Amsterdam

Delft University of Technology
Faculty of Civil Engineering and Geosciences
Faculty of Architecture and the Built Environment

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The 2019 Summer School Smart Mobility & Urban Development in Haven-Stad, Amsterdam *took place from 19 till 26 August 2019 at AMS Institute, Marineterrein, Amsterdam*

Sponsored by

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Preface

Which approaches and scenarios of smart (multi-modal) mobility can be tested and applied to the future urban development of Haven-Stad, Amsterdam?

This is the main question the participants of the 2019 Summer School *Smart Mobility & Urban Development in Haven-Stad, Amsterdam* started working on.

Amsterdam is in great need of living and working space. The harbor area north-west of the city center, mainly within the A10 Ring Road, is appointed by the City of Amsterdam as the main development area to facilitate Amsterdam's need for 40,000 to 70,000 homes and 45,000 to 58,000 jobs. Currently, this area covers twelve sub-areas that are still being used primarily as a port area, industrial area, and business park.

Haven-Stad will be a new high dense metropolitan area that gives the opportunity to design from the ground up integrated mobility solutions while maintaining high quality urban planning and architectural expression. In four phases covering the next 30 years, Haven-Stad is one of the biggest urban developments ever in the history of the Netherlands.

With an interdisciplinary approach young professionals, academics, and master students had one week to explore and apply different development strategies for Haven-Stad. Their different backgrounds let the participants exchange knowledge of existing and future sustainable solutions with a strong focus on smart mobility.

This book includes the results of this intense week of work done by 41 participants from over 20 countries. Furthermore, invited experts from academia, government, and practice share their experience on urban development and mobility within the fields of urban planning and architectural design at various spatial scales.

Joran Kuijper
November 2019,
on behalf of the Organizing Committee

This summer school was organized by AMS Institute (Amsterdam Institute for Advanced Metropolitan Solutions), the City of Amsterdam, Delft University of Technology (Faculty of Civil Engineering and Geosciences and the Faculty of Architecture and the Built Environment) with the support of DIMI (Deltas, Infrastructures & Mobility Initiative) and ARENA Architectural Research Network.

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Introduction

Tom Kuipers
AMS Institute

In this year's Summer School, 41 participants from over 20 countries and with various expertise have worked in three groups on the main research question: *Which approaches and scenarios of smart (multi-modal) mobility can be tested and applied to the future urban development of Haven-Stad, Amsterdam?* Following the previous Summer Schools at TU Delft and AMS Institute—Making the Metropolis in 2017 and Integrated Mobility Challenges in Future Metropolitan Areas in 2018, which was linked to the Stations of the Future/Gares du Futur event held in Paris—in the 2019 edition, the focus was even more on the interrelationship between smart mobility and urban development, resulting in various approaches and strategies for Haven-Stad.

Cities are in transition. Most cities, like Amsterdam, are growing in terms of inhabitants, visitors, and jobs, which cause an increase in the movement of people and goods to, from, and around the city. Next to that, socio-economical factors, new insights, policies, and technology innovations change how we live and work in our cities. Mobility operates as the intersection between the city's infrastructure and its inhabitants; it is the central link in the well-functioning of a city and a key element in the organization of multi-modal transport. We have seen a rise of, among others, Mobility as a Service (MaaS), ride-sharing, and micro-mobility, and even though not implemented yet, autonomous vehicles are one of the relevant technologies to consider when looking at our future cities. How does mobility in the future impact the way our cities are being developed?

Just like cities in general, the area of Haven-Stad is in transition as well. From being a harbor area at the edge of the city center, it will be developed into a mixed-use neighborhood and will be the biggest urban generator for future developments in Amsterdam. To gain insight and to better understand the interrelationships between urban development and urban mobility and to show perspectives on integration of future mobility scenarios in an actual urban environment, we asked each of the three groups to elaborate on a specific part of Haven-Stad. Each group came up with a perspective for their area, while looking at a wide variety of aspects: the role and function of smart urban mobility, including Mobility as a Service (MaaS) and emerging mobility options; the travel behavior of a growing number of users; the sustainability challenges and fairness in transport planning; the public and semipublic spaces (and social dynamics therein); the exploration of alternative, marginal and emerging social uses of urban developments as meeting places and culture; the urban integration in the overall mobility system; the interface between architecture and infrastructure within the urban fabric; the programming of future transport nodes and the access and egress to and from such transport hubs of all types of smart mobilities (e.g. conventional public transport, shared mobility, autonomous taxis, et cetera). As the development of Haven-Stad will take over 30 years, the factor time and phasing in the approaches and scenarios is key in each of the three proposals.

The eight-day program covered different didactical components. Firstly, participants were introduced to Amsterdam, the current status of the Haven-Stad project, mobility, and future developments. Through various presentations by city representatives, participants were informed on the history, general information and mobility policies on Amsterdam and Haven-Stad. Next to that, experts from TU Delft gave presentations on smart mobility, different modes of mobility, behavioral aspects, and the state of the art of mobility-related research. During an afternoon bike tour, participants had the chance to explore the area and get a better feeling for its size and current atmosphere of the project location. During intensive and interactive work sessions with the seven tutors, analyses were made and the perspectives, approaches, and scenarios were refined. The three groups presented the final results for a group of visiting critics.

With this publication, we want to show the richness of perspectives and insights on Haven-Stad, that were developed during this short but very intensive Summer School. We are proud to present the three different projects, each with their own focus. The invited experts provided the participants with background knowledge lectures and a workshop. Excerpts of these sessions are included in this publication. We thank all participants, tutors and involved stakeholders for their efforts that have made this Summer School a success!

Design as Prospect for Action

Hans de Boer
DIMI, TU Delft

This edition of the summer school reflects the necessity of integrating spatial, transport and policy disciplines in order to contribute to an attractive and vital future built environment for Haven-Stad. The foreseen transformation of this raw and industrial port area is a unique opportunity to develop a new city district addressing the mix of functions, programs, and activities and to anticipate multiple transitions like energy, mobility, climate adaptation, and circularity.

From a strictly functional perspective, the desired amount of houses and inhabitants, companies and jobs need also schools, sports and playgrounds, parks, parking lots, public transport stops, car lanes, and pedestrian and cyclist paths which are parameters of a complex formula. They all compete for the scarce space. Through urban planning and design, transport planning and infrastructure design a spatial layout is created whereby the existing infrastructures and inherently fragmentation dictate the present and future playing field for filling in the spatial and technical parameters. It is unclear to what extent the transitions will complicate this even further or if they could be used as a direction for new opportunities. From a traditional sectoral approach, present systems must be pushed to its limits. But what about system change or even the overall integration of changed systems when addressing a future (proof) built environment?

Apart from the awareness of the lock-in by present systems, it is necessary to deal with several perspectives when addressing the parameters of the formula in order to get things moving. Especially the social, cultural, economic, and financial aspects in the context of its historical origins, present qualities and shortcomings, and prospects. As shown before in the preceding summer schools *Making the Metropolis* and *Integrated Mobility Challenges in Future Metropolitan Areas*, Haven-Stad and its surrounding areas are not a tabula rasa. The ongoing urban transformation of the Sloterdijk station area is building upon the high multi-modal node-value of the station with an increasing place value due to its new mix of working, living, and tourist residences. Creating both social and economic value could legitimize the necessary financial investments. From a cultural perspective, Sloterdijk village characterizes the polder identity of the area. The extensive allotment area act besides its social value also as a climate buffer zone absorbing excessive rainfall and cooling the local and harden area by evaporation during summer heat. However, its local accessibility by pedestrians and cyclists to and from the Haven-Stad area is lacking the human scale, due to the dominance of large infrastructures connecting the city center and port area to the highway. The connectivity and accessibility for the present functions are sufficient, but how will the merging of other functions influence them? Could Sloterdijk and its current development be the precursor and the impetus for Haven-Stad?

Developing Haven-Stad is complicated due to multiple factors; the long lead time for transformation, the uncertainties with the progress of the multiple transitions, the development and acceptance of new technologies, and the time-bound policies that could turn in an opposite direction. Without knowing the answers for future issues, scenario thinking seems evident in order to develop no-regret measures. Another strategy could be an incremental development within a robust spatial, infrastructural and policy framework, guided by planning, design and development principles derived from an overall vision, the main objectives, and the experience of other area developments.

For students it is relevant to experience and deal with uncertainties, especially now multiple transitions will be the driving forces for decades when working in practice after graduation. A research by design approach, whereby a thorough analysis is an essential element to deliver a relevant formula and its parameters, could test preliminary conclusions as a kind of hypothesis. The approach enables imagining how the future could manifest itself without actually knowing the outcome. A critical review and discussion of the imagined future and its assumptions could reveal new insights into the issue itself, the appropriateness of the formula, or into the consequences of a particular design. The actual outcome is not only its future image but especially the translation of the insight into a prospect for action. Spatial designers like architects, urban designers, and landscape architects could be leading professionals and integrators of several kinds of expertise for exploring the prospects for a comprehensive approach of the future built environment.

About Delft Deltas, Infrastructures & Mobility Initiative (DIMI)
DIMI is developing integrated solutions for urgent societal problems related to vital infrastructure for water safety and smart mobility, which are intrinsic to the natural and built environment. An integral approach, in which different disciplines cooperate, provides the best guarantee for finding these solutions And this is precisely how DIMI works at TU Delft. The 'Delft approach' is integral, innovative and down to earth.

01

POSITIONING WITHIN ACADEMIA AND POLICY

Mobility and the Sustainable Cities of Tomorrow Trends and Mobility Innovations

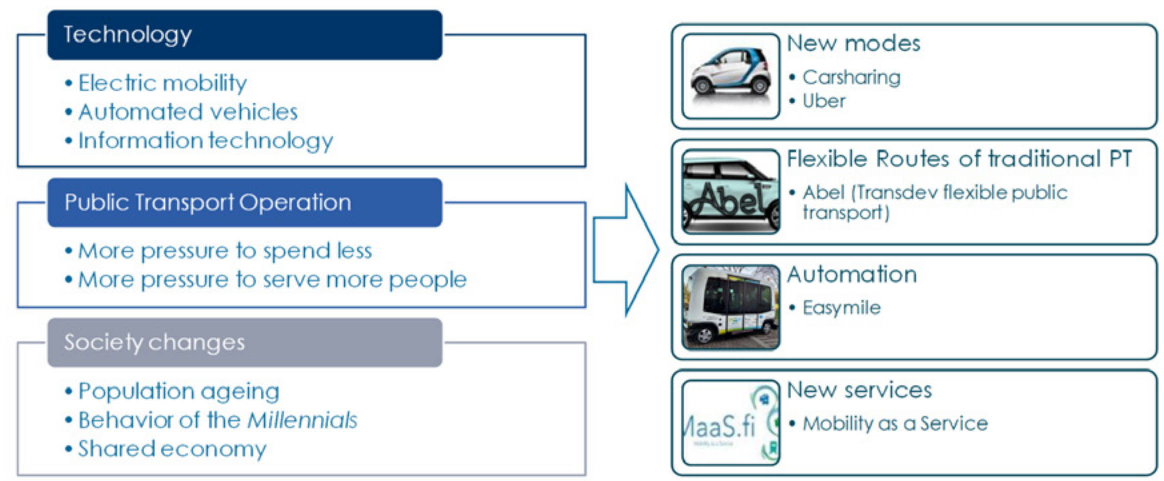
Challenges are great in managing mobility systems in urban areas. Despite policymakers aiming to transfer people from private cars to public transport it has not been possible to decrease much the impact of urban mobility on the environment and the time it takes to move around in our major urbanized regions. In the last years, though, a series of mobility-related innovations and social trends have been changing the way mobility is managed.

Gonçalo Homem de Almeida Correia

CO-Director of the hEAT Lab (research on Electric and Automated Transport), TU Delft

From a technology perspective electrification has been growing both on the private cars but also in public transport, decreasing local pollution (Vasconcelos et al., 2017; Ashkrof et al., 2020). Information technology has kicked-in and is allowing people to use public transport in a much more convenient way which is simultaneously an opportunity to collect more detailed data about people's traveling behavior (Wang et al., 2019). Finally, vehicle automation comes as a promise to make transport systems safer, more efficient and more affordable (Milakis et al., 2015; Scheltes & Homem de Almeida Correia, 2017; Nieuwenhuijsen et al., 2018; Winter et al., 2018). Regarding public transport, on the one hand, this is seen as the best solution to mitigate the effects of too much transport demand, therefore, there is great pressure to provide more, but on the other hand, there is the need to save costs with transportation systems since these are so expensive to build and maintain. Society is also changing which will lead to different needs for mobility management. Most notably there is the aging population in Europe and other countries that leads to different transport requirements and at the same time the so-called millennials are apparently buying fewer cars and focusing more on sharing transport means.

These trends have given rise to new ways of traveling. Sharing is associated to both ride-hailing with companies like Uber or Lyft, which do not own any assets but greatly disrupt the mobility market with their ride-matching algorithms (Martinez et al., 2015), but also with one way carsharing systems (Huang et al., 2018) which make cars available for when people really need a car. Traditional public transport companies too, pressured by the market evolution, have been trying to create more flexible systems to compete with the new players. This was the case with the Abel system tested in Amsterdam by Transdev, a private-public transport operator. Automation is already being used especially for first/last mile operations with several companies supplying vehicles that are used in pilots, particularly connecting train stations to the travelers' final destination (Yap et al., 2015; Scheltes & Homem de Almeida Correia, 2017) the reasoning is that these are shorter routes for which it is possible to guarantee safety in the operations of these innovative vehicles but at the same time they fill out a need that is difficult to fulfill with current expensive current human-driven buses. Last, but not the least, MaaS (Mobility as a Service) should be mentioned as one of the ways that Europe has been moving forward to integrate all the different public transport modes but also mobility innovations like shared cars and bikes and take advantage of information technologies. MaaS provides a one-stop shop for all mobility needs of travelers with integrated payment and route or trip chain optimization which should decrease the stress of travelers in finding the right mode for their trip (see figure below).



Trends and corresponding mobility innovations

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Mode Use in the Netherlands

Attitudes and Behavior

Danique Ton

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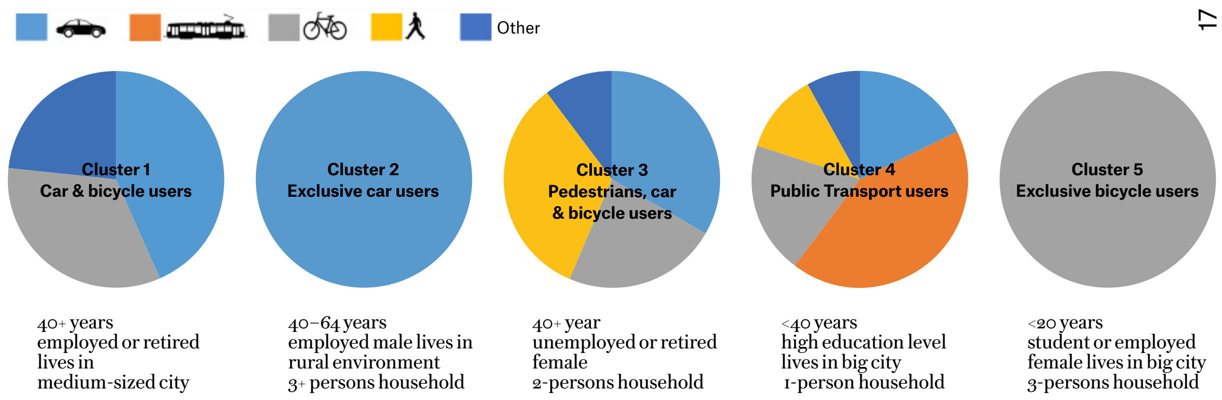
In the Netherlands, sustainable modes (i.e. walking, cycling, and transit) are dominantly present, covering around 52% of all trips on a daily basis. Still, the government has set as goal to have 200.000 commuters switch from car to bicycle. To design effective policy measures it is important to know who might switch modes, which modes are currently used, and which factors influence mode choice.



Profile of individuals that are dominant in each cluster of daily mobility patterns

A total of five clusters of daily mobility patterns have been found in the Netherlands, see the figure above (Ton et al., 2019b). Generally, individuals are more positive towards a mode they use on a daily basis, compared to unused modes. However, some individuals are using modes they prefer least, therefore providing room for change. In the car-dominant clusters (1-3), walking and cycling are options that could be explored via the employer (as most are employed). Transit is generally less preferred and is less likely seen as an alternative. Short term campaigns can help increase awareness of other modes.

Individuals are mostly habitual in their commuting mode use (e.g. only car). Some individuals alternate between two modes (15%). The experienced commuting mode set was explored to identify which factors explain the willingness to add an additional mode (i.e. more sustainable) to the mode set (Ton et al., 2020). Important drivers are found in the work environment. Being reimbursed by the employer for a mode increases the likelihood of using that mode, while at the same time discouraging use of some other modes. For example, bicycle reimbursement has a positive effect on the use of bicycle and local transit, but a negative effect on car usage. Next to this and the importance of ownership, also the urban density of the home location and sociO–Demographics are important. A city like Amsterdam, results in a higher probability for including cycling, local transit and train in the experienced choice set compared to less dense areas.

Mode shares vary largely for different trip purposes and trip durations. However, for each mode several factors can be named that have a positive or negative association with the probability of choosing that mode for a trip (Ton et al., 2019a). Positive associations with the bicycle are mostly found in the trip characteristics and sociO–Demographics. Traveling with a larger group has a negative association with cycling. Cycling is most likely for school, work, and leisure trips. Having a transit subscription has a positive association with cycling, whereas having a lease car has a serious negative association with cycling.

In conclusion, the Netherlands has potential for increasing the share of sustainable modes. Many individuals have a limited set of modes they use (habit), therefore a modal shift requires attention to various aspects. Increasing awareness is one of them, but the different factors positively associated with sustainable modes can also provide input for effective policies. Employers play an important role in the mode use/choice of its employees, via the reimbursements they provide.

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The agent-based simulation model of Amsterdam

Implications of On-Demand Services on Urban Mobility

Jishnu Narayan

PhD at Smart Public Transport Lab, Department of Transport and Planning, TU Delft

Increasing urbanization around the world caused by rapid economic growth has produced an ever-increasing need for efficient mobility systems for users in urban areas. The recent advancements of various ICT platforms have facilitated the emergence of on-demand services which include individual or shared mobility, ride-hailing and ride-sourcing services, where the users and service providers or drivers interact through an online platform. These services have the potential to effectively operate offering individual or shared Door-to-Door or Stop-to-Stop services.

The spectrum of on-demand services varies depending on aspects like sharing and ownership. Such innovative mobility solutions could potentially address the problems inherent to a conventional public transport system to some extent, attract privately owned car trips and make urban mobility more efficient. And they can impact urban mobility on various levels such as congestion, parking spaces and the service of public transport. Moreover, depending on the operating area (urban or rural) the on-demand services have different implications on mobility. Some of the key operational aspects of these systems are vehicle dispatching, relocation, detouring and fleet size dispatching.

The impact that on-demand systems have on urban mobility stresses the importance of models for the design and operation of these services; like behavioral models for users, traffic flow models, and operational models for vehicles. The general input to such a model consists of the network (infrastructure and public transport service), demand (users traveling from origin to destination), and the supply (vehicles and fleet size). The model needs to be calibrated for the parameters used and the results need to be validated and verified. Simulations models, particularly agent-based simulation models have been proven to be more efficient in capturing the real-time dynamics compared to analytical models. The modeling capabilities of agent-based simulation models cover both microscopic (vehicle to vehicle and vehicle to surrounding interaction) and macroscopic (fleet cooperation, routing and dispatching) aspects. The Smart Public Transport Lab research group at Delft University of Technology developed an agent-based simulation model of Amsterdam (network is shown in figure) to investigate the impact of several on-demand services on the mobility of users. The modeling capabilities include user behavior (day-today learning) and supply (car, public transport, active modes, and on-demand transport). The model can be applied to determine service externalities (parking, user waiting time, and vehicle rebalancing), fleet size utilization, and to designate transfer points between public transport and on-demand service.

In conclusion, the current trends and mobility demand have favored the rise of on-demand systems. Such services affect urban mobility on several levels (congestion, parking level, travel time of users) and are multi-dimensional in operation and design. Modeling tools for the design and evaluation must be equipped in order to capture the real-time dynamics of such services.

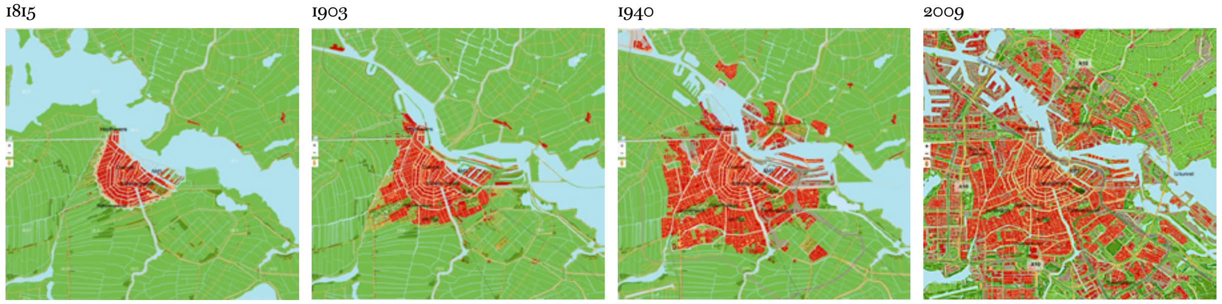
Transport Network Design and Management

Hans van Lint

Data Analytics & Traffic Simulation Laboratory, TU Delft

A linear narrative of transport network design starts with people having needs and desires. To fulfill these, they engage in activities which require all sorts of goods and services. Since these activities, goods, and services are spatially spread, transport networks and systems are designed and managed to serve the underlying needs and desires. This idealized chain of cause and effect makes sense, but it only scratches the surface of the complexities involved. In reality, transport systems are constrained by geographical, societal and economic factors, and typically co-evolve with those needs, desires, activities, goods, and services. Moreover, the objectives of the stakeholders involved are often conflicting. All this results in elaborate and dynamic feedback loops over long and short timescales, which make designing and managing transport systems highly complex. Three such complexities will be discussed.

Amsterdam in:
1815 1903 1940 2009



Transportation networks are historically constrained
As the maps of Amsterdam show, the dominant transportation network consisted of the canals and waterways from and to the docks, with roads alongside and perpendicular (via small bridges) for walking and carriages until the start of the 19th century. This center-oriented ring-radial structure was not ideal for horse and carriages or walking, but it sufficed and was acceptable because shipping was the dominant mode for trade. This changed dramatically with the introduction of trams, trains and the automobile. Today the base topology of all road and public transport in Amsterdam is still ring-radial, and highly vulnerable to congestion, with several hundred thousand travelers in cars, trams, and trains that need to be served every day. On top tourism days the entire system is stretched far beyond its limits. The densification projects in the city, with for example Haven-Stad adding 40,000-70,000 residents and 45,000-60,000 working places right in the heart of this transport system, will put even more pressure on the system.

The performance of transport networks under pressure goes from bad to worse
Traffic in networks can be highly efficient as a result of travelers and freight movers maximizing their objectives. However, this self-organization process becomes very inefficient when the number of participants exceeds a critical threshold. Beyond this threshold, the capacity of the network decreases, because an increasing number of queues will block an increasing number of paths in the network, which may lead to a total gridlock. For a city like Amsterdam, a car-dominated person transport system is inefficient and undesirable from economic, societal and environmental standpoints. This is well understood. However, also public transport systems become vulnerable when used to capacity. Adequate and integrated multi-modal control and management of transport systems are therefore crucial to guarantee the accessibility of metropolitan areas.

Designing transportation networks is fraud with dilemmas
The tendency of natural systems in which things flow is to evolve into hierarchical networks. Like the blood circulation in the human body with tiny hair veins at the extremities and large arteries and veins from and to the heart and lungs. Hierarchy is highly efficient for transport networks as well. However, more hierarchical levels require more investments and space to connect the levels and complexify the control and management. A second dilemma relates to the number of access nodes. An intercity station in close vicinity is convenient, however, an intercity that has too many stops is no longer an intercity, and a freeway with an on-ramp every kilometer is no longer a freeway. A third dilemma is where to place access points. For example, Haven-Stad could be designed as a car-free area, with access points to the main Amsterdam road network in a circle around it. Where should these access points be located? Should Haven-Stad get its own train station and if so, where? Or a set of tram stations? Or perhaps just a hub for buses? The fourth and final dilemma involves how densely the nodes should be connected. One could construct a minimal network that allows for hi-frequency services but forces travelers to take detours or choose a dense network that offers low-frequent direct door-tO–Door services. All four dilemmas relate to reconciling money and resources versus (societal) value and managing externalities.

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The Transforming Dutch City seen through the Infrastructural Changes

Railways and the Case of Amsterdam

Roberto Cavallo

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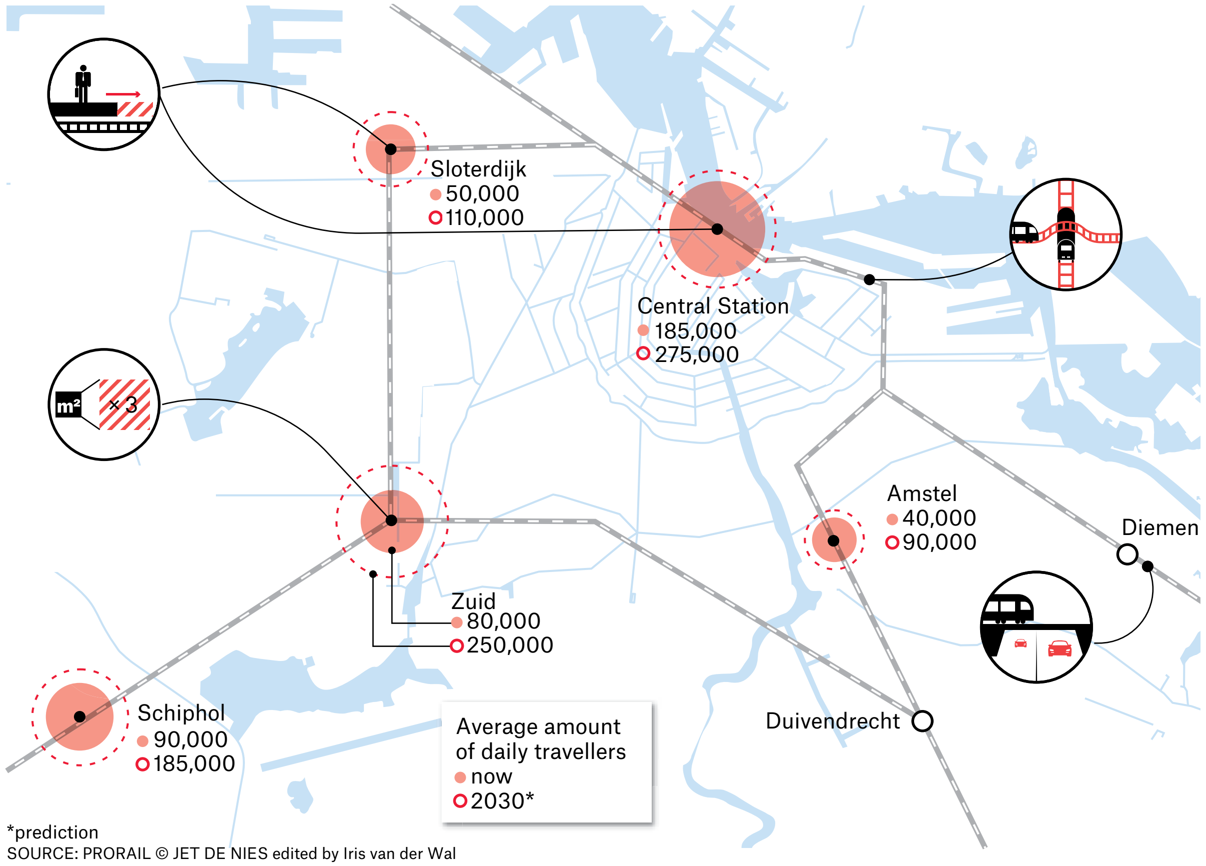
The relation between infrastructures and urban transformations is a complex matter. When we look at the Randstad, this part of the Netherlands is characterized by not only its urban development in the last 150 years, but also by the fact that the territory changed; herein geomorphology, waterways, and railroads play an important role. Since the Middle Ages, a well-developed system of canals is ordering landscape and cities, while roads had shallow relevance. Therefore, it is not a coincidence that the first Dutch railroads were positioned parallel to the canals. Land expropriation was easier there and the railway layout could be kept as straight as possible, saving resources.

Railways and cityscape

The first railroads approached the Dutch cities by different starting and ending points. The relatively small cities were all walled at that time and the railway lines ended outside, near the city gates, avoiding direct confrontation between the historical city and the new means of transportation. The very first Dutch railroad, opened in 1839, was positioned parallel to the existing canal connecting Amsterdam to Haarlem (dating 1631). Next to the railway to Haarlem, the construction of another railway to Utrecht started in 1843. This resulted in two terminus stations, Willemspoort (west) and Weesperpoort (east). The presence of two terminus stations in the capital city caused problems in the following years, especially logistic ones. The main concern was the connection between these lines and the link with the harbor. Discussions went on for years and only with the realization of Amsterdam Central in the 1880s, railways and port had finally interconnected one another. However, this project had a remarkable impact on the cityscape, changing the visual link between the historical center and the IJ water. Yet, among other issues, and next to the station, the realization of long dikes, viaducts, high and partly moveable bridges also created new physical barriers between city and water. Making a jump in time, the rise of vehicular traffic in the 20th century brought along the construction of extra viaducts and bridges parallel to the train tracks, this time needed for the accessibility to the central area of the city by road. Within this context, one drawback to mention is the ever increasing barrier effect between city and water.

Metropolitan railway projects

Meanwhile, from mid 19th century onwards, the railway proved to be a reliable solution for the growing mass transportation demand in expanding cities. In addition, particularly underground railways became good alternatives for an overcrowded, congested city-fabric where land prices were too high to consider building an overland rail network. While London, Paris, Vienna, and Berlin were busy with the realization of metropolitan railway systems, this discussion did not even become an issue in The Netherlands up to almost 1930. Due to their size and relatively small population, the Dutch cities, including Amsterdam, did not urge the introduction of metropolitan railway lines. The only exception worth mentioning is the Plan Zuid project by Berlage, proposing as early as 1915 an additional railway station on the southern edge of the extension of the city, implicitly suggesting the possibility of a bipolar transportation system in the city with central and south stations. Although the realization of Plan Zuid rolled out relatively soon after the project, the Amsterdam South station was only to be realized in 1978.



The average amount of travelers using the Amsterdam train network

The 1935 AUP (Amsterdam General Plan of Expansion) of Van Eesteren clearly pointed out the necessity of connecting the planned outskirts of the city with the center of Amsterdam, including plans for metropolitan railway lines. Due to the Second World War, this topic shifted in time and only in the 1960s the discussion was picked up again. Despite the city had grown considerably, rather than in Amsterdam the plans for metropolitan railway lines became more concrete In Rotterdam. Here the Second World War bombings had destroyed almost the entire city and the framework of reconstruction works opened the opportunity for all kinds of interventions. Therefore, the project and construction of the first metropolitan railway in Rotterdam runs relatively easy as part of the re-building developments of the city; the first metropolitan line, Erasmus line, opened in 1968. In Amsterdam things went differently; not without setbacks in social as well as in economic terms, the first two metropolitan lines opened in 1977. Nevertheless, also due to the many problems caused by the previous metropolitan railway projects, the plan to connect north and south of Amsterdam remained for many years only a wish. In 1999 the central government approved the realization of this line, a decision ratified only in 2002 by the municipality. After many years of political discussions, difficult as well as challenging works and financial setbacks, in July 2018 the new Noord/Zuid line finally opened. This line functions as the link between the north, central station and the new Zuidas business district.

Stations in transition

Amsterdam stations are getting overcrowded. Train passengers' figures are constantly rising and the projections for the next years are indicating a further increase. Central Station, right now counting about 200,000 passengers per day, will grow to 275,000, maybe even 300,000 in 2030. Station Zuid will have an unbelievable increase, from the current 80,000 to 250,000 in 2028. Sloterdijk station will increase from around 50,000 to about 110,000 people per day in 2030. Also in other stations the number of passengers will grow significantly in the next decade. Therefore accessibility, safety, and passenger flow measures are a priority and substantial funding is reserved for transforming and updating the stations. In addition, the new Amsterdam-Zuid station is yet to be realized. Above all these developments, the next years will be crucial for Amsterdam stations. As the city has reached its limits in terms of expansion, and the population will keep growing, the municipality is planning a number of densification projects in the so-called Ring Zone, basically the area between pre- and post-war Amsterdam. For obvious reasons, the most pivotal projects are located in the vicinity of infrastructural nodes and all railway stations will have to be the carriers of these urban transformations. In fact, next to the Zuidas, new mixed-use projects are already being realized at Sloterdijk and Amstel stations. The big question here is whether the spatial interaction between these stations and their neighborhoods will be accompanied by a proper transformation of the public space which is now usually lacking quality. The combination of the increasing number of passengers and the future densifications will require versatile stations in spatial quality tune with their context.

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Haven-Stad Mobility

Micha Sijtsma

APPM Management Consultants
Manager Mobility Haven-Stad
at the City of Amsterdam

Haven-Stad is located in northwest Amsterdam, mostly within the A10 Ring Road. The area of 650 hectares consisting of ports and industrial sites, and will be developed over the next 35 years into a mixed-use urban area. Haven-Stad will meet the high demand for housing and further growth in the number of jobs, with themes such as sustainable energy, climate adaptation, and economy as an integral part of the project. The ambition of the City of Amsterdam is to create 40,000–70,000 houses and 45,000–58,000 jobs in this area, therefore, it is one of the largest transformations in the Netherlands at the moment. This development with its increasing amount of inhabitants and visitors is accompanied by a big challenge for the mobility in this area.

High density
Only through densification, the extensive mixed-use program of living and working can be realized on the relatively small area of Haven-Stad. In its full capacity, it will accommodate around 140,000 people, meaning around 20,000 people per square kilometer (or 200 per hectare). Nowhere in Amsterdam, nor the Netherlands, urban areas with such a high density can be found. By minimalizing the footprint, the green and blue areas can be preserved, including the wetlands north of Amsterdam and Zaanstad.

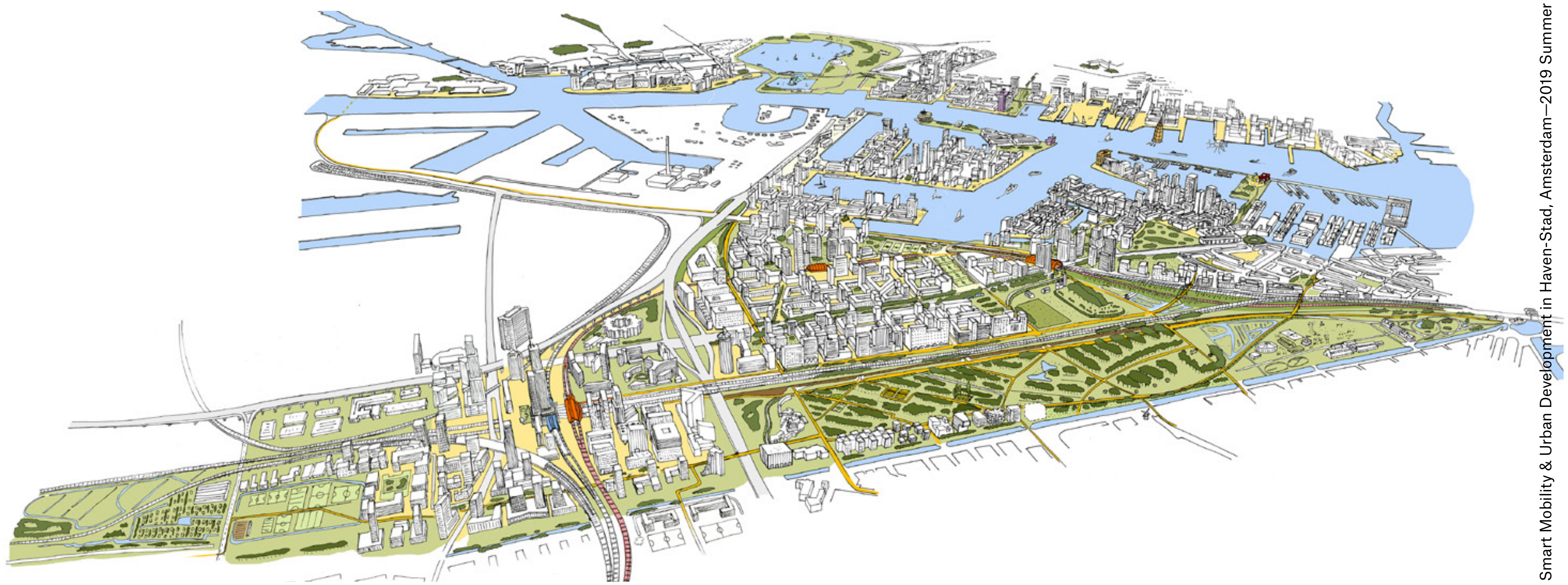
Furthermore, the high density development positively influences the accessibility. Densification in combination with the mixed-use program is a relatively cheap solution for the accessibility of Haven-Stad, since it shortens the distances between housing, work, school, facilities, et cetera. And for a large group of city dwellers, these short distances increase their quality of life. An important point of attention when building in high densities is the use of space for the increased mobility on a smaller area as a result. For Haven-Stad, this requires a well-considered choice for the transportation system, preferably resulting in a limited use of space. Choosing to focus on cycling and walking becomes obvious.

Low-traffic district
Many Haven-Stad residents will be unable to own a car, due to the low parking ratio of 0.2 car per home. Therefore, alternative and attractive transportation options have to be provided in order to make them accept the lack of an own car. The same applies to visitors of this new district, who will often have to use alternative modes. Of course, Haven-Stad will not be completely car-free; as there will be taxis, shared cars, delivery vans, busses, trucks, ongoing car traffic between the A10 and the city center, et cetera. In that sense, Haven-Stad will be turned into a relatively low-traffic district.

The low-traffic areas refer in particular to the various neighborhoods of Haven-Stad, consisting of pleasant streets that are the domain of cyclists, pedestrians, and playing children. The cars will be concentrated as much as possible at the edges of these neighborhoods in mobility hubs (with shared mobility) and indoor parking facilities. Loading and unloading stays possible at designated so-called drop zones.

Alternatives
A recognizable public transport network is created with a few metro stations on the south bank of Haven-Stad, connected to a number of tram and bus lines that operate in the district. The metro functions as a backbone, from which the other public transport lines branch off. The metro stations are quickly and safely accessible by bicycle and on foot, and serve an important function in the transfer between the modalities. Cyclists and pedestrians are the main users of a large part of the Haven-Stad streets. The infrastructural network for these road users is recognizable throughout the whole new district.

The bike lanes connecting to the surrounding, existing neighborhoods are planned in such a way to create interaction and exchange with these neighborhoods. For example, the facilities in these neighborhoods are easily accessible from Haven-Stad, and vice versa.The design of functional and fast connections between Haven-Stad and the rest of Amsterdam is one of the biggest challenges in the coming period.



Public Transport Data Applications

Ties Brands

Department of Transport
and Planning, TU Delft

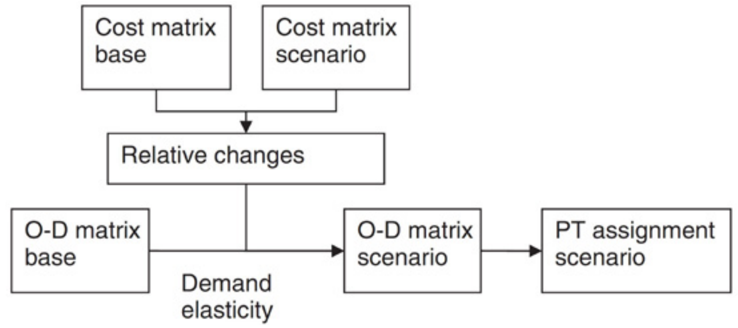
Smart Mobility in the context of public transportation can be interpreted as the use of automated data sources. The two main data sources available in public transportation are passenger data from smart card systems and vehicle data (Automated Vehicle Location: AVL-data). Other data sources relevant for public transport modeling and analysis are for example smartphone location data, passenger counts, surveys, or smartphone tracking app data. For the two most important data sources examples of practical applications are given in the following sections: smart card data and AVL data.

Example 1: What-if analysis with smart card data
This example was published earlier in Van Oort et al. (2015)
Public transport operators are collecting massive amounts of data from smart card systems. In the Netherlands, every passenger checks in and checks out; this system creates detailed records of demand patterns. In buses and trams, users check in and check out in the vehicle. Options for analyzing smart card data and performing what-if analyses with transport planning software are explored.

Van Oort, N., Brands, T., & de Romph, E. (2015). Short-Term Prediction of Ridership on Public Transport with Smart Card Data. *Transportation Research Record: Journal of the Transportation Research Board, 2535*, 105–111.

On the basis of big data, this new generation of transport demand models add to the existing range of transport demand models and approaches. The goal is to provide public transport operators with a simple, easy-to-build model to perform what-if analyses for network scenarios. The data are converted to passengers per line and an origin–destination (O–D) matrix between stops. With the introduction of an elastic demand model, changes in the level of service realistically affect the passenger numbers.

The steps of the elastic demand calculation are shown in the first figure on the next page. First, a public transport route choice algorithm is used to calculate generalized cost matrices for the base situation and the situation that includes a network scenario. Comparing the cost matrices results in cost changes for each O–D pair. The O–D matrix for the base situation (from smart card data) and an elasticity value are used to calculate the relative changes in O–D flows, resulting in an O–D matrix for the network scenario. The final step is to assign this O–D demand to the public transport network, again using an algorithm for public transport route choice. In bottom figure on the next page two examples of results of network scenarios are shown. Left in the figure the effect of frequency increases on two lines is shown, with expected ridership growth on these lines (green) and a small decrease on a nearby line (red). Right in the figure the effect of a route change (trams are diverted when a link is blocked) is shown. The total number of passengers decreases because of higher travel costs on the new route: the increase on the diverted line route (green) is smaller than the decrease on the original route (red).



Schematic representation of the demand prediction model

Example 2: Automatic bottleneck detection using AVL data
This example was published earlier in Brands et al. (2018)
Service reliability, which is a result of variability in operations, is the certainty of service aspects compared to the schedule as perceived by the user. Unreliability causes longer and uncertain passenger journeys, due to longer average waiting time. In the case of crowded public transportation operations, also due to longer dwell times. In numerous studies, reliability-related attributes have been found among the most important service attributes.

Brands, T., & van Oort, N., (2018). Automatic bottleneck detection using AVL data: A case study in Amsterdam. *15th Conference on Advanced Systems in Public Transport.*

In Brands et al. (2018) a method is developed to automatically detect bottlenecks in the public transport network in a systematic way. AVL data is used as a data source for analyzing service reliability. A tool is developed to translate the data into valuable information about the quality of service.

Effect of two example scenarios in a public transport network: frequency increase (left) and route change (right).

Data processing

The following data is generated from the AVL data and aggregated.

- Realized dwell time (the difference between actual arrival time and departure time);
- Realized punctuality (the difference between actual departure time and planned departure time);
- For each line segment (from previous stop to current stop), realized run time (the difference between actual departure time at the previous stop and actual arrival time at the current stop);
- Using the length of each segment these travel times are converted into speeds.

The average values are calculated for each time period, as well as the 15, 50, and 85 percentile. Each of these values is calculated for six different time periods:

- AM peak (7 AM–9 AM) on workdays;
- Inter peak period (9 AM–4 PM) on workdays;
- PM peak (4 PM–6 PM) on workdays;
- Evening period (6 PM–midnight) on workdays;
- Saturdays;
- Sundays.

These time periods represent the relevant distinctions between several situations to analyze. In both peak periods, the largest delays and travel time variations are expected due to high traffic volumes: in many cases only in the peak direction. In the AM peak most traffic is commuter traffic, while in the PM peak traffic is more mixed with other purposes. The inter peak period on workdays generally has moderate traffic volumes with a lot of leisure traffic, comparable with Saturdays. Evening periods on workdays are usually less busy, just like Sundays.

Bottleneck detection

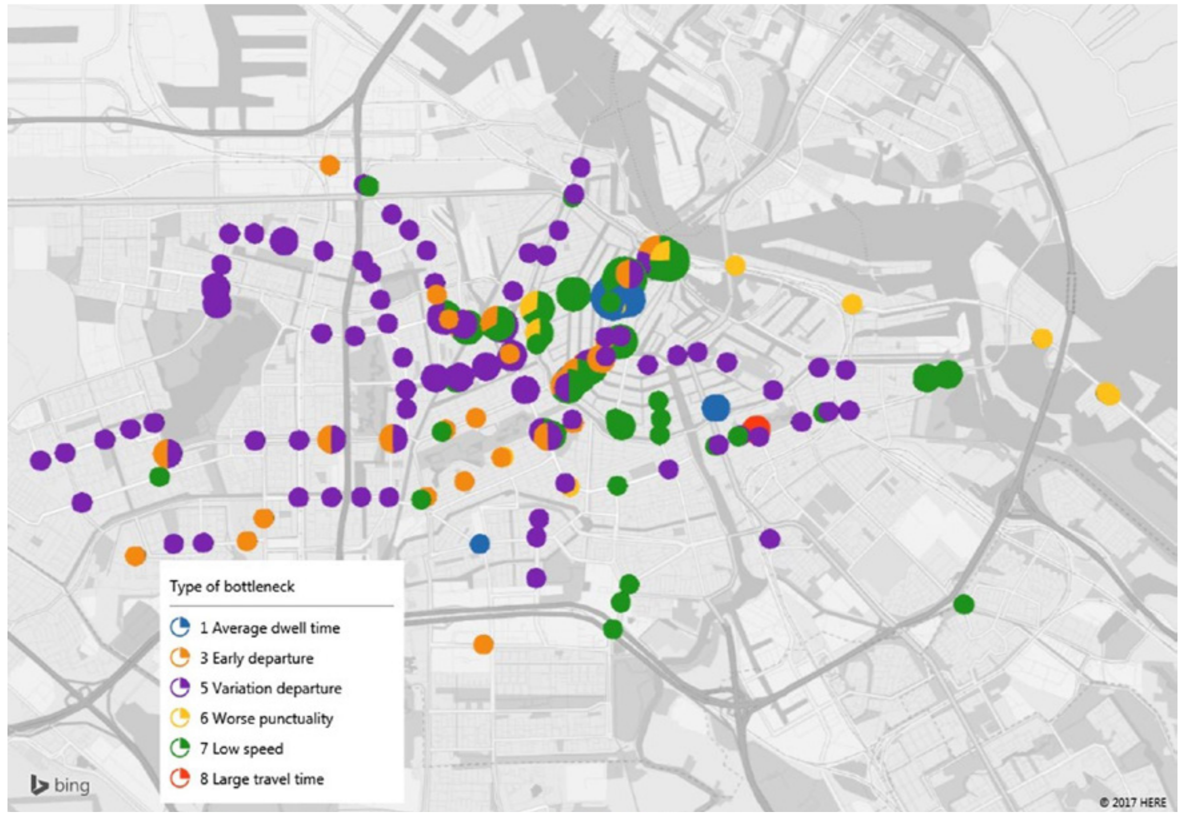
Based on these aggregated data, the following definitions are used to identify bottlenecks. The parameter values used in an example case study (Brands et al. 2018) are mentioned between brackets, and are based on expert judgment of the authors and of Dutch public transportation operators and authorities.

- Large dwell time (larger than 60 seconds);
- Large variation in dwell time (difference between 85th and 15th percentile values larger than 120 seconds);
- Early departure (more than 60 seconds early);
- Late departure (more than 180 seconds late);
- Large variation in departure time: (difference between 85th and 15th percentile values of punctuality is more than 300 seconds);
- A punctuality change compared to the previous stop (of more than 60 seconds). If this is the case, a structural delay occurs at the stage between those stops, that is not included in the schedule;
- Low speed (lower than 15 km/h);
- Large travel time compared to free flow (more than 60 seconds difference with the 15th percentile of the travel time on Sundays).

If at least one of these criteria is met for a specific stop on a specific line and direction, a bottleneck is added to the list. This list is made for each time period.

Results

The method is applied for the case study (tram network of Amsterdam, The Netherlands) using the mentioned parameter values. In figure on the next page the geographical spread of detected bottlenecks is shown.



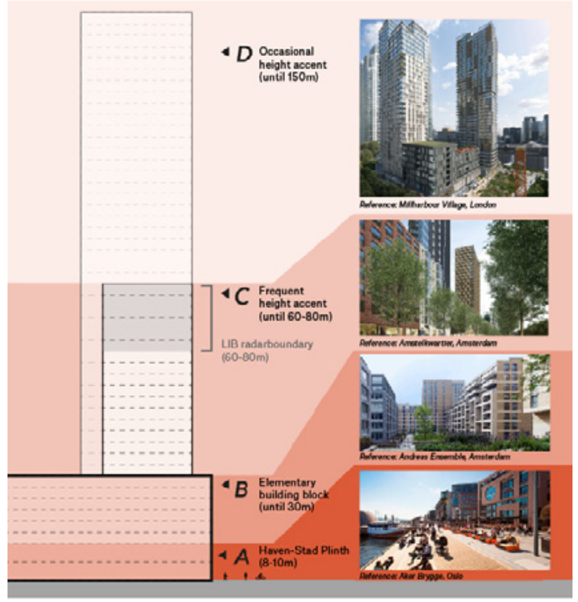
Geographical representation of bottlenecks during the PM peak for the example in Amsterdam, The Netherlands

HAVEN-STAD Amsterdam

Haven-Stad Amsterdam

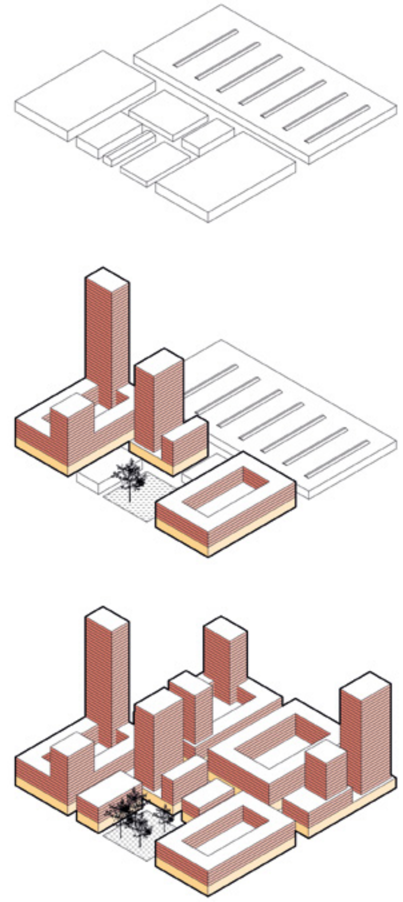
City of Amsterdam

Enclosed by the Sloterdijk Station area to the southwest, the IJ to the northwest, Westerpark to the southeast, and the NDSM grounds to the northeast lies an area in which over the next few decades 40,000 to 70,000 homes and 58,000 jobs will be realized. With the city center ten minutes away by bike and Zaandam twenty minutes, this is prime territory. Here, a city within the city will take shape: Haven-Stad (Dutch for Harbor-City), an area mainly within the A10 Ring Road with immense potential to transform from an office and industry zone into a fully-fledged living and working Amsterdam neighborhood.

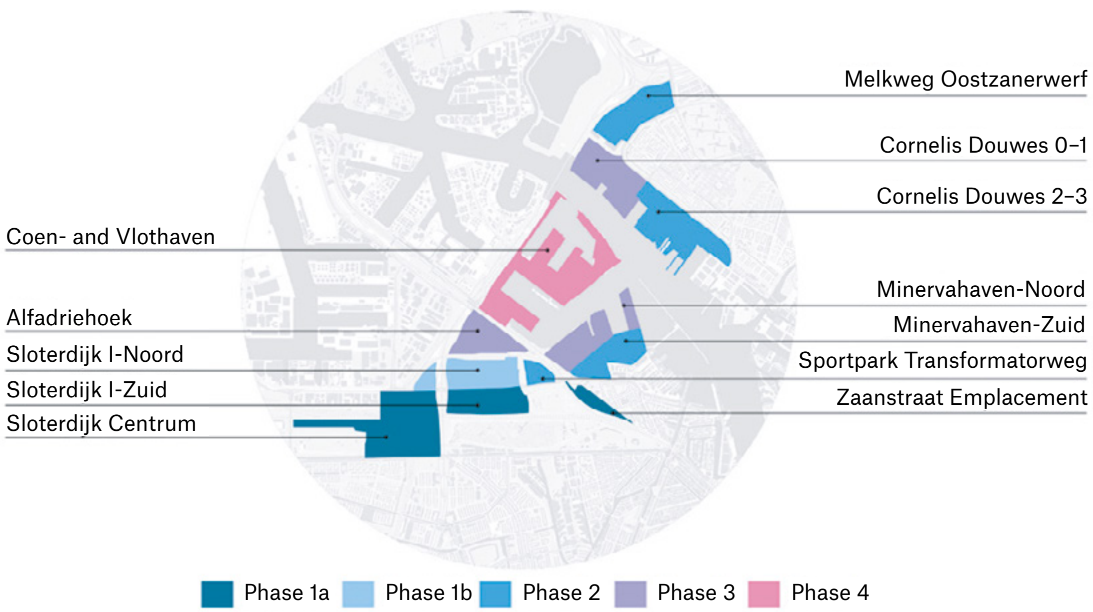


Highrise vision Haven-Stad

right: Haven-Stad will gradually transform into a highly dense urban mixed-use neighborhood, developed upon existing industrial lots



Haven-Stad's sub-areas and phasing



With the creation of Haven-Stad, there will literally be 'more of Amsterdam'. One of its most distinguishing features will be the IJ and harbor basins dissecting the area. A beautiful space that will be able to absorb the population increase, and where the creative and manufacturing industries can flourish. There are also opportunities to reinforce Amsterdam's public transport connections with the surrounding region. And Haven-Stad's size offers an excellent opportunity for sustainable developments.

Metropolitan living

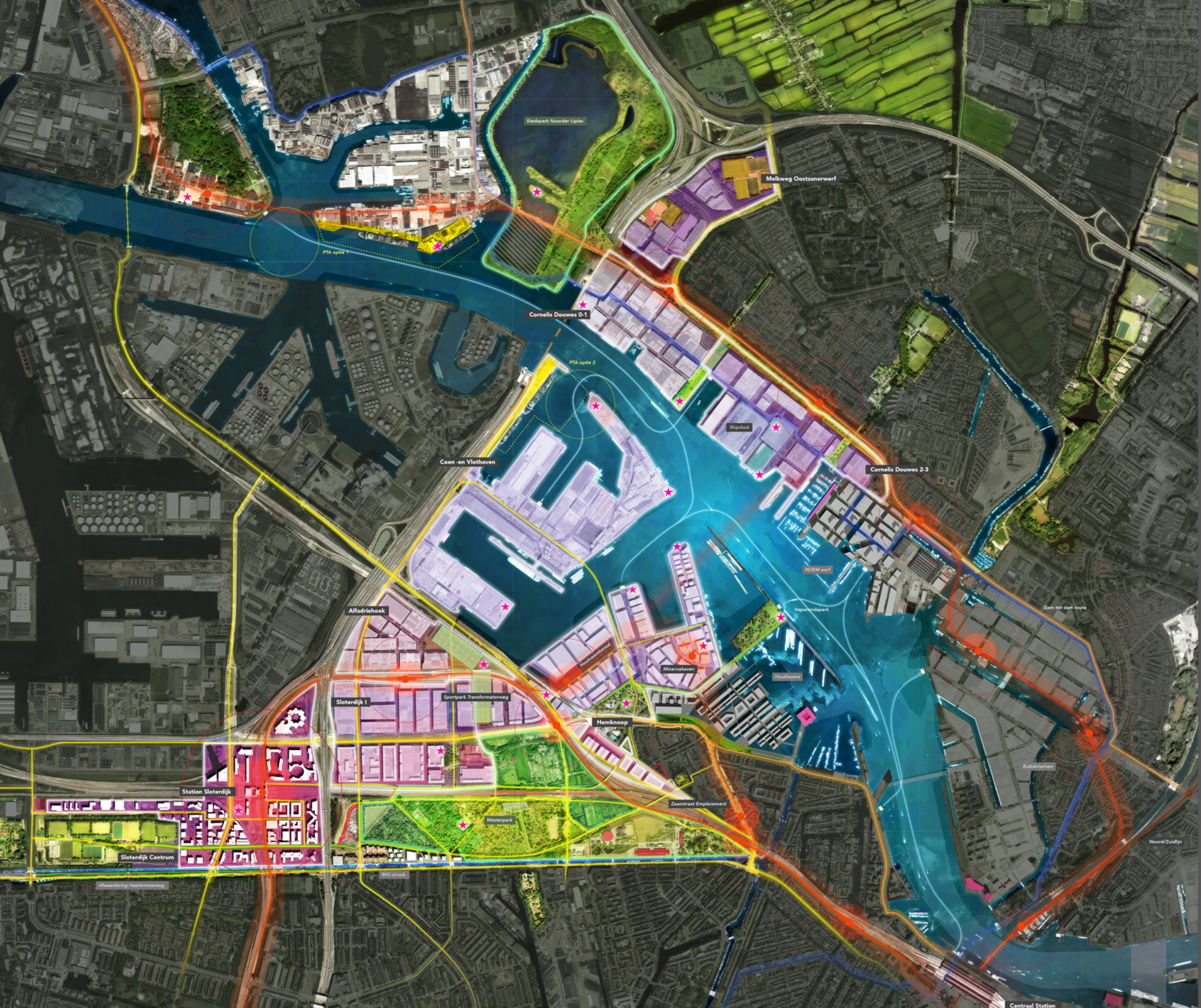
The plans for Haven-Stad are not a static blueprint—their ambitions and goals offer an inviting perspective. There are clear principles and secondary conditions to create an attractive mixed-use neighborhood: a metropolitan area where public transport, cyclists and pedestrians are given priority. Every neighborhood will be provided with all necessary amenities, from schools, sports, leisure, and care facilities to shopping and greenery, always taking into consideration each sub-area's characteristics, qualities, and opportunities.

Areas already in transition

The transformation will be carried out gradually and in stages. The initial changes are already visible: the Sloterdijk Station area is quickly changing from mostly offices to a mixed-use living and working area. Over the next few years, around 1,500 homes will be built in Sloterdijk Centrum across various segments. For the Sloterdijk I Zuid area, the production of approximately 4,600 homes is being prepared. More areas to develop (Sloterdijk I-Noord, Minervahaven-Zuid, Sportpark Transformatorweg/Amsterbaken and Zaanstraat Emplacement) are planned from 2029. Amsterdam is exploring the possibilities of accelerated planning of these areas, without obstructing existing companies in carrying out their business activities.

In the future, Westerpark, and Noorder IJ-plas will form Haven-Stad's central city parks and serve as green links with the center as well as with Zaanstad. For both parks, plans are being developed to improve ecological qualities, user potential, and accessibility.

HAVEN–STAD VISION



LEGEND

- Boundary subarea
- Boundary city park
- High quality public transportation (HOV)
- Alternative route HOV
- HOV stop
- Bicycle network
- Ferry network
- Possible location Passengers Terminal Amsterdam
- Turning circle cruise ship
- *Ankers aan het IJ*
- Iconic building, object, or cultural accent
- Possible location iconic or cultural accent

Development Strategy Haven-Stad

Approved by the city council on December 21 2017

Gemeente Amsterdam

Ruimte & Duurzaamheid

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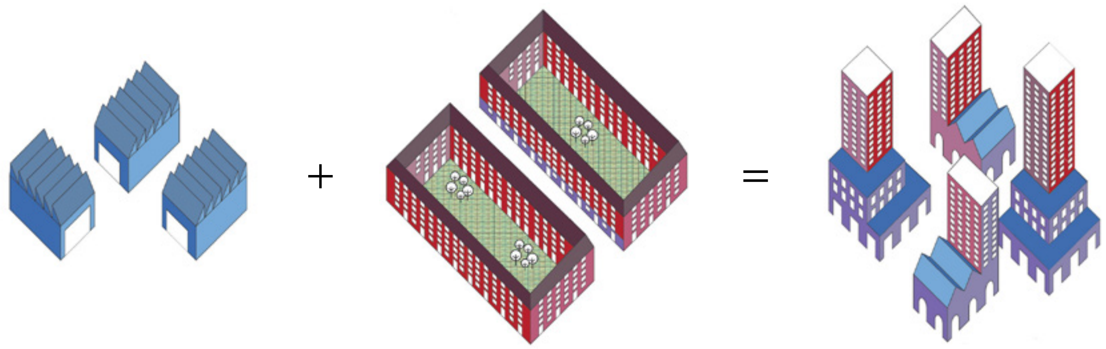
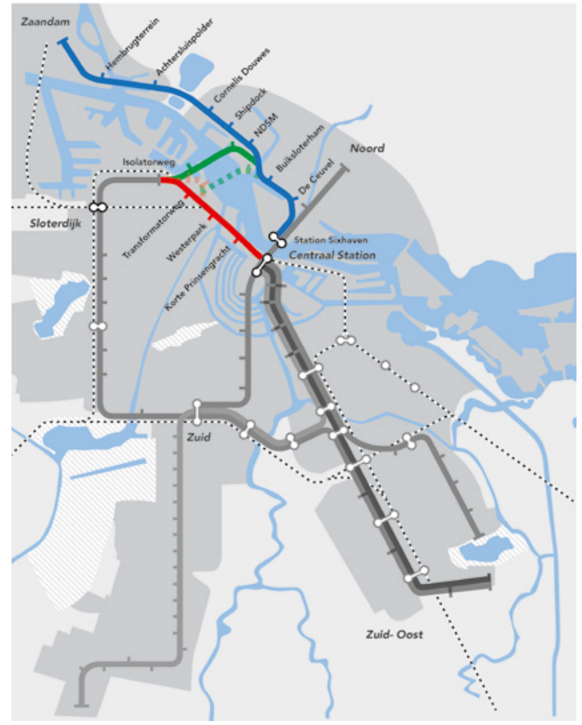


The combination of working and housing results in a new building typology: 'live-work buildings'

High Quality Public Transportation network (HOV) with existing and optional routes The dotted lines show the optional routes.In red the connection to Amsterdam's city center closing the Circle Line, in blue the connection between Amsterdam and Zaanstad.



More jobs

At the moment, Haven-Stad is an area dominated by light and heavy industrial activities as well as office buildings. The transformation will not spell the end of the area as a working zone—quite the contrary. In Haven-Stad, living, working, studying, and leisure activities will take place side by side, below and above each other. Twenty percent of all building floor space has been earmarked for work of all kinds.

Sloterdijk and the Minerva Harbor are already attracting a growing number of small businesses from the creative, knowledge, and innovation sectors. These companies capitalize on the area's mix of living, working, and recreational possibilities. Because of its origin, its history, and its prime location, Haven-Stad is ideally suited to manufacturing, crafts, tech incubators, etcetera. Upon completion, Haven-Stad is expected to provide 58,000 jobs, which is more than there are now.

Diverse neighborhoods in an inclusive city

The Amsterdam tradition to strive after demographically diverse neighborhoods in terms of socio-economic status, age, and type of household, will prevail in Haven-Stad. For example, housing programs will include social housing, middle-income housing and housing for the elderly or people with disabilities. Social and cultural amenities will support a pleasant, safe, and healthy living environment. With high employment figures and living densities, plus all necessary facilities, Haven-Stad will offer opportunities for personal fulfillment to all.

Sustainable and mobile

Due to its scale, Haven-Stad offers unprecedented opportunities to decrease the city's ecological footprint. Haven-Stad will be developed to be energy neutral, circular and rainproof. The project's scale makes it also necessary and possible to develop completely updated energy grids. Buildings will no longer be on the natural gas grid, whereas traffic will be emission-free.

Residents, workers and visitors alike should be able to travel in an efficient, pleasant and safe manner: walking, cycling or otherwise. The current car infrastructure, including the A10 Ring Road and the road network, cannot process much more car traffic. This is one of the reasons to upscale public transport facilities and organize a new balance in transportation alternatives. The aim is to have a ratio of 30% public transport, 30% cycling, 25% pedestrians and 15% cars.

Haven-Stad will only accommodate one parking space per five homes, which means there need to be credible alternatives for car ownership and use. Haven-Stad will prioritize cyclists and pedestrians, adequate ferry connections, mobility hubs for car-sharing schemes, and combine these with high-grade public transport networks and hubs to catalyze metropolitan development. Simultaneously, the quicker this development takes place, the sooner transport networks will offer maximum returns through intensive use. On top of that, Haven-Stad will need to be well-connected with surrounding neighborhoods and the rest of the Amsterdam metropolitan region, to play its part in the regional economic and cultural meaning. Reliable, fast and high-grade bus or tram connections to Zaanstad, and extending metro lines from Isolatorweg Station to Central Station will create a closed circle line and form the basis of the public transport system.

Interview Arjan Klok

Haven-Stad's Chief Urbanist at City of Amsterdam
by Iris van der Wal

Aerial view of Haven-Stad with the crossing train tracks of Sloterdijk Station and the A10 Ring Road.

The City of Amsterdam has been working on the Haven-Stad project for many years now. What do you think about this Summer School, in which participants came up with three proposals in just one week?
This kind of summer school produces many interesting thoughts but it cannot be expected to define ultimate solutions. The Haven-Stad project is far too complex to tackle in such a short time. Yet these summer schools are always valuable. Sometimes we do not have the time nor space to zoom out and to rethink our views on urban design, so the agenda-setting nature of these workshops is very relevant. And it is always interesting to see how an international, interdisciplinary team tries to fathom what kind of project Haven-Stad actually is.

Moreover, it is very important to involve the new generation right now because they are the ones that will fine-tune projects like Haven-Stad over the next decades. From this point of view, for the City of Amsterdam, finding solutions is not the objective of summer schools. The importance lies in the project as a means to help the participants to extend their skills and knowledge and to prepare themselves for future participation in the process of city-making.

What kind of team works on this project at the municipality? Is that an interdisciplinary group of people as well?
Yes, and I am very much in favor of interdisciplinarity! At the City of Amsterdam we work with around 700 people at the Department of Planning and Sustainability; a mixed team of urban designers, landscape designers, planners, social geographers, sustainability specialists, and so on. In the planning process of Haven-Stad we regularly involve approximately 10% of these people one or the other way, besides all external specialists and advisors. The specialists always work as a sort of interactive cloud around a strategic core team, they constantly influence each other. Interdisciplinarity is the key to the working model of the future.

So what about the role of the urban designer? Should the urban designer be the one that brings the other disciplines together?
Ultimately, we urban designers must indeed bring them together. Practicing urbanism is precisely that: to place everything in space and time in a coherent way, that is our specialization. Other disciplines are not trained to do so or have other focus points or responsibilities. To put it simply, an urban designer has to bring elements together in a plan or map and give the various disciplines a position in space and time. That is why their role is essential in the process of city-making.

In highly dense multifunctional development projects, such as Haven-Stad, even more claims than average are made on development plots and public space. For that reason, it is key to involve people who will take part in the implementation phase already in an earlier stage of the project. Together we can puzzle out the options and find the balance between ambitions, necessities, and possibilities in a continuous way.

During such a summer school, I often see that many new topics like the use of drones, urban agriculture, or self-driving cars are picked up, scientifically researched, and pointed out as important without really thinking through what its spatial—and by that its social—impact is. Implementing new technologies, that in itself is not what urbanism is about! All these new themes entail a demand for space that could result in spatial conflicts, especially in restricted highly dense areas. At a certain point, the urban designer brings everything together and has to solve all kinds of conflicts of interest. When an urban plan is finally drawn, one can no longer deny the spatial and societal consequences of all the separate topics.

A big risk in short workshops is getting stuck in narratives and infographics, like these maps with symbols explaining how complex systems work. 'But what exactly do you mean by this 'hub' symbol? What is its size, its specific impact?' Of course, this also depends on the structure of a workshop. I am in favor of organizing short workshops in a threefold way: spending one day on the narrative, one day on the systematic design, and thereafter focus one day or more on the spatial impact, precisely measured in space and time. When you put this in practice together, all disciplines will inform and influence each other. And likely, they will come up with concrete proposals for projects or experiments, useable as a kind of reality check.

Do you regard the input of the City of Amsterdam as the reality check of this Summer School?

No, because I think a project like Haven-Stad is just too large and complex to come up with holistic or realistic proposals during a Summer School like this. It might be more about the city of the future with Haven-Stad as a case study. One will realize that in the city of the future, there is a permanent battle for space. In the city of the future, double land use becomes triple land use or even more. In the city of the future, it is all about 'together, together, together', permanently. A balance must be found between all these aspects.

I have been in the profession for a while now and I experienced three periods of urban development strategies in the Netherlands. When I started as a young urbanist, the focus was on the terrain, doing historical analyzes, not starting with a tabula rasa. Then there was a period when we again started to think about the people, both socially and economically. And nowadays the dominant trend is to be responsible, finding ways and developing urban strategies to minimize the environmental impact of cities. At the same time, we should not forget the other two things, starting with the inhabitants. 'How do they live in the city? How do we get them to stay and let their children grow up in the city? What are the specific historical, social, and spatial characteristics of a city?' I miss these aspects as a part of the current conversation. It is important to create a collective awareness around these aspects during a summer school, that is the reality check. The involvement of the city representatives can only partially help, more important is the state of mind of the participants.

Does the Haven-Stad tour, during which you were one of the tour guides, actually play a more important role in connecting the Summer School to real-life projects?

I always say: 'What you see is what it is!' Drawing something does not mean it actually fits the surrounding. You cannot assess design proposals properly from an office or studio. Too often one starts with an excursion but afterward, nobody checks the outcomes of the design process in the field—it stays just paperwork. Another tricky way of reflecting on a spatial issue in a summer school is to deduce data, trying to capture information in technical terms, conducting analyzes, and to derive conclusions from this. This seems to be a very scientific method, but is it useful in the real world of urban transformation and development? Most of the time during a short summer school, participants will get a data overload. I needed a year to get up-tO–Date on the information behind Haven-Stad's project definition. And even then there are always new sources, forces, or systems influencing urban design and challenging your assumptions. I think field research, observing people's behavior, talking with stakeholders—just simply talking—is of great importance to develop an understanding of the past, present, and future of an area. Field research should be a continuous analytical part of the design process.

Why is it important for you to meet the new generation now?

An international summer school is important because we have to explain the project to a wide variety of fresh, young people full of questions. This automatically forces us to think sharply about what we are actually working on.

Moreover, I find it really important to share an extensive project like Haven-Stad project with others, especially with these younger generations. The Haven-Stad project started around 2010 on a comprehensive planning level and serious plans started to develop around 2015. Now we are entering a new phase in the project development. During this last decade, a whole generation of colleagues has worked on the project and I just started. We are still in the first quarter of the project that will be completed somewhere around 2055. When I retire, we may be just halfway through the implementation of the plans that are made now and at that time, the real urban life is probably still taking shape. So we need to involve a new generation already 20 or 30 years before to slowly motivate and prepare them to take over at a certain point.

The people I meet nowadays during workshops will be the ones who will fine-tune Haven-Stad. The participants of the Summer School and their generation can still work for 30 years or more in all sorts of ways on this kind of urban transformations. What especially interests me is that they may already think differently about the future than my generation right now. I am very curious, for example, how their sense of belonging will develop in our global society or how future generations think about spending their spare time in qualitative and meaningful ways. All these factors will heavily influence the kind of neighborhoods we develop and how we should invest. This generation must take all that into consideration and start to share their thoughts with us straightaway. They can advise now and will ultimately decide in the final stages of the planning process. That is what I find very valuable and exciting about encounters like this Summer School!

Tour Haven-Stad

Joran Kuijper

group of Architectural
Design Crossovers,
TU Delft

Maps represent reality in a consciously filtered and scaled way. We—not only designers but anyone who wants to interfere with the built environment—need maps to get an clutter-free overview of space. Moreover, we can project and infer very specific data of a location on a map creating a model and providing information that could never be perceived from a real-life visit. Nevertheless, we cannot perceive a space and its identity without experiencing it.

Tour by the City of Amsterdam: Micha Sijtsma

With a vast area of 6.5 square kilometers, Haven-Stad is almost as big as Amsterdam's city center. For such an enormous surface, maps and data are indispensable to get an overview of how space and its characteristics are arranged. We can, for example, differentiate the natural environment from the constructed harbor docks. We can project economic data about trade in industrial areas, or we can find out where the noise disturbance is located along the A10 Ring Road.

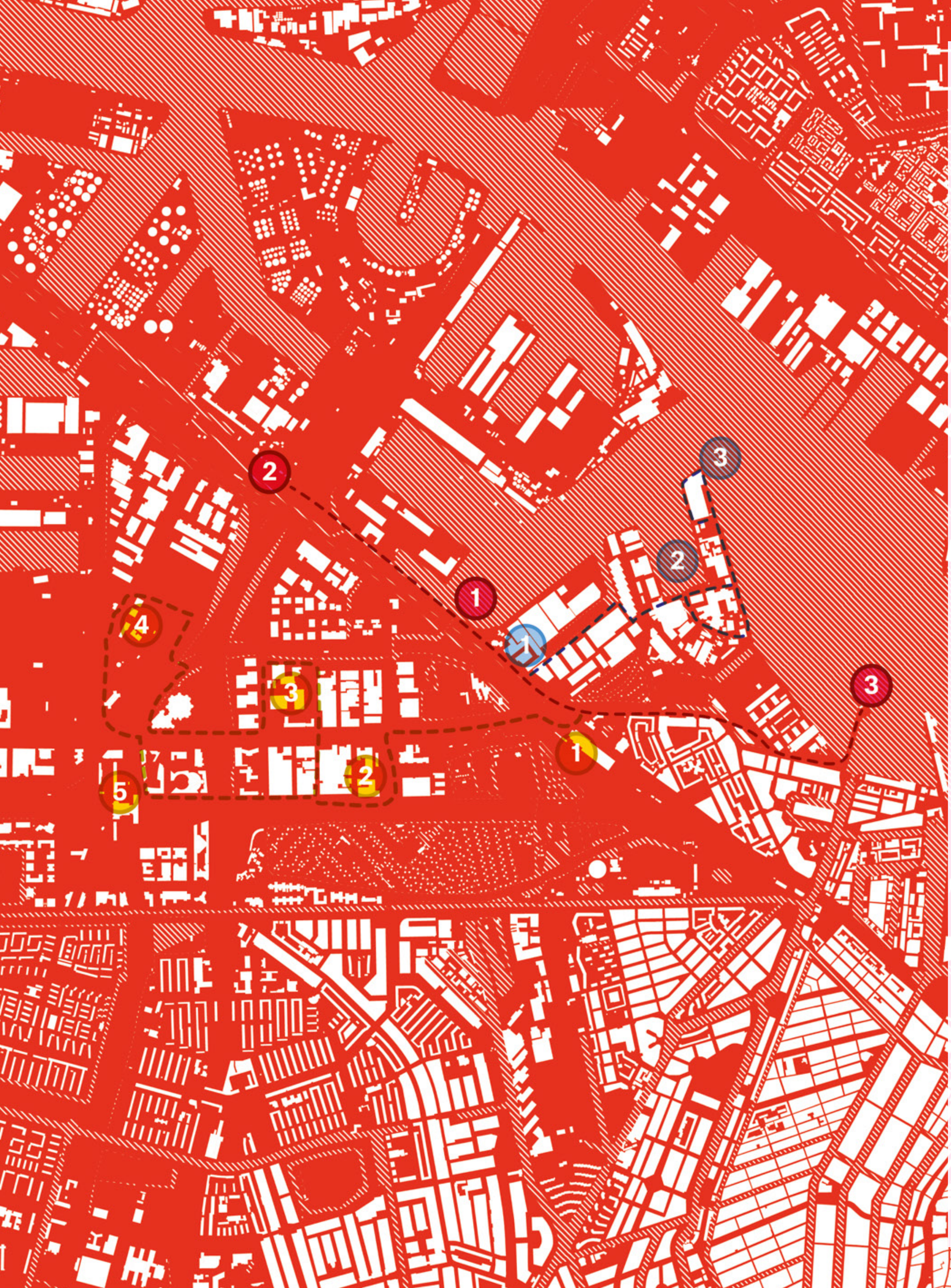
But space and its identity are more difficult to grasp by maps. Haven-Stad comprises twelve sub-areas that strongly differ from identity. The City of Amsterdam wants to retain the existing character of each area as much as possible. As part of converging to an integral answer on the main question of the summer school capturing the use of the individual areas as well as their qualities and aesthetics—that what is difficult to assess by maps only—is essential. Therefore, the real-life excursion is the vital method to experience space and its identity.

Armed by just our senses—and of course a bicycle—Arjan Klok, Micha Sijtsma, and Koos van Zanen toured us around three of the twelve sub areas, giving us a comprehensive experience of Haven-Stad's space and its different identities. Merel Akerboom shared with us relevant points of interest from the perspective of the City of Amsterdam, showing us the current issues the city is trying to solve (as indicated on the following map and pictures).

Batič, J. (2011). The Field Trip as Part of Spatial (Architectural) Design Art Classes. *Center for Educational Policy Studies Journal, 1*, 73–86.

Gemeente Amsterdam. (2019). *Concept Ontwikkelstrategie Verkorte Versie.*

Gemeente Amsterdam. (2017). *Ontwikkelstrategie Haven-Stad: Transformatie van 12 Deelgebieden.*



compiled by Merel Akerboom,
City of Amsterdam

RED
(Nieuwe Hemweg–A10–Houthaven)

1 Viewpoint across the IJ towards Noord, viewpoint towards Minervahaven and Coen- and Vlothaven.

The focus here is the identity of the area together with the mobility challenges for not only railways and roads, but also waterways. How is this turned into a well-accessible metropolitan residential area? And how are the various sub-areas connected by these waterways?

2 Connecting to the A10 Ring Road, deflecting the car traffic in this area is a major issue. Where are the much-needed future parking hubs situated? How is the destination's last-mile organized?

3 Here, the issue is the connection of the Houthavens to the existing city together with the ferry connection across the IJ.

BLUE
(Hemknoop–Minervahaven)

1 The focus here is the area development around the future multi-modal Haven-Stad junction. The ultimate goal is the development of a major station: a mobility hub with subsystems and proper accessibility for bicycles. There is need for densification of transport facilities with in the end a fully functioning Transport on Demand (ToD) system.

2 Parking in the neighborhood (a new parking garage called 'Heren 2') is important here, as well connecting this to the landing of the *IJ-baan* (a new cable car across the IJ with a possible future station in the Minervahaven).

3 This is the 'fashion pier', a spot radiating high-quality architecture with clear views on the IJ. This part will connect Haven-Stad with Amsterdam-Noord and with Coen- and Vlothaven by water.

YELLOW
(Zaanstraat yard–Westerpark–Sloterdijk 1 and Station)

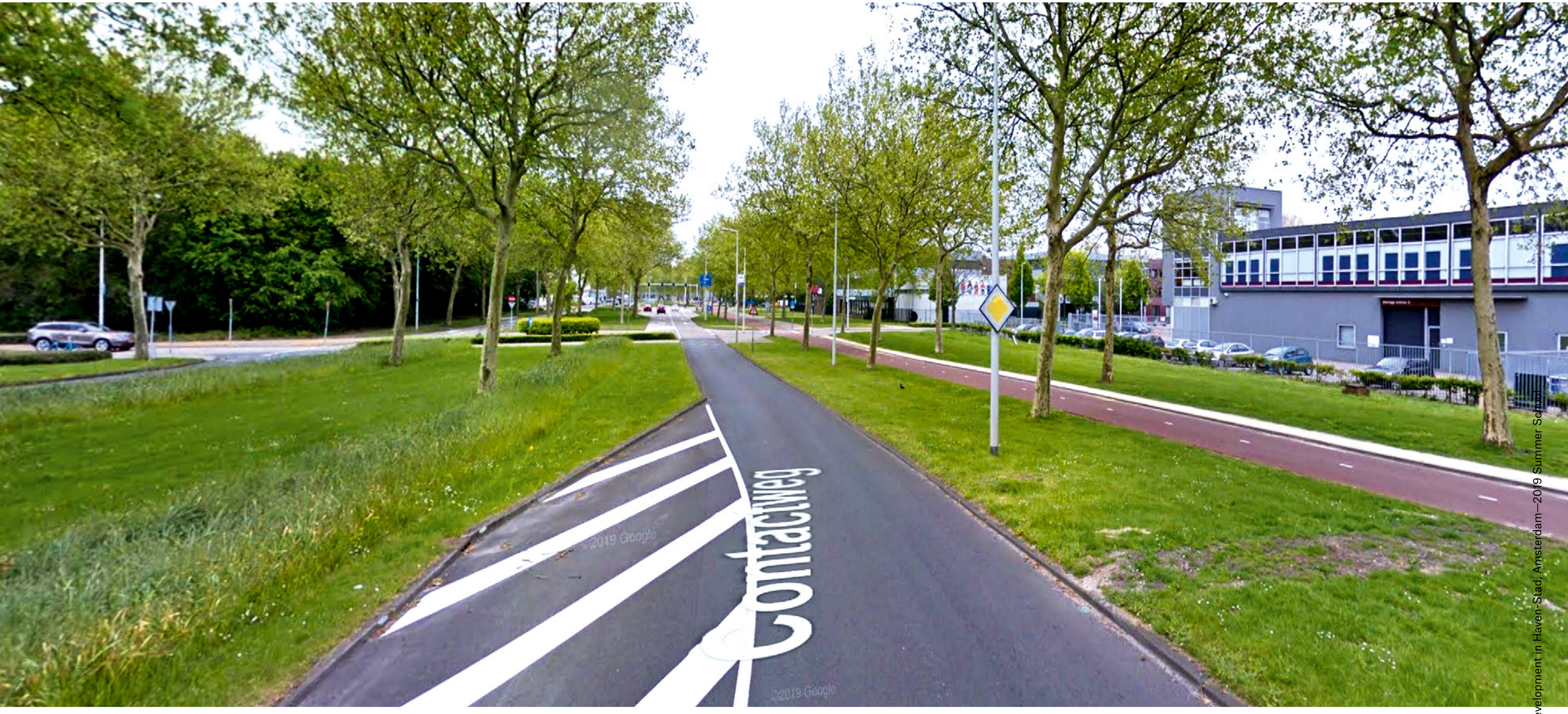
1 The Zaanstraat yard is now a large bundle of train tracks that will soon be developed. Part of the tracks remains and is of regional importance. How will this combine with the high density area development?

2 At the building block level for the 'Sloterdijk 1' sub development area, new parking hubs and subsystems are considered. The Contactweg location gives already an impression of the scale on which solutions are being sought.

3 The Isolatorweg metro stop is now the final destination of this metro line. When the metro ring line is going to be continued to the Amsterdam Central Station this will become a local neighborhood stop. What needs to be done to transform this metro stop?

4 In the future, this triangle may become the distribution center of Amsterdam-West within Haven-Stad. Large-scale parking facilities, package services, et cetera are planned here.

5 Sloterdijk Station is already limited in capacity and will have to expand considerably with the realization of Haven-Stad. In collaboration with the Dutch railway parties (NS and ProRail), research is being conducted into how they can invest in the expansion of the station by property development on top of the train tracks and the railway station.


Contactweg
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M
R-NET
RataPlan


NIEUWENDIJK
GLOSEC
Donauweg


TAURO

SUMMER SCHOOL RESULTS

02


SUMMER SCHOOL PROJECTS
A *CO-OP: Collaborative Productive High Density Dutch Typology*
B *H(e)aven-Stad: A new Waterfront Community in Amsterdam*
C *Mobility as a Tool (MAAT): The Way Mobility transforms Scheepsbuurt*
C
B
A

CO-OP: Collaborative productive high density Dutch typology

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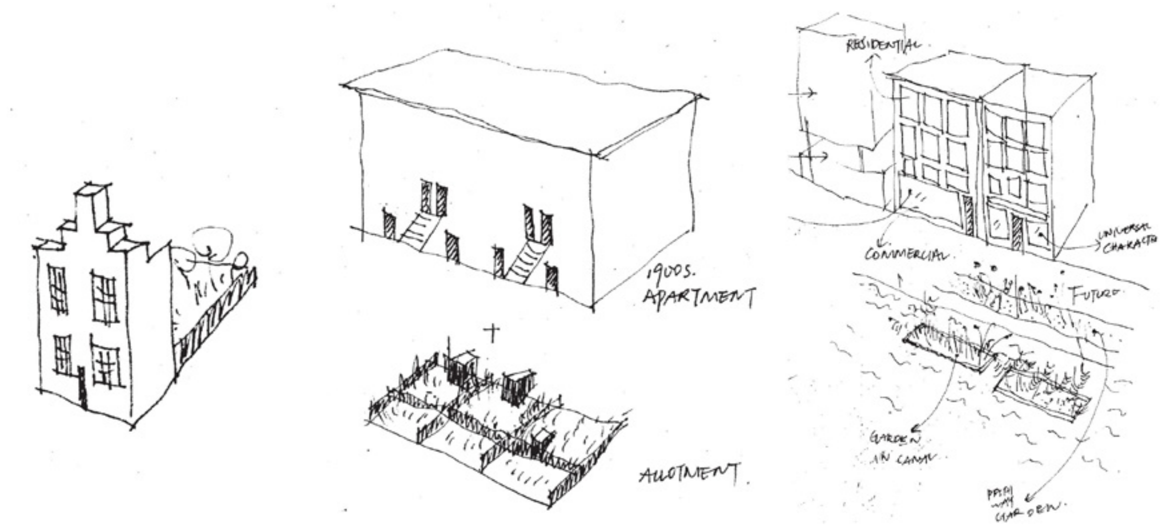
The Haven-Stad vision in the northern part of the City of Amsterdam consists of plans for housing, commercial, recreational, and office development with the aim to reduce the current housing pressure on the city. The proposed vision 'CO-OP: Collaborative productive high-density Dutch typology" is based on the interrelationship between the urban transformation and mobility strategies in the areas around Sloterdijk station, found in the concept of sharing.



18th century | 20th century | Dutch high density

The evolution of the Dutch house

Both areas around Sloterdijk and Westerpark are defined by a strong mobility network and high density with offices and industrial developments. Sloterdijk station is the main transport node with a direct connection to Amsterdam Central Station. On a macro scale, the train station serves as an important transfer hub. Currently, the local road system consists of a daily use of 14,300 vehicles between the A10 to the S101, 39,000 from the A7 to the A10 and 30,000 from the S102 to the A10. In the area, the following mobility modes are existing: train, metro, tram, bus, bikes, pedestrians, and cars. The land use is divided accordingly: greenery (approximately 30%), industrial (approximately 25%), offices (approximately 35%), and residential (approximately 10%). The key urban elements are: Westerpark, allotment gardens, canals, Dutch traditional housing, industrial buildings, hotels, commercial buildings, social housing, station Sloterdijk, and Isolatorweg metro station. During the SWOT analysis the following strengths, weaknesses, opportunities, and threats are defined.

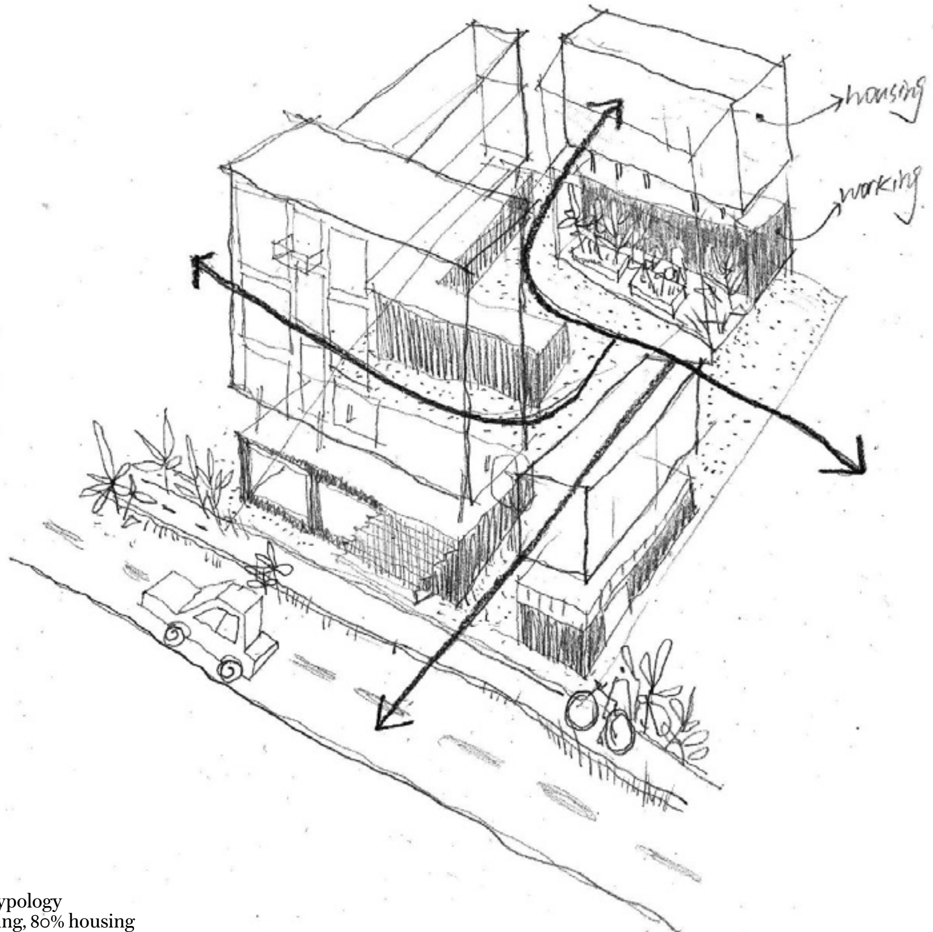
Strengths
Location within the Ring Road (A10)
Industrial character
Proximity to the airport

Weaknesses
Fragmentation of land use & mobility
Unfriendly industrial-scale

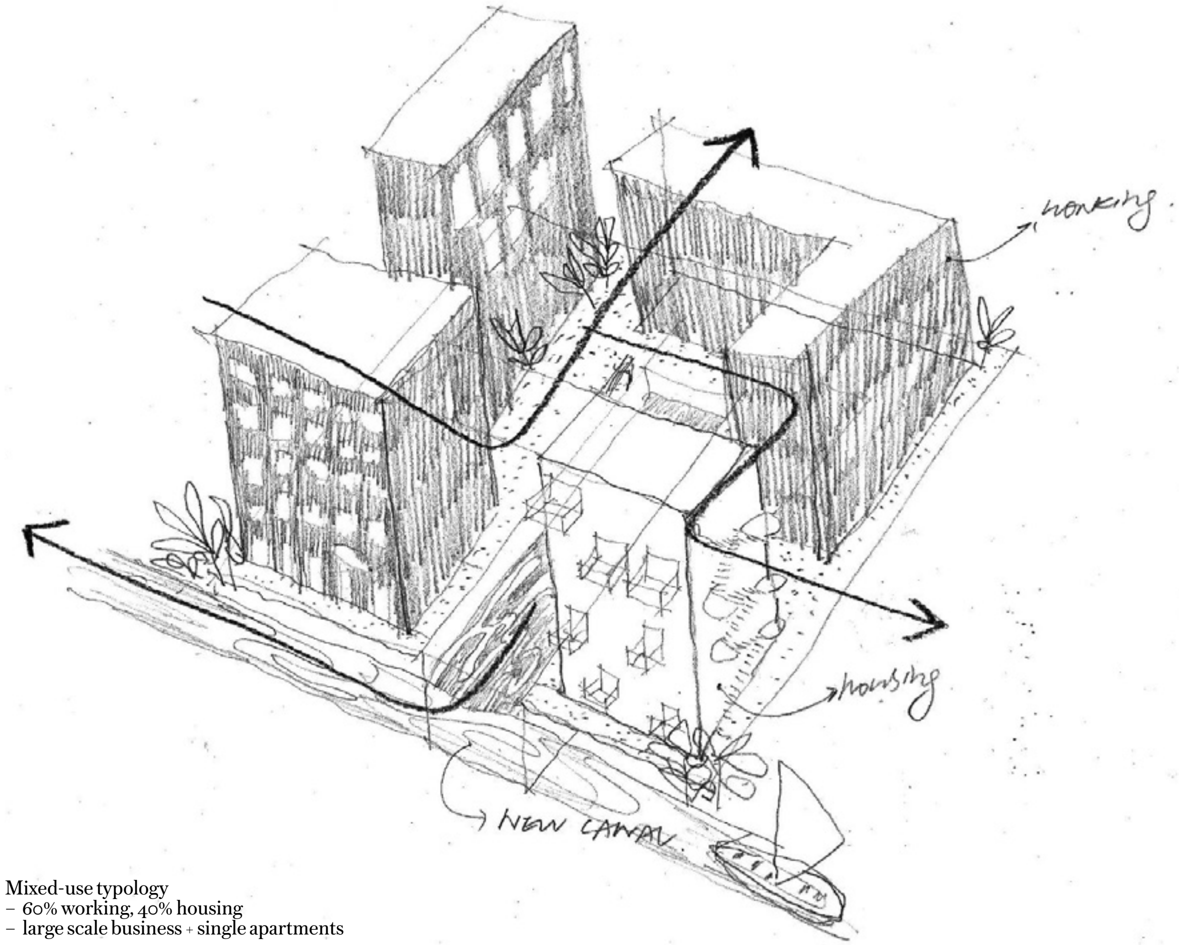
Opportunities
Potential for high density
Dutch urban identity
Experimental ground for future urban model

Threats
Noise and odor pollution
Safety

The described opportunities are the key elements for the proposed concept. From the urban context, the 'Dutch identity' is taken as the point of reference for both the urban strategy and the mobility plans. Today in the center of Amsterdam one can still see the iconic Dutch gable canal houses that have evolved from the 15th to the 19th century. These houses are placed in a row with a small backyard garden while maintaining their individual characteristics. The Netherlands—as the country with the highest population density in Europe—has a long history dealing with densifying cities. Such effort is visible in the housing typologies developed in the 20th century. During this period, apartment block-like housing was developed to respond to the increasing needs. These blocks maintain the feeling of having an own house by allowing each household to have its own entrance directly to the street.
The greenery lost by accommodating more people is compensated by dedicating areas as allotment gardens. Such typology allowed higher density while maintaining the characteristics of the Dutch lifestyle. Nowadays, while densifying the areas around Sloterdijk, there is a need to develop a new housing typology that allows a higher density population than that of the 20th century. The industrial area around Sloterdijk paves the way for a new typology. Due to its industrial nature, the streets were planned to be as wide as twelve meter to allow



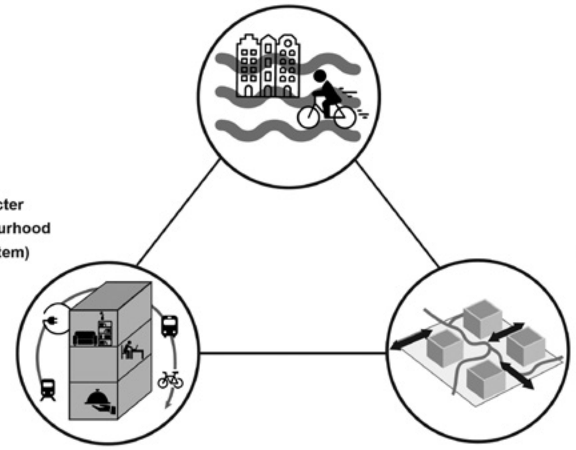
Mixed-use typology
– 20% working, 80% housing
– small scale studios + family apartments



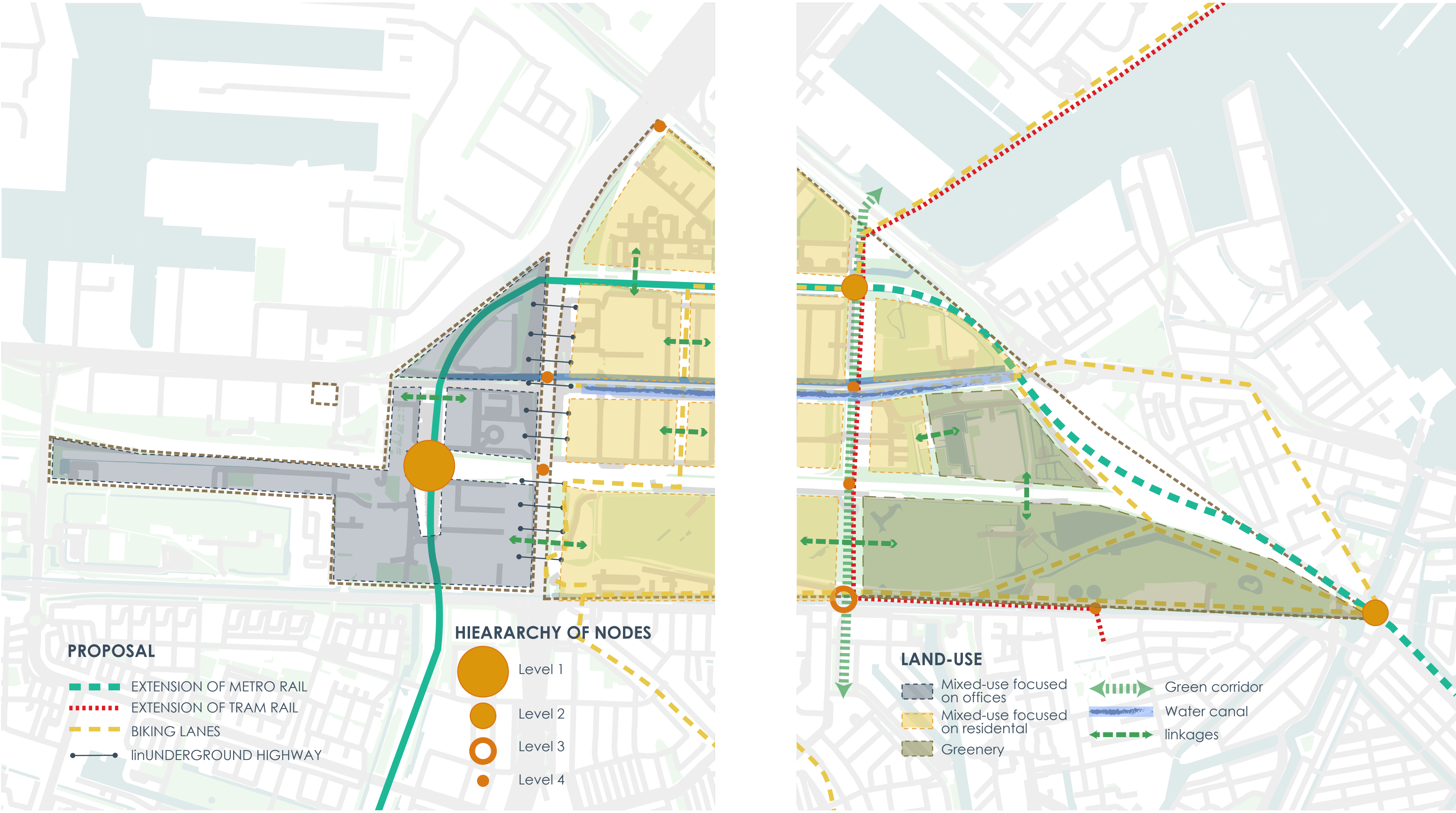
Mixed-use typology
– 60% working, 40% housing
– large scale business + single apartments

heavy-duty trucks to pass through. A residential area in Paris has a street width of an average of eight meter, which is a comfortable scale for pedestrians. As a result, transforming this post-industrial area into a residential human scale leaves a four meter street width discrepancy, that leaves room for developing recreational functions for the new Dutch high density housing typology. The industrial area is taken as the most promising area for collaborative and productive modes of living, working, and commuting. Therefore, we can define four types of interrelated urban and mobility strategies: providing mass housing through the Dutch identity, mass shared mobility on a human scale, industrial character providing space for a mixed-use program (working and living), and focus on last-mile mobility.

The proposed strategy CO-OP is twofold: a heavily integrated system and an adopted multi-modal public transportation. The urban and mobility strategy revolve around sharing. Public space is adopted as productive green areas. Building blocks are designed as a porous mass, rather than a barrier. The functions intertwine leading to an inclusive and lively neighborhood. The private is made "collaborative" and also productive. The mobility connects the multi-functional system to multi-modal transport: the vehicle where one starts his or her jour-

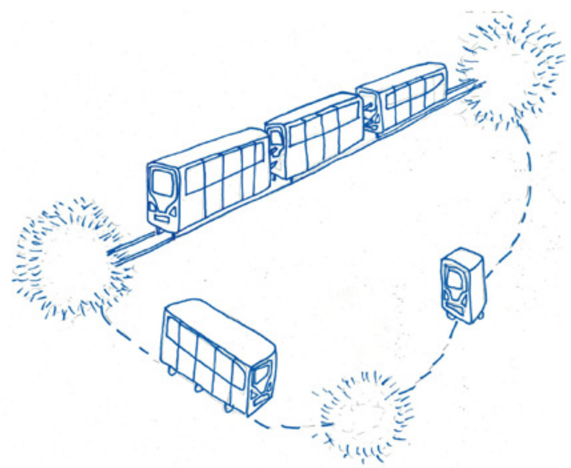


The strategy



Proposal of the urban and mobility plan

ney attaches to form a MaaS (mobility as a service) system, and detaches again to get him or her to the last mile. The system caters the level of the community as well as the level of individuals. Namely, the mobility approach is adapted on micro- and mesoscale: an intensive connectivity laid out on human scale to create a neighborhood in which each home is directly linked to the macro mobility network. The network consists of horizontal and vertical levels of transport: the horizontal level contains extensive bicycle lanes and public transport. The vertical levels give the possibility to transfer to different modes on horizontal levels and to the last-mile transport. On the horizontal levels different degrees of nodes are indicated, with for example degree one for train station Sloterdijk as the most important node of transport and transfer. For the urban plan, the plots are subdivided in different variations of three typologies: mixed-use focused on working (60% working, 40% housing: large scale businesses and single apartments), mixed-use focused on residential (20% working, 80% housing: small scale studios and family apartments) and greenery.



MaaS model

H(e)aven-stad: Waterfront A New Community in Amsterdam

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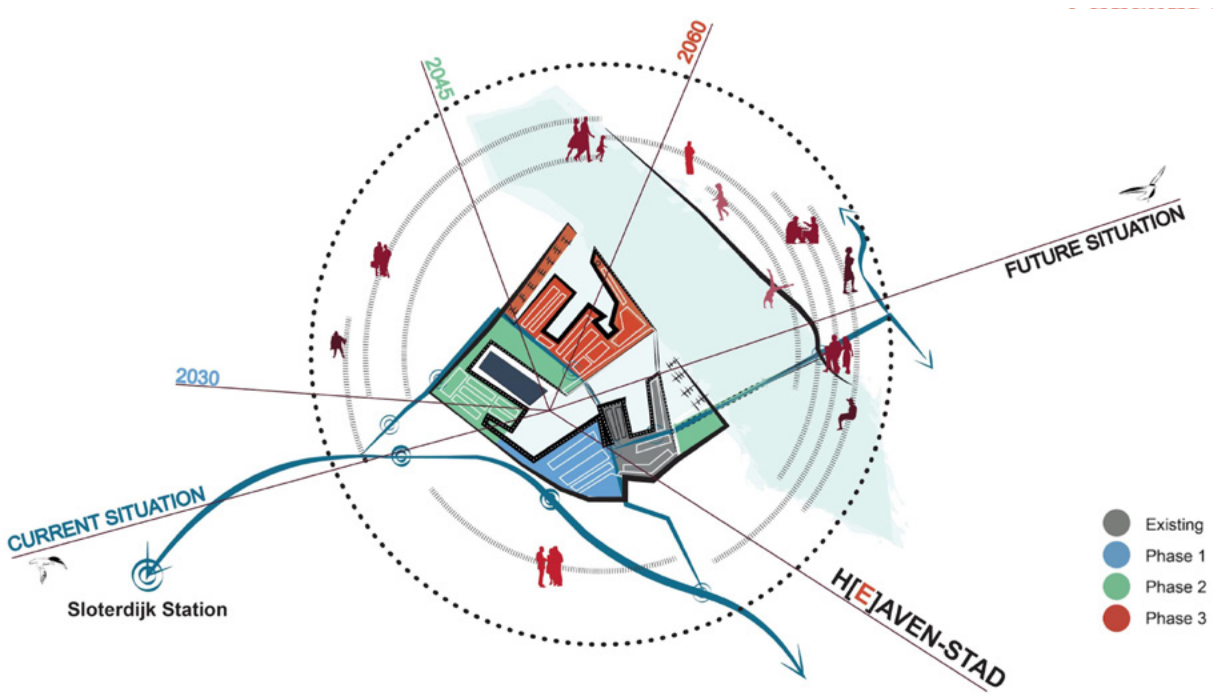


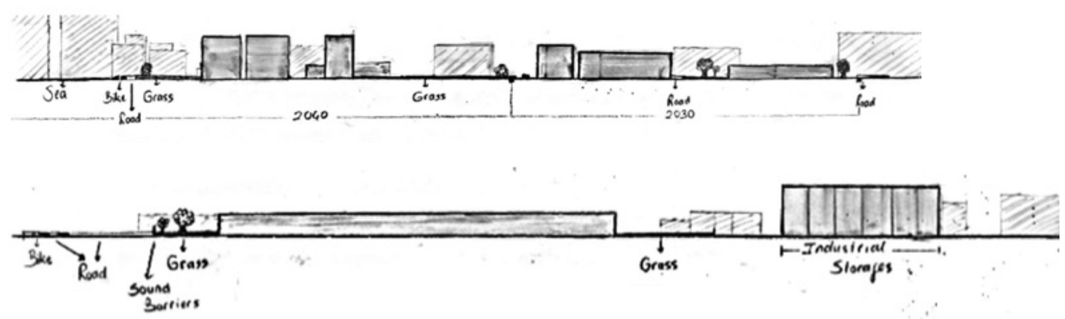
Concept map

The city of Amsterdam is growing rapidly by 15,000 inhabitants each year and housing demands keep rising, attracting investors and new businesses. To provide a solution to the rapidly increasing demand for growth, the industrial zone of Haven-Stad represents an opportunity to create a mixed-use area for living and working within striking distance to the city center. This need for growth within the existing borders of the city, together with new insights and ambitions on liveability in urban areas, environmental concerns, and sustainability, has led to regulations on mobility in inner city urban environments. The current practice of wide-spread private car-ownership is not a possibility anymore as parking norms in Haven-Stad, for example, will minimize the number of parking spots to 0.2 per household. This requires thinking about new innovative mobility concepts that need to be integrated into the urban development plans.

Located in a strategic position next to the water within the A10 Ring Road and close to the Sloterdijk Station and the Isolatorweg metro station, the Haven-Stad central area comprises of the Minervahaven and the Coen- and Vlothaven. On one hand, the Minervahaven is in development, with no longer purely port-related activities. In fact, the area is rapidly changing into a sought-after location for offices in the creative sector, hotels, and leisure. This proves the enormous potential of this area on the border between the city and the harbor. On the other hand, the Coen- and Vlothaven are characterized by large scale industrial buildings in full use as a port area. This cluster's layout is a peninsula that is connected to the A10 Ring Road and it has no direct connections with the other clusters because it is surrounded by water. Following the development plan of the Haven-Stad made by the City of Amsterdam, this cluster will be the last part to be developed after 2040. In addition to financial feasibility, an important issue is the availability of alternative locations for the companies present in the area which will have to be relocated elsewhere in the metropolitan region. The proposed timeframe adds an additional challenge, that the multidisciplinary team of engineers, architects, and planners faced during the Summer School. The task of the group was to find solutions that integrate an urban planning strategy with concepts and schemes of smart mobility for the central district of the Haven-Stad, as a place to experiment with innovative ideas and test new mobility solutions.

During the site analysis, it was clear that the predominant concentration of industrial usage of the area represents a complex factor for the phasing of a future vision. The significant presence of water, which covers 1.1 km2 of the Haven-Stad central area, can be perceived not only as a physical barrier but also as a unique feature that can be emphasized in the future. In terms of connectivity, the area has the potential to be linked to the Sloterdijk Station, the Isolatorweg metro station, and the A10 Ring Road. To be taken into consideration is the lack of attractive, large public spaces that generally is at the heart of Amsterdam's urbanization.

Profiles of the existing Fashion Pier and the Industrial Area

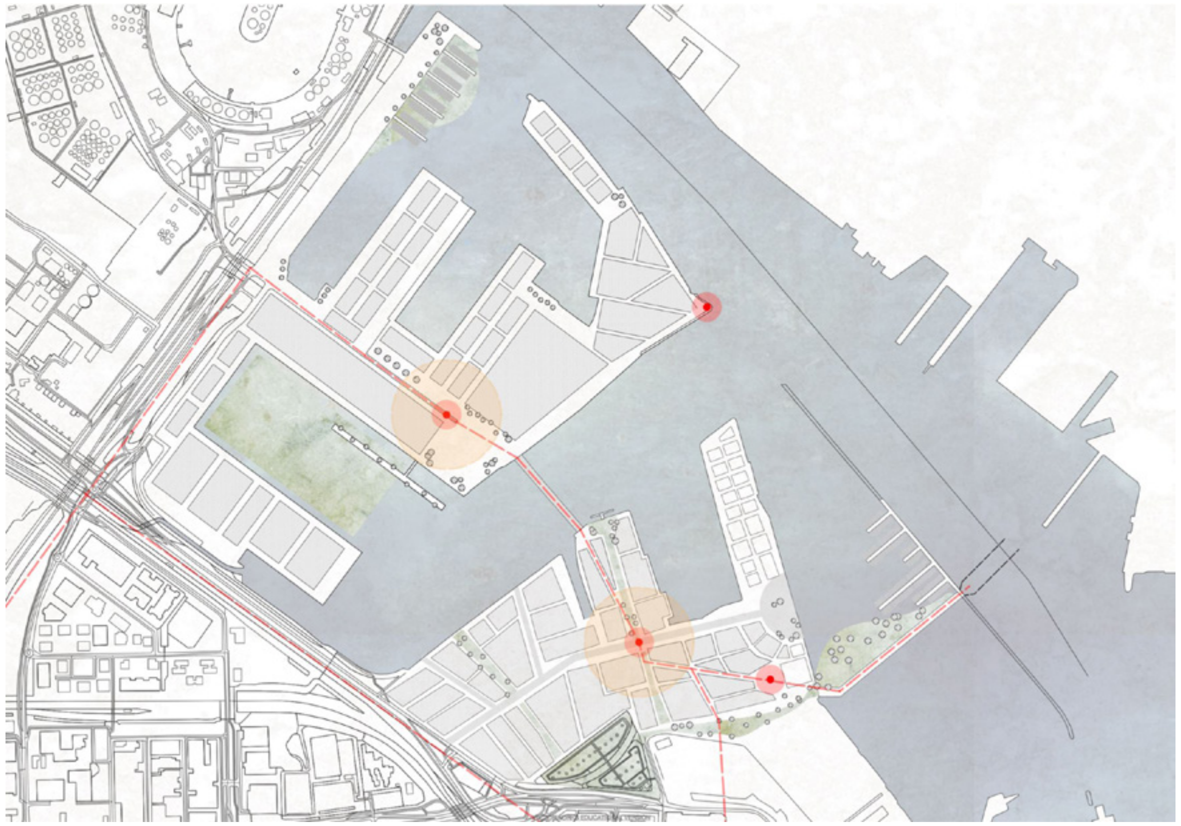


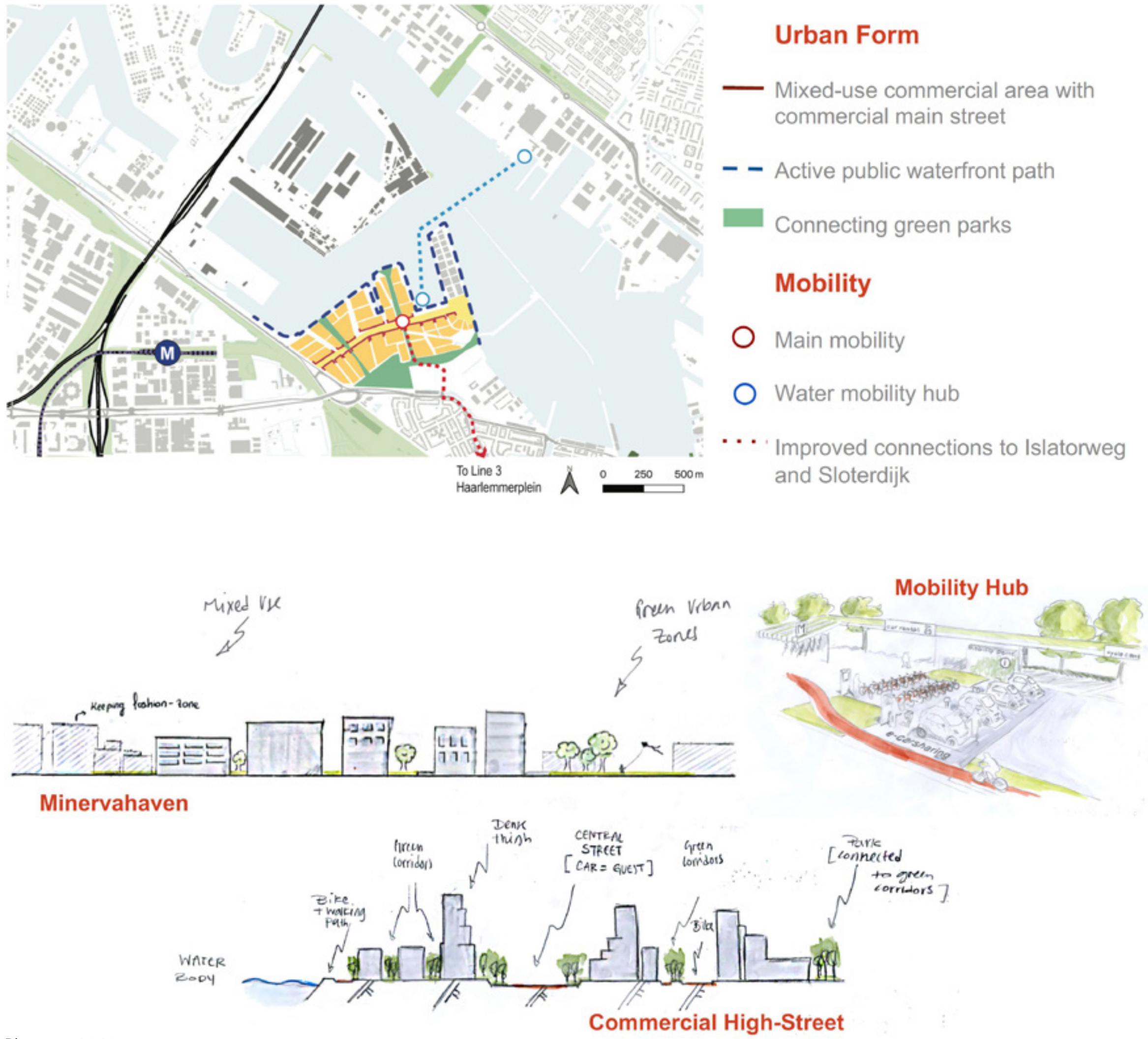
The proposal

In line with the ambition of the municipality of Amsterdam to assign 80% of the built environment to dwellings and 20% to workspaces including commercial facilities, the idea of this multidisciplinary group of students and professionals is to propose H[e]aven-stad, a neighborhood on the waterfront which combines work, life, and play within a short distance providing amenities, necessary infrastructure, public space, and high-quality public and multi-modal transport.

The group envisions the transformation of the Haven-Stad central area into an urban mixed-use neighborhood for approximately 78,000 people. The urban plan emphasizes three key aspects that define the identity of the area: the public use of the 10 km waterfront for transport and leisure activities, the creation of green public spaces to connect existing ecological corridors, and the reuse of industrial buildings maintaining the existing character of the site. At the same time, the mobility strategy focuses on active mobility with a variety of different forms of transport, reducing the number of cars while enhancing the use of public transport, bicycle, and pedestrian flows. The final scheme consists of mobility hubs, as places for interaction and connection not only with the already existing Amsterdam's major station such as Sloterdijk, but also within the rest of the Haven-Stad. These hubs enable a seamless transition to various modes of transport connecting a network of trams, ferries, shared cars, and bicycles, that make more efficient movement of people in the urban environment possible and reduce the amount of space needed for privately owned cars. Clearly this transition requires a change in behavior of people regarding mobility and at the same time, it leaves more space for pedestrians, cyclists, and high-quality public space.

The design proposal

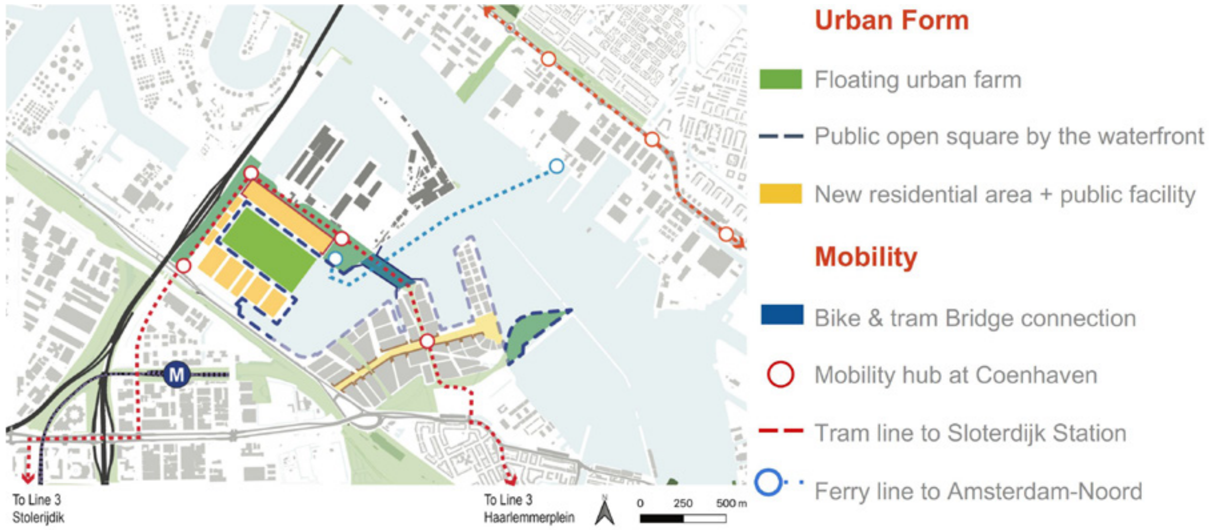


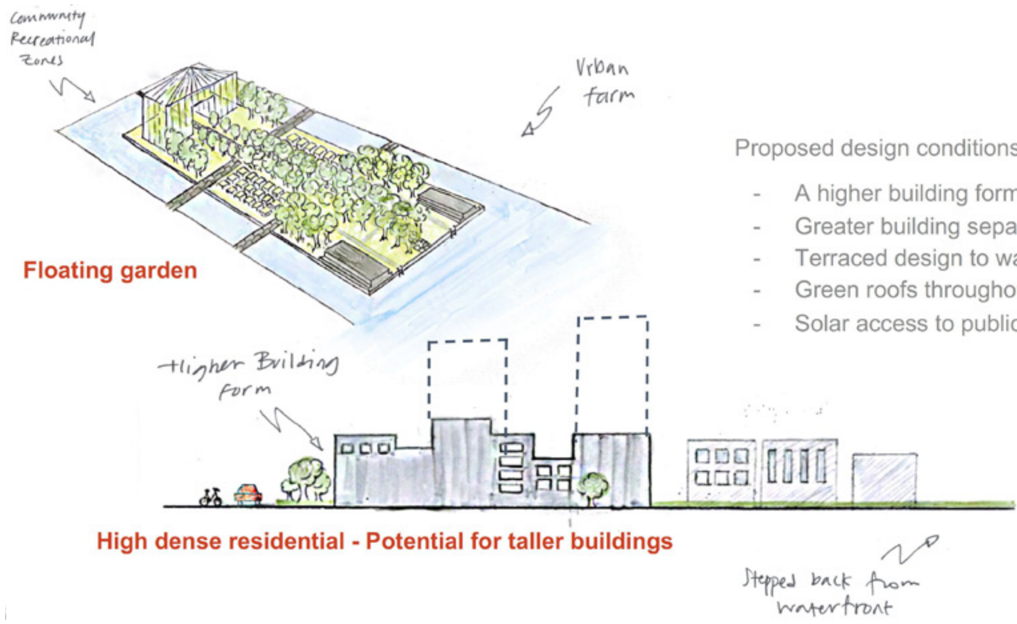


Phase 1 – 2030
Map and concepts

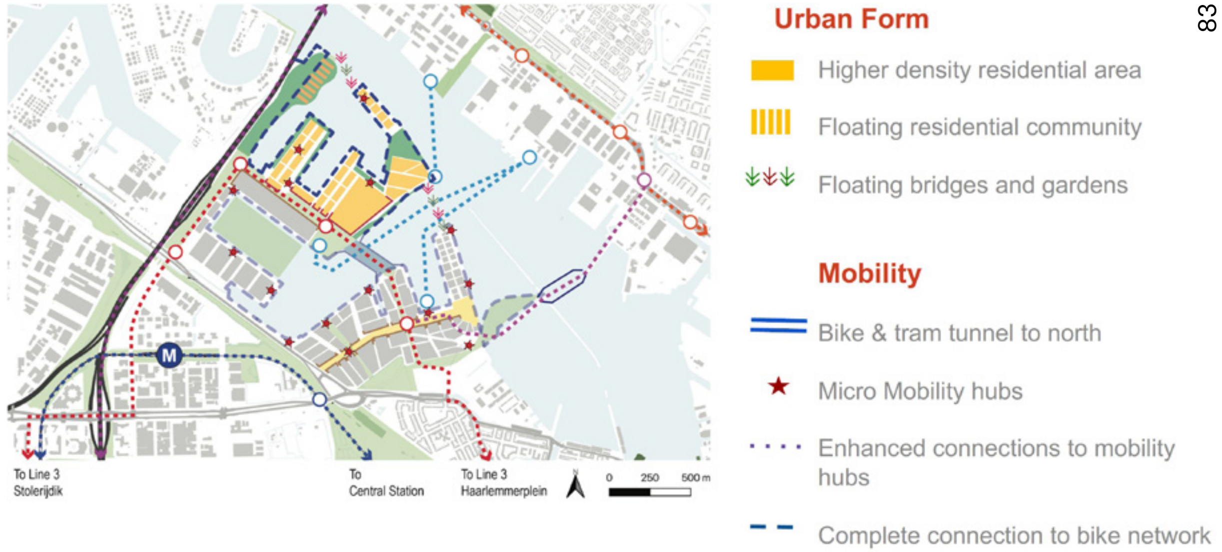
Three phases

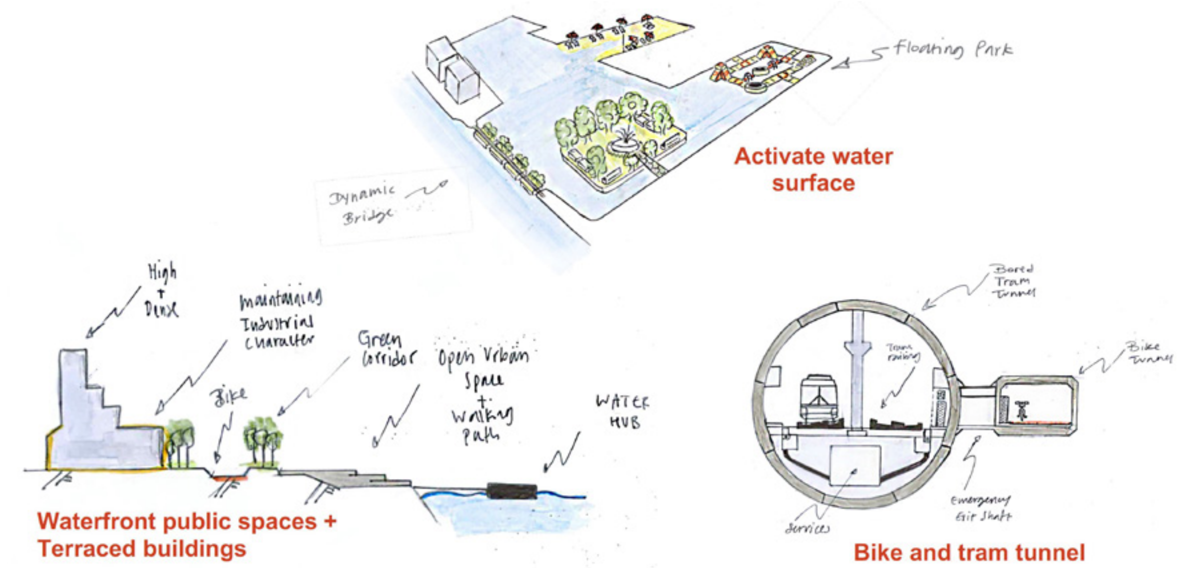
In relation to the timeframe, the vision of the Haven-Stad central area is developed in three phases. Aiming to be completed in 2030, the first phase concerns the development of a commercial corridor in the middle of the Minervahaven to enhance the sense of community in the area. Green corridors will connect the Haparanda park with the public banks converted into waterfront sidewalks and will not anymore be seen as the backyard of private buildings blocks. A new ferry connection to Cornelis Douwes, the part of the Haven-Stad located across the IJ, is created improving the physical relationship with Zaanstad as well. A new tramline will also connect the area to Amsterdam Central Station and the rest of Amsterdam's network. The mobility hub represents the spot to transit from the ferry to the tram line with the possibility of taking an OV-fiets or a shared-car.





Phase 2 – 2045
Map and concepts



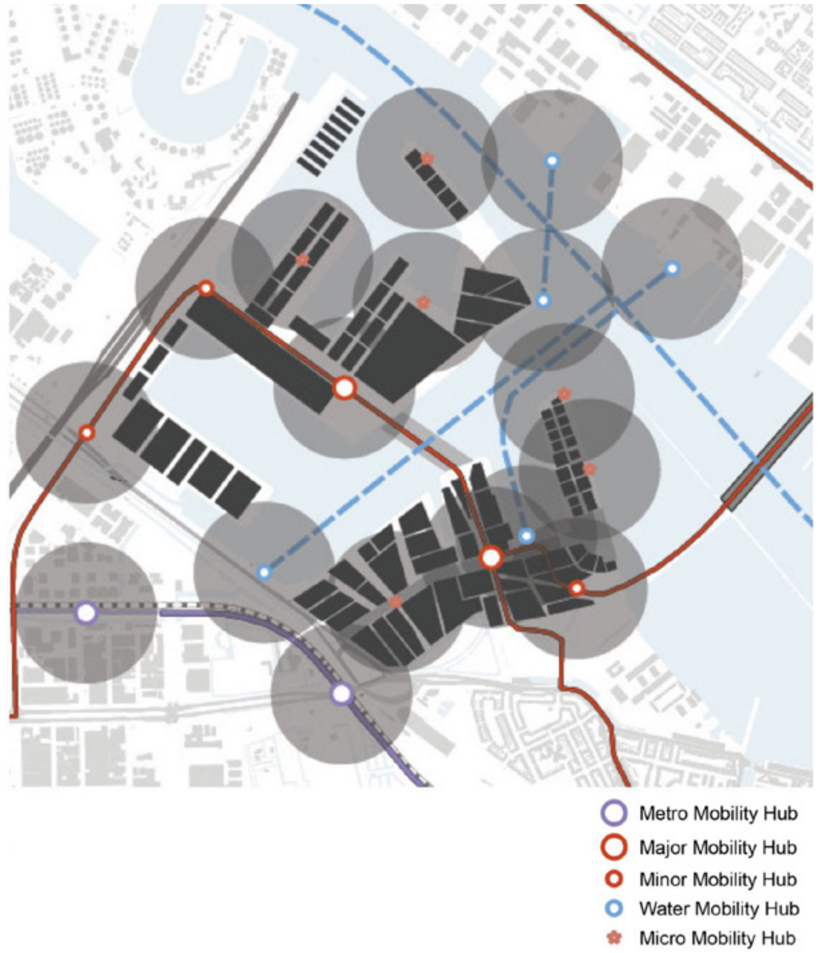


Phase 3 – 2060
Map and concepts

The second phase, to be completed in 2045, comprehends the realization of an urban farm in the Coenhaven that functions as a platform to activate the public waterfront. A new high-dense work and residential area, situated in a walking-distance with a new mobility hub, will be developed and a bridge for the new tramline and bicycles will be built in order to connect the Coenhaven with the Minervahaven, on the other side of the water. The same tramline will also continue to Sloterdijk Station to facilitate the connection with the train and metro.

The final phase for 2060 consists of the realization of a bike and tram tunnel connecting Amsterdam North and the existing network. Micro mobility hubs will be realized throughout the area to further enhance the connection and combination of different transport modes. Real-time data from the area will give the opportunity to achieve more sustainable and personalized mobility tailored to individual requirements. An option could be also to close the short ring metro via Minervahaven to the Isolatorweg metro station.

H(e)aven-Stad Mobility Network



H(e)aven-Stad Mobility Hubs

Mobility

The group's main mobility theme is providing integrated and multi-modal transport services through a multitude of mobility hubs linked with active, shared, and smart transport connections that would ultimately enable 'Mobility as a Service' & 'Mobility on Demand' schemes along with emerging micro-mobility solutions and hence limit the private car share to minimal levels while enhancing active and public transport modes with the increasing development of Haven-Stad area up to the year 2060. Dependent on the phasing of development, mobility needs change and the groups' perspective took into account the element of time, related to the number of people living and working and the role the location plays in the broader context. In the first phases, the first ten to twenty years' focus was on building a strong backbone of public transport within the central area of Haven-Stad towards Amsterdam Sloterdijk and Amsterdam Central Station while at the same time providing soft infrastructural links by ferry to the part of Haven-Stad above the IJ river. Developing this network further and increasing the number of hubs is part of the second and third phase. These hubs are both land and water-based, including ferry connections for passengers and area logistics to utilize the extended waterfront of the area in optimizing the mobility network.

The results of the group work show the complexity of the location and its crucial role in connecting the existing urban network of Amsterdam to the rest of Haven-Stad. The central concept—focusing on a 'green-blue' environment, the industrial character, and the approach to build the area's vision from the perspective of time—helps to shape a coherent story for the development of H(e)aven-Stad as the center of Haven-Stad in which active mobility solutions are integrated.

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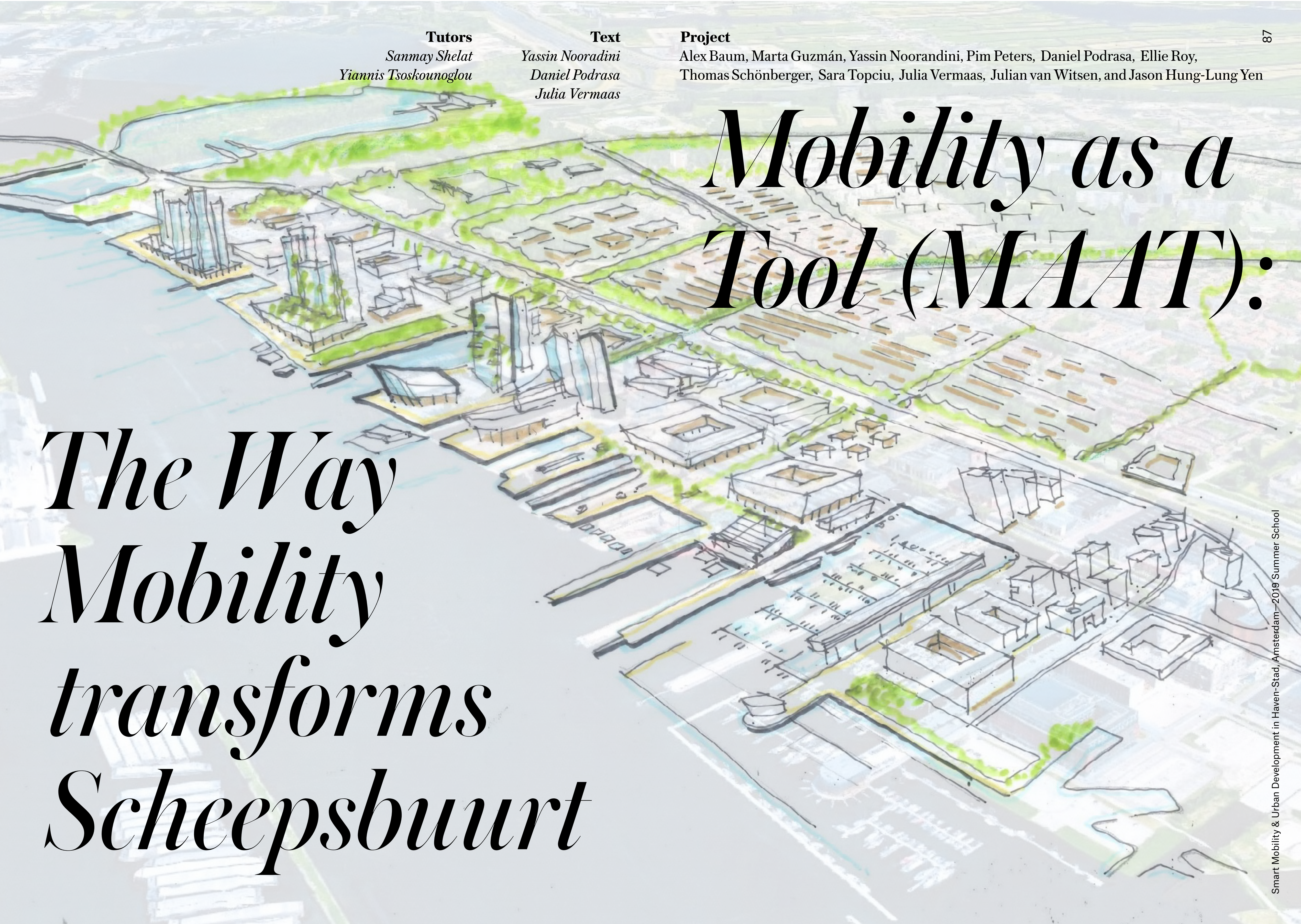
Mobility as a Tool (MAAT): The Way Mobility transforms Scheepsbuurt



More than 75% of the world's population is expected to live in cities by 2050, so far this exchange process started from internal zones to retrofit for future affordance. Current urban challenges such as sustainability, efficient use of scarce resources, uncontrolled growth, and social exclusion will become much more critical. In this regard, urban mobility planning plays a crucial role in supporting urbanism through the provision of a multi-modal and efficient response to current and future mobility needs, multi-scale research, and analysis.

The design-oriented study MAAT focuses on the northern part of the Haven-Stad area, a lean industrial zone aligned with IJ-banks with an area up to 22,000 square meters. The industrial zone needs readjustment to connect to adjacent areas and the city center of Amsterdam.

Population and city growth provoke urban authorities and governments to have a new look at areas through retrofitting and regenerating projects. Today, the City of Amsterdam seeks to transform Haven-Stad to accommodate the increasing housing demands and simultaneously support sustainable lifestyles, diverse cultural identities, and connections with the wider region. They aim to do so by creating a mixed-use program with 80% residential and 20% commercial use, by proposing shared modes of mobility by reducing car use through a parking ratio of 0.2, and by increasing the accessibility to the city center and the surrounding area.

SWOT Analysis

In order to understand what the strong features of the site are and what could be improved by creating a new urban and mobility strategy, a SWOT analysis was carried out. The strength of the Scheepsbuurt mainly lies in the connection to the water and its history. The still very visible industrial harbor features give the place a unique identity within Amsterdam. Furthermore, it is well connected to the highway A10. With that also comes weaknesses like air and noise pollution. Furthermore, the connectivity of public transportation (over land and water) is low compared to other parts of Amsterdam. In general, Scheepsbuurt is perceived as a remote neighborhood surrounded by three main barriers: 't IJ, A10, and Cornelis Douwesweg. The opportunities lie in some valuable points around the site that brings more opportunities for new arrivals. The Northern Park is well known as a natural park including a canal, an agricultural field, and a nature conservation area. Those green spots have potential to open new green corridors into the site. Meanwhile, a residential complex locating very close to the district brings a friendly and livable atmosphere into the project. The A1 is passing near the site, which is one of the main loops in the transportation network of Amsterdam that guarantees accessibility to all parts of the city. Moreover, the existing infrastructure and industrial traces are considered as part of the site and affect the final strategies on both mobility and urban programs. The approach to existing elements has an economic nature, as it will reduce the demolition costs. At the same time, the existing, physical elements are identified as threats for the project, since they limited the possible use of space. But preserving industrial remnants is crucial to maintain traces of the identity of Scheepsbuurt.

The vision of MAAT

Strengths
- Proximity to city center;
- Large waterfront;
- Strong industrial harbor identity;
- Access to nature.

Weaknesses
- Noise and air pollution of A10 Ring Road;
- Car dominant infrastructure;
- No rapid transit;
- Barriers ('t IJ, A10, Cornelis Douwesweg.

Opportunities
- Natural parks in the north;
- Green paths;
- Residential neighborhood.

Threats
- Existing infrastructure (including urban grids, lines and lots, industrial building and boarder of the port).

Multi-modal and shared mobility

Multi-modal and integrated mobility optimizes design and sources, meanwhile, it improves the urban environment. The strategic location of the site relies on various mobility options and the connectivity with multiple destinations, including center of Amsterdam and external zones. The project considers maximum permeability of space through various modes of transportation. Shared type of mobility, like shared scooters and bikes, will easily connect to other public transport systems. Mobility is the key to strengthen an effective connection between Scheepsbuurt and Sloterdijk, to avoid isolation, and to ensure convenient, safe, and seamless connections to all citizens, both at a local and urban scale. Pedestrian friendly and accessible urban environments encourage social connections and, if designed to be appropriate for communities and people, play a significant role in the construction of social relationships and experiences.

Multi-scale

Mobility patterns involve different, tightly interlinked scales, requiring an approach that goes beyond project boundaries. There is no predefined scale of intervention nor analytical limits: access to any given building is influenced by interconnected dynamics at the city scale, while inversely provisioned national infrastructure affects circulation at the local scale.

Transit Hub - User Behavior

The urban demand study done on Scheepsbuurt consist of travel demand forecast modeling, generating multiple scenarios based on the most likely evolution of the current status. In addition, multi-modal transport modes are used on macro and, where applicable, micro scales to assess cumulative and partial network performance.[1] This analysis considers the connectivity of Scheepsbuurt on wider scales (like Sloterdijk) and within the north-west area.

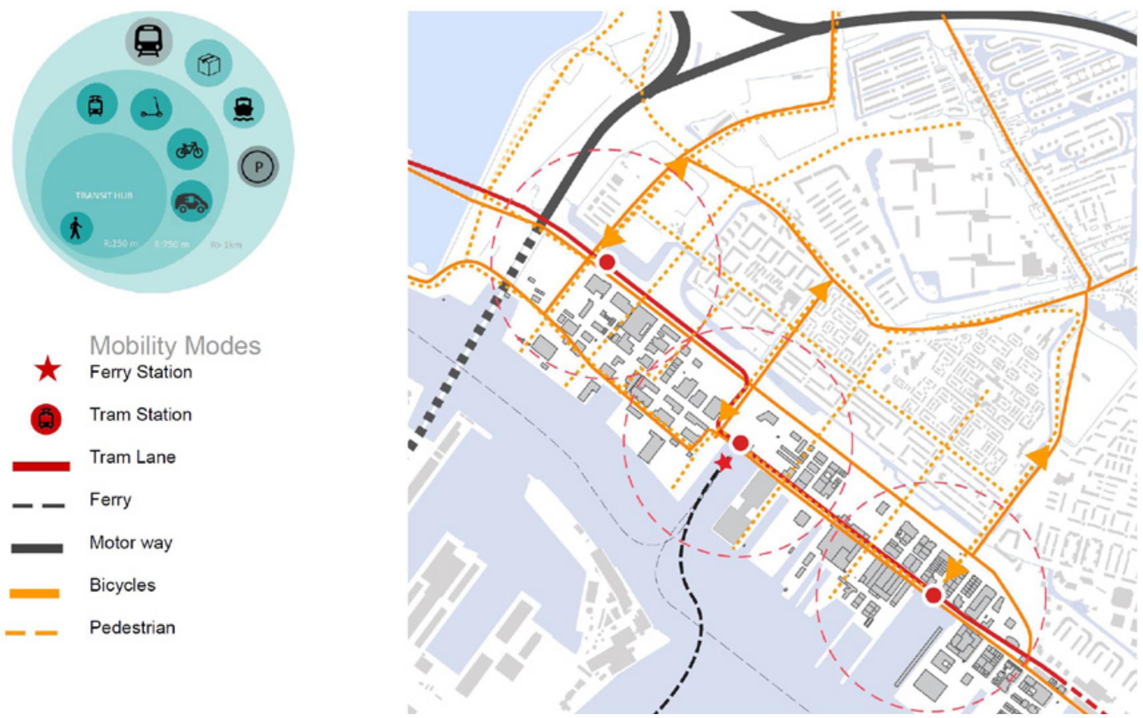
Regarding mobility, the location of Scheepsbuurt benefits from existing networks and modes. A seamless network of slow-mobility will be extended within Scheepsbuurt with transit hub that collects and diffuses travelers. It is sustaining the intense traffic along A1 in the interval zone. The new, mixed-use program, will lead to a relatively low flow of commuters.

Innovative municipal legislation is needed to optimize transportation networks. Travelers' data can be used as an input for algorithms predicting the fastest routes, to improve the travelers' experience. The experience of mobility has a key role in changing user behavior and decision processes and is therefore deeply connected to urban planning.

The mobility and urban planning strategies in the Scheepsbuurt project work through variable scales. Multi-modal mobility, mobility experience, and urban program are directly affecting user behavior to choose the best option for everyday commuting.

1 Systematica. (2017). *Transform Transport, Mobility studies and projects.*

The mobility masterplan



The key projects

Mobility Transforms cities
MAAT regards urban development as a testbed for the new regeneration of inhabitable areas through innovative modes of mobility as a service for urbanism. The high level of opportunities around the site—the residential complex and greenery— reinforced the vision to transfer this industrial district into a plausible space for new arrivals and residences. Scheepsbuurt is a car dominant neighborhood. Meaning, it is well connected by roads and there is a lot of parking space while the connectivity of public transportation (over land and water) is relatively low for Amsterdam.

Therefore, MAAT is a vision and strategy that favors the use of public transportation and shared modes of mobility.

Private cars use will be discouraged by increasing their travel time, costs, and effort by two main interventions. Firstly, there will be no parking space for private cars in Scheepsbuurt. Secondly, if the private care users do want to make use of their car, they could make use of the P+R area in the North, which already exists. This hub will be well connected with Scheepsbuurt by public transportation.

The second part of the vision is to encourage public transport use. This means that a new ferry and tram connection will be introduced to connect to the metro system. Lastly, car sharing with others will be encouraged. This will function as an alternative to owning a private car and will nudge the user into using shared modes even more.

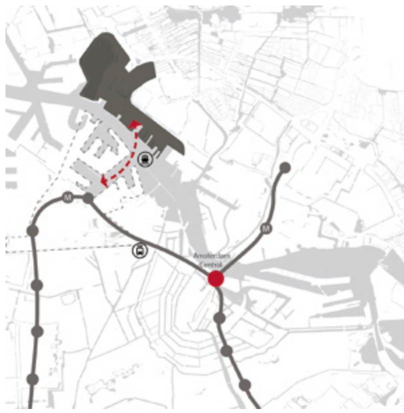
This vision could be implemented by the following three-step strategy:

I) Close the metro loop from station Isolatorweg to Amsterdam Central Station (figure I). This does not only create a better connection between the Sloterdijk area and the rest of Amsterdam's public transportation system but also to the (inter)national train network.

II) Introduce a new ferry line that connects Scheepsbuurt to the metro line in the West (figure. II).

III) Introduce a tram line that will create a connection to the Noord-Zuid metro line which connects Scheepsbuurt to the city center and the south of Amsterdam (figure III). This line will also serve the private car users that will make use of the P+R area in the north of Amsterdam.


Step 1: Metro line connecting to Amsterdam Central


Step 2: Ferry line connecting to harbor


Step 3: Tram line completing the external loop (East to West)

Mobility and Urban Development
The urban development within the site is driven by the mobility strategy and site-specific characteristics, pursuing the vision of an active, green, and water-oriented district. The urban structure is proposed to evolve from the transportation network. For example, the new tramline is designed in a way that used to structure the site into three zones. The layout is further refinded by green arms, serving as a link between the waterfront, the neighboring district Tuindorp Oostzaan, and to the polder landscape. These green arms are complemented by further pedestrian connections strengthening not only the walkability of the district but also its orientation towards the water.

The industrial character of the docks along the waterfront is supplemented by selectively kept and refurbished industrial buildings throughout the district. While the innovative vision for the MAAT project is to create a permeable space and to break the solid structure of grids and massive built areas, designing a more active plinth and a pedestrian-friendly street layout serves as a basis for more interaction within the neighborhood. The soft mobility is dominated the site that needs maximum shared and common ground and accessibility of pedestrian and other shared-slow modes of mobility. On a larger scale, the three proposed key projects are related to the mobility strategy. The public waterfront is a connection point for ferries, while it also serves as recreational space. A central mobility hub links ferry, tram, and active transportation modes and it also strengthens the district center at the intersection of park and water.

Furthermore, the hub provides a mix-used program of amenities and retail to vitalize the area. Due to the new mobility concept, the Cornelius Douwesweg, which as a large road separates the new district from Tuindorp Oostzaan, can be redesigned as a connecting corridor between the two neighborhoods.

Summer School Shots

Photographs by
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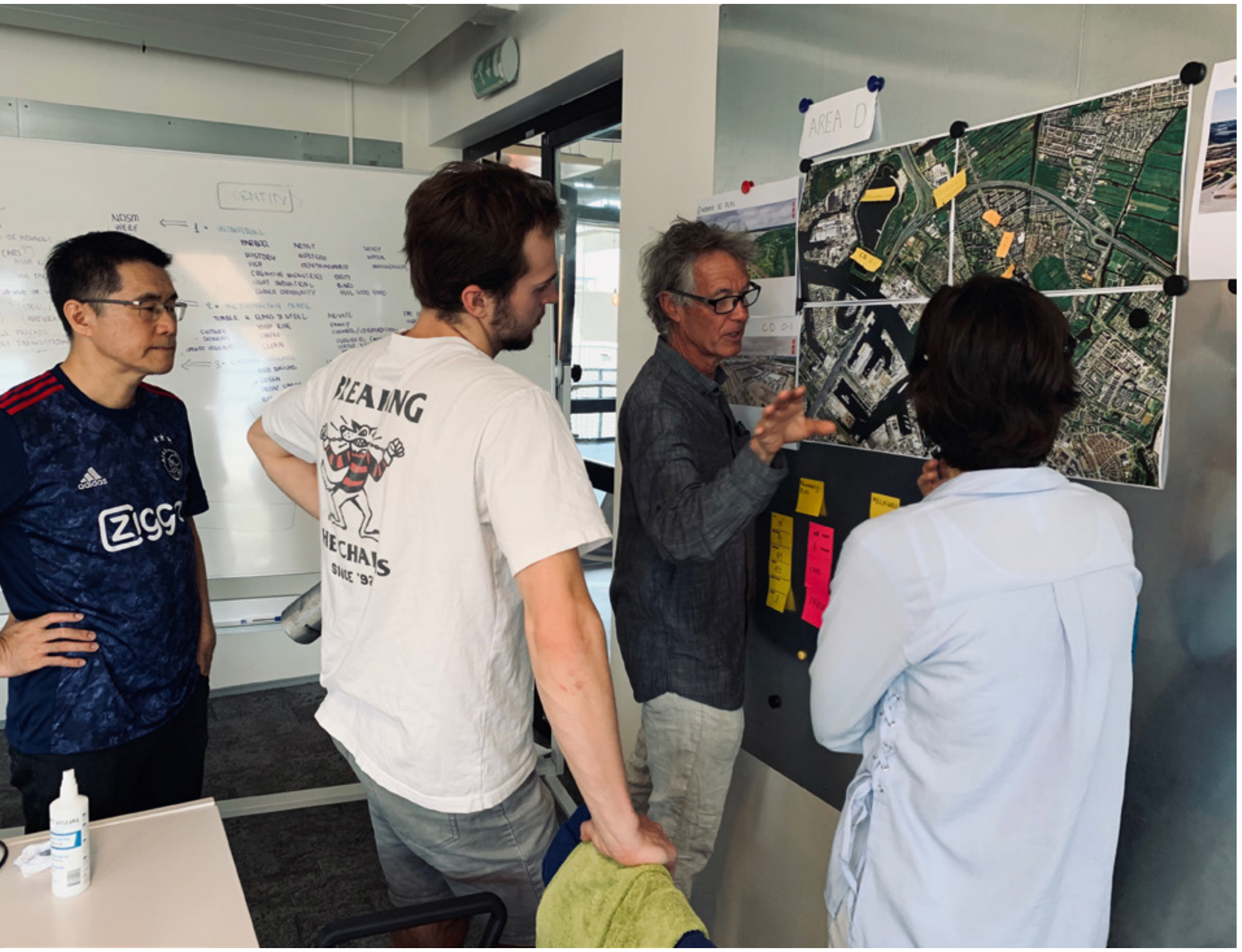
Haven-Stad Areas


SHOP
Gazelle


Parkeergarage Houthavens
ZONE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Joran is involved in research and education activities at the Department of Architecture at the Faculty of Architecture and the Built Environment. Within the academic environment he has been member of several editorial teams, as for example in 2012 for the international conference 'New Urban Configurations', and the French-Dutch publication on exploring the role of stations in future metropolitan areas that includes the 2018 Summer school results: 'Stations as Nodes'. Currently he is involved in the Architectural Design Crossovers research project 'Future Cities/City Futures—Good City Life', a research by design project focusing on the how architecture and urban design will contribute to challenges induced by the pressure on urbanization and digitalization of cities worldwide.

Roberto Cavallo

Associate Professor and Head of the group Architectural Design Crossovers at the Department of Architecture, Faculty of Architecture and the Built Environment, Delft University of Technology

Roberto is member of the steering group for the research program at the Department of Architecture, Faculty of Architecture and the Built Environment. He is council member of the EAAE (European Association of Architectural Education), founding member of the ARENA Architectural Research Network and editor of AJAR (Arena Journal of Architectural Research). In 2013 and 2014 he worked in China as senior researcher (Shanghai, Hong Kong, Beijing). He has extensive experience in international workshops, symposia, conferences and exhibitions, and he is often invited for keynote lectures and as member of scientific committees in international academic and professional events. Between 2014 and 2019 he has been director of education of the faculty. His particular research expertise is about the mutual interactions of infrastructures and the city.

Hans de Boer

Coordinator Research Affairs and Innovation of the TU Delft Deltas, Infrastructures & Mobility Initiative (DIMI)

Hans has a special interest for the theme Future (proof) Built Environment and Urban Infrastructures for which several design studies were initiated and organized in close collaboration with the Royal Dutch Architect Association (BNA), ministries, and municipalities. Design studies like 'Designing Transit Oriented Development' (2014), 'Highway & the City (2017)', 'City of the Future' (2019), and recently City × Climate (2020). A related responsibility he has is the coordinatorship for the interfaculty minor program 'Integrated Infrastructure Design'. He is formally being trained in Information Science and Public Administration (Management & Organization). He had former positions in Automation, Research Policy and Strategic Planning.

Iris van der Wal

Freelance researcher, designer, and cultural organizer

Iris has lead the art, science, and technology program 'Crossing Parallels', a collaboration between TU Delft and TodaysArt. Residents included fashion designer Iris van Herpen and architect Philip Beesley. She has worked with architecture and design firms as well as on personal projects and collaborations including a residency at Guest Projects London, a collaboration with Zaha Hadid Architects for the Salone del Mobile, and the project 'Icoon Afsluitdijk' with Studio Roosegaarde. Iris studied Architecture at the TU Delft and graduated in 2017 on redesigning contested heritage.

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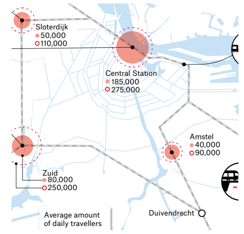

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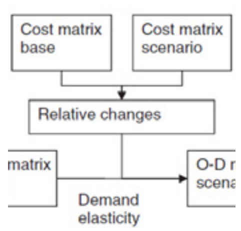

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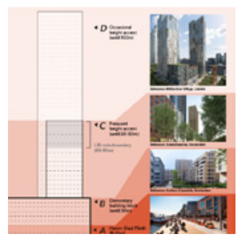

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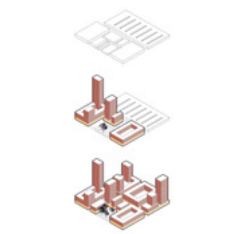

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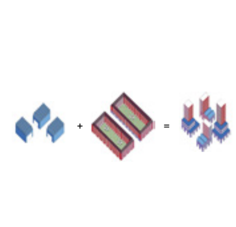

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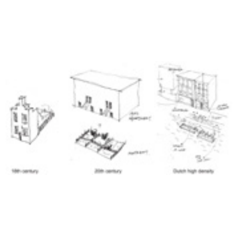
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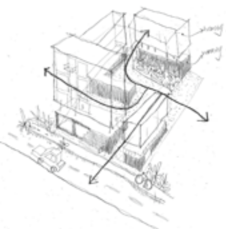
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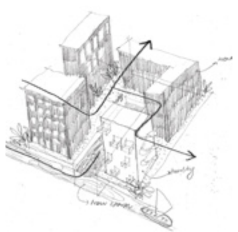
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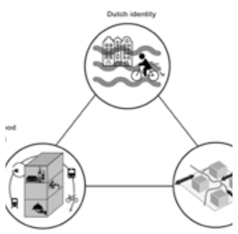
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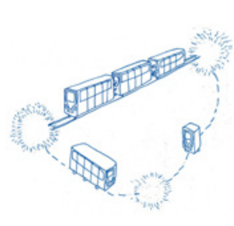
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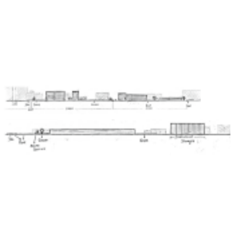
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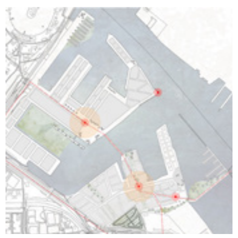
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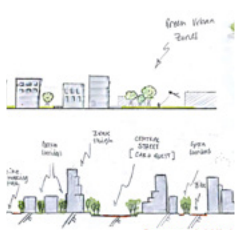
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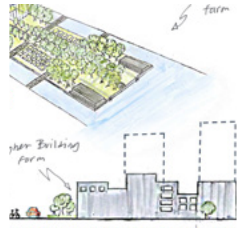
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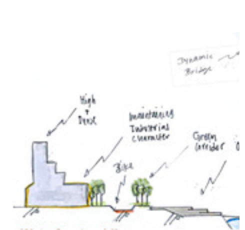
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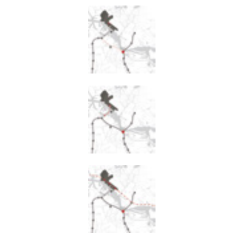
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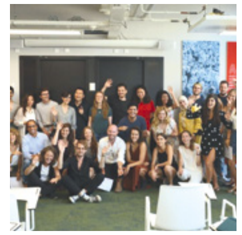
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Which approaches and scenarios of smart (multimodal) mobility can be tested and applied to the future urban development of Haven-Stad, Amsterdam?

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