Graduation Reflection

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Dear reader,

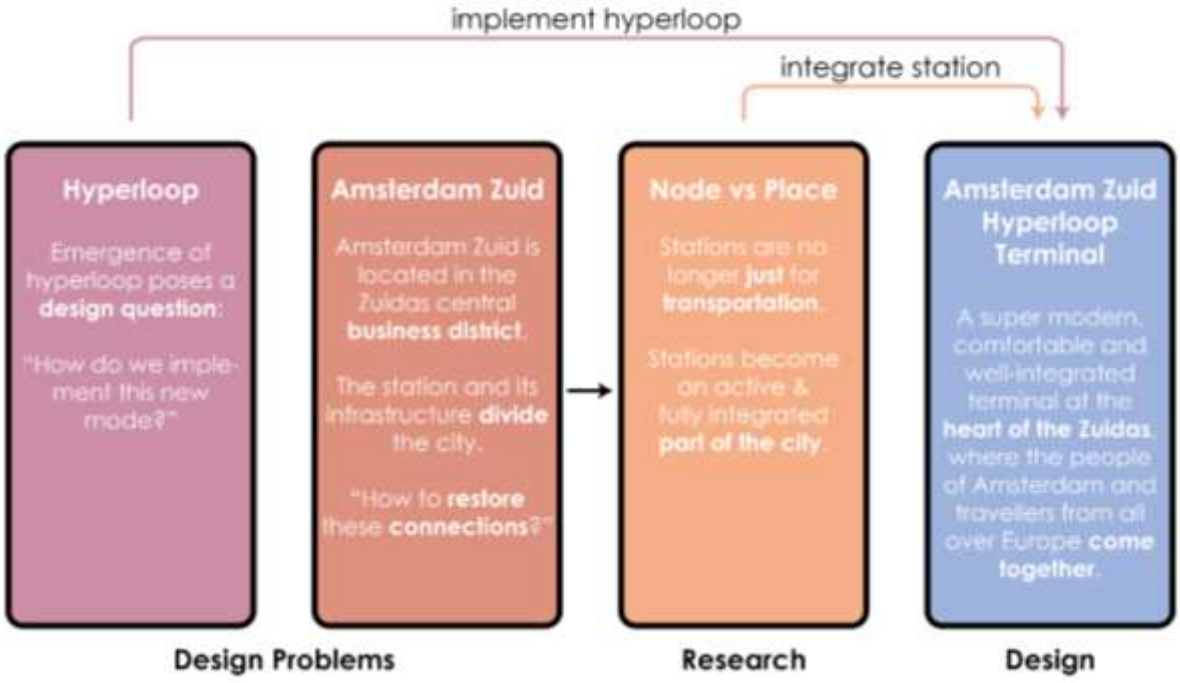
In front of you lies the reflection on my graduation project. The potential emergence of a hyperloop network formed the starting point for this project. Contemplations on where to implement a hyperloop terminal, resulted in choosing Amsterdam Zuid station as my project location. Analysis of the site led to new insights regarding the role of the station within the area and the barrier-effect that the accompanying infrastructural bundle imposes on the urban area surrounding the location. This led me to formulate my graduation research on the integration of the station within the city. The research informs the design by presenting six design principles and six design spaces that can help in the realization of a well-integrated urban station.

The preliminary design that I made for the New Amsterdam Zuid Hyperloop Terminal over the past year, has thus been informed by two factors: the implementation of hyperloop and the integration of the station within the city, see also the image below. The next pages will provide more in-depth reflections on my graduation project within its wider contexts. This will happen by covering these five different topics:

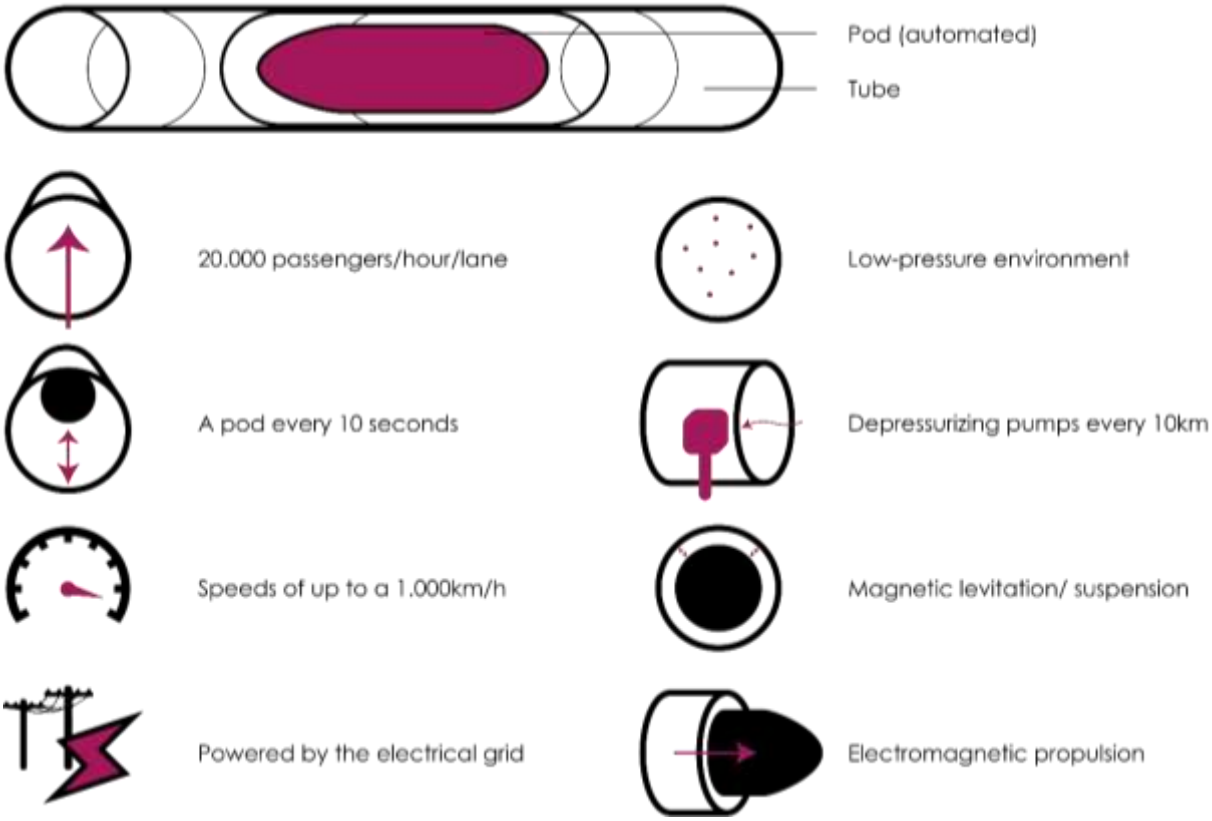
1. A brief description of what hyperloop is or could be.
2. The relation between the performed research and the proposed design.
3. The relationship between the graduation project, the master track and the master program.
4. Relevance of the research and relation to the wider academic context.
5. Ethical issues and dilemmas encountered during the graduation project.

I hope this reflection gives insight in the process of my graduation project.

Kind regards,
Robin Koelmans



/ About hyperloop



// What is hyperloop?

Hyperloop could reform European transportation as it could offer a sustainable but fast alternative to flying. Hyperloop exists of an air-tight tube that has a near-vacuum environment within it in order to minimize air resistance. Within this tube, a carriage, or pod, moves without physically touching the tube. Magnets enable the pods to stay in the middle of the tube whereas electromagnetic propulsion enables the pod to accelerate and move through the tube. Due to the lack of physical connections between the pod and the tube, there is no rolling or sliding resistance and due to the low pressure environment within the tube there is a minimal air resistance, resulting in a highly efficient way of transportation.

Courtesy of Delft Hyperloop

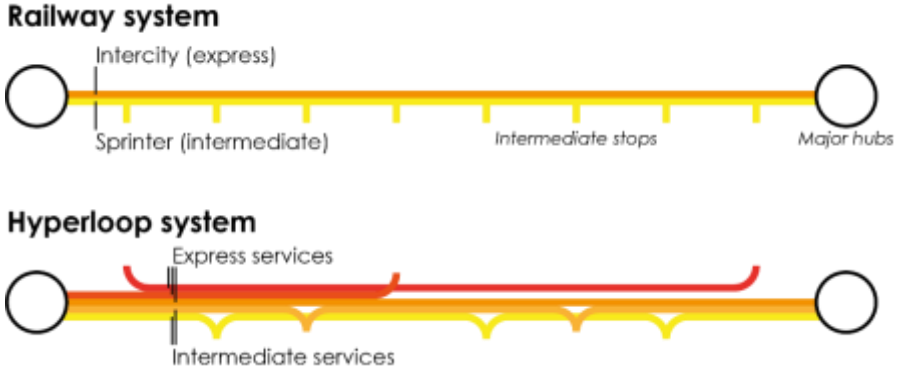
// How does a hyperloop network look?

Industry professionals from Hardt have stated that it is not feasible to build a single hyperloop line connecting two nodes as this would not create sufficient ridership to adopt this modality. Hyperloop might well start as a single line, but on the long term it should be built into a network in order to increase its functionality as a feasible transportation method.

Due to the sheer speed of hyperloop, it will connect places on relatively long distances. In fact, hyperloop is expected to fill the gap between (inter)national (high speed) rail services and short-to-medium-distance flights. This means that, depending on the level of service a potential hyperloop system aims to offer and depending on the service area that it aims to facilitate, stops are distanced anywhere from a hundred kilometres to a few thousand kilometres apart from one another. More stops ensure a greater service area and thus a larger target group of potential travellers. Inherently however, more stops increase travel time and thus decrease the quality of service provided to riders, making it harder for hyperloop to compete with medium-distance flights.

Hyperloop could solve this paradox by implementing branches and on-demand or charter services. By creating branches, stations can be located next to the main tube. The main tube functions as a highway with a continuous flow of pods, whereas pods only stop at their desired stops defined by the demand of the riders. This way, the hyperloop network could have both a large service area due to its many optional stops whilst maintaining an express service level due to its demand-driven operation.

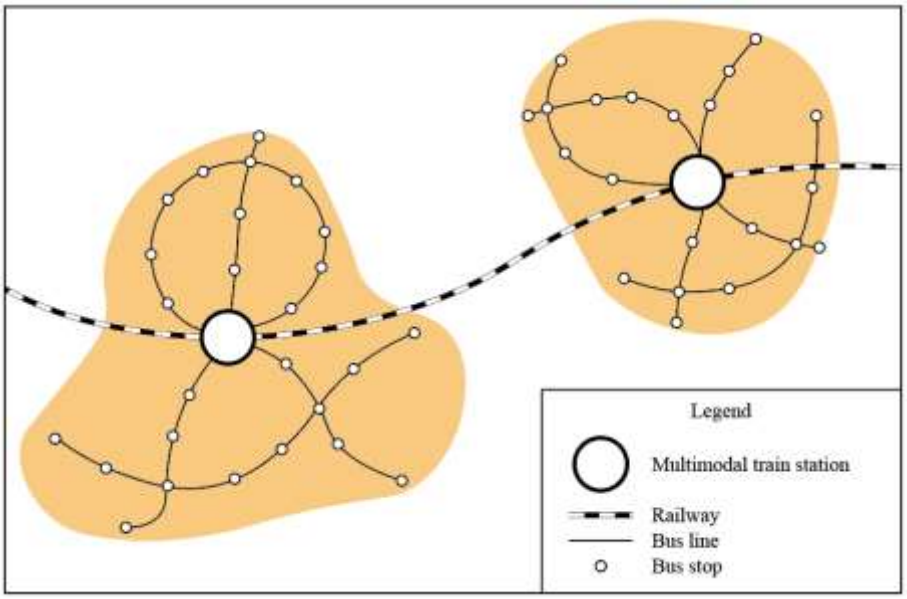
In railway transportation, we see that there are two types of trains in order to achieve this kind of service: sprinters stop at intermediate stops (ensuring a big service area), whereas intercities function as an express service (only connecting the main hubs in the network). Hyperloop could combine the functionality of both networks into one. A great examples of this approach would be that it reduces the need for stop-overs and ensures direct connections between all different nodes on the network.



// Where to implement a hyperloop terminal?

As described, a hyperloop network functions on a relatively large scale in-between larger hubs, similar to the way airport or high speed rail services function. In order to increase the accessibility, the hyperloop network should be connected to other networks on different scales. This is called 'multimodality' and the aim here is to use the advantages of different modalities whilst minimizing their negative impacts.

An example of this can be found in the close connections between national rail services and local bus services. Generally, the most important bus station of the city's bus network, is located in front of the station. Enabling not only regional trips on the bus network, but also providing the opportunity to combine both networks, using the bus as the access or egress mode to the national train services.



In a similar way, I believe that a hyperloop network should be integrated with other networks in order to benefit from their respective advantages for transportation. Two important locations can be appointed for this: airports and railway stations. Airports already facilitate large flows of international passenger travels and they have all the facilities at hand for safety and customs checks. However, airports are generally located outside of the city due to their size and the nuisances they create for citizens.

Hyperloop does not create nuisances in the form of pollution or sounds and on top of this a hyperloop system is rather compact, which means it could be integrated within a city centre's urban fabric. By placing the hyperloop terminal in a central position within the city, it becomes more easily accessible and this makes it a more desirable mode of transportation. Hence, I would advocate to implement the hyperloop terminal in a railway station.

/ The relation between research and design

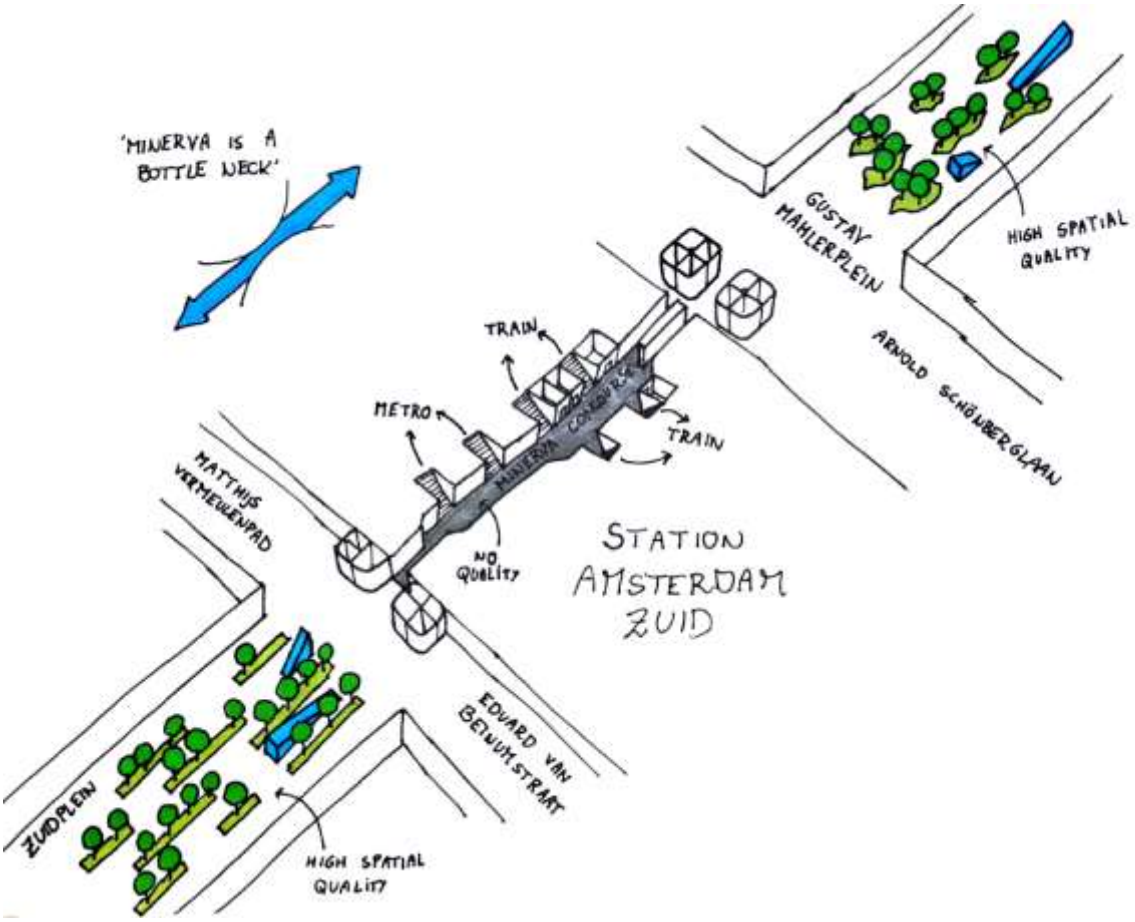
// About Amsterdam Zuid

As described, the aim was to integrate a hyperloop terminal within a railway station. As The Netherlands are characterized by a well-organized and extensive railway network that enters deep into urban centres, an existing railway station would be most suitable. For a number of reasons, I defined Amsterdam Zuid to be the most suiting location for the first Dutch hyperloop terminal:

1. Amsterdam Zuid is currently a station that is not living up to its potential. There is a great lack of capacity and the station needs to be renovated really bad. Because of this, the station has been marked as a 'nieuwe sleutelproject'. The 'nieuwe sleutelprojecten' comprise six important railway hubs in the Netherlands of which five have already been renovated, Amsterdam Zuid is the last project to be undertaken. Implementation of hyperloop can happen as part of the renovation works and could enable new funds to be directed towards the project.
2. Amsterdam Zuid is located in the Zuidas, which is the biggest Dutch central business district and thus is an important international destination for business travels.
3. On top of this, Amsterdam Zuid has a sublime accessibility on different scales. Internationally, it will feature Eurostar, Thalys and InterCity Direct connections towards Belgium, France and England. Nationally, it is really well-embedded within the national rail system and it's only a six-minute-train-ride away from Schiphol International Airport. Regionally it's thoroughly embedded in the transportation system of the metropolitan area of Amsterdam (MRA). The recently finished 'Noord-Zuidlijn' connects Amsterdam Zuid to the city centre and Amsterdam Centraal within respectively seven and ten minutes, creating a new gateway towards the city.

The decision to design a new multimodal hub at Amsterdam Zuid, resulted in the performance of a site analysis of the location. I found that Amsterdam Zuid is being characterized by huge contrasts in spatial quality of the public realm. On one hand, streets and public squares such as 'Zuidplein' and 'Gustav Mahlerplein' have been designed with great care. These spaces have a great spatial and public quality and this invites many people that work and dwell in the Zuidas to stay and enjoy these public spaces.

On the other hand, the A10-ringway and the railway divide the Zuidas in half. The infrastructural bundle creates a barrier, resulting in relatively few connections between the areas North and South of the bundle. The few connections that are present, are rather uncomfortable due to their low spatial quality and the lack of social control (see the next image). The spaces underneath the infrastructural bundle, including the station of Amsterdam Zuid itself, exist merely for the sake of utilitarianism: creating a space for bodies to move through it from one place to the other. Marc Augé defines these spaces as being non-places, because no one actually ever stays in these spaces voluntarily.



The lack of spatial quality surrounding the station of Amsterdam Zuid and the barrier that it forms within the city, brings about two paradoxes:

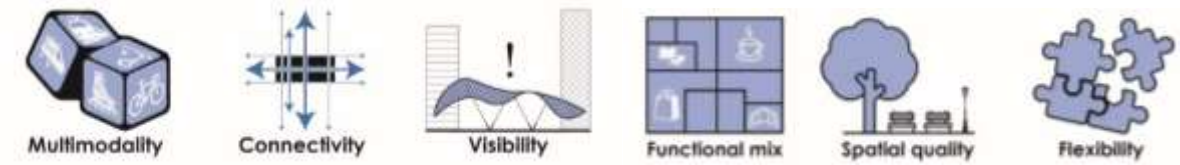
1. Stations fulfil an important role in connecting people. Thanks to the railway system in The Netherlands, the whole country is connected within only a few hours of travel. However, on the smaller scale, stations divide people by being a barrier and by splitting up neighbourhoods. So apart from connecting people, stations tend to divide people as well because of their layout.
2. Traditionally, stations have been seen only as a node that exists for the sole purpose of connecting people. Although stations are visited by large amounts of people every day, the station is rarely ever the destination of the journey. In recent years, more attention has been given to expand the role of the station within society. In addition to the nodal function, public functions are being incorporated, turning the station into a destination in its own right.

// The graduation research topic

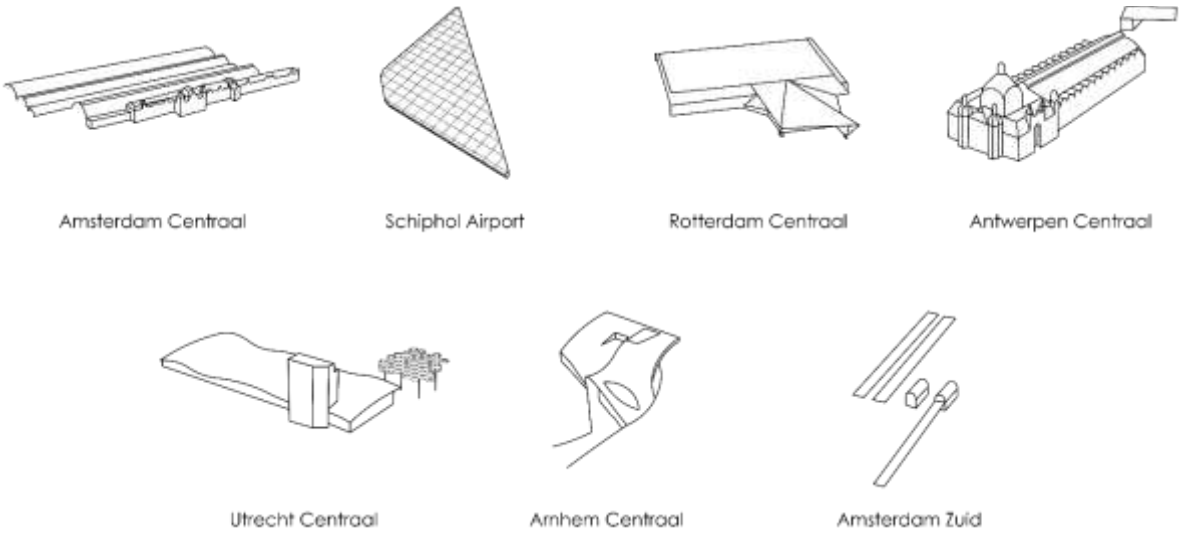
In recent developments, Amsterdam Zuid is increasingly becoming a mixed-use neighbourhood, where people can work, dwell, educate, be treated, sport, immerse oneself in culture or recreate. The aim is to intensify the use of the area in order to realize housing ambitions for the city of Amsterdam. Besides this, the aim is to create a more green Amsterdam Zuid. Because of these ambitions and developments, the renovation of Amsterdam Zuid is more pressing than ever.

Hence, the barrier effect and the double role of the station (node versus place) form the starting point for my graduation research. The notion that stations divide urban areas and create a discontinuous public realm, led me to perform a literary research into the role of the station. I found that a lot has already been written on this subject and the common understanding is that stations and station areas should become integrated parts of the city.

Based on literary sources, case studies, design exercises and interviews with industry professionals, I defined the following six design principles:



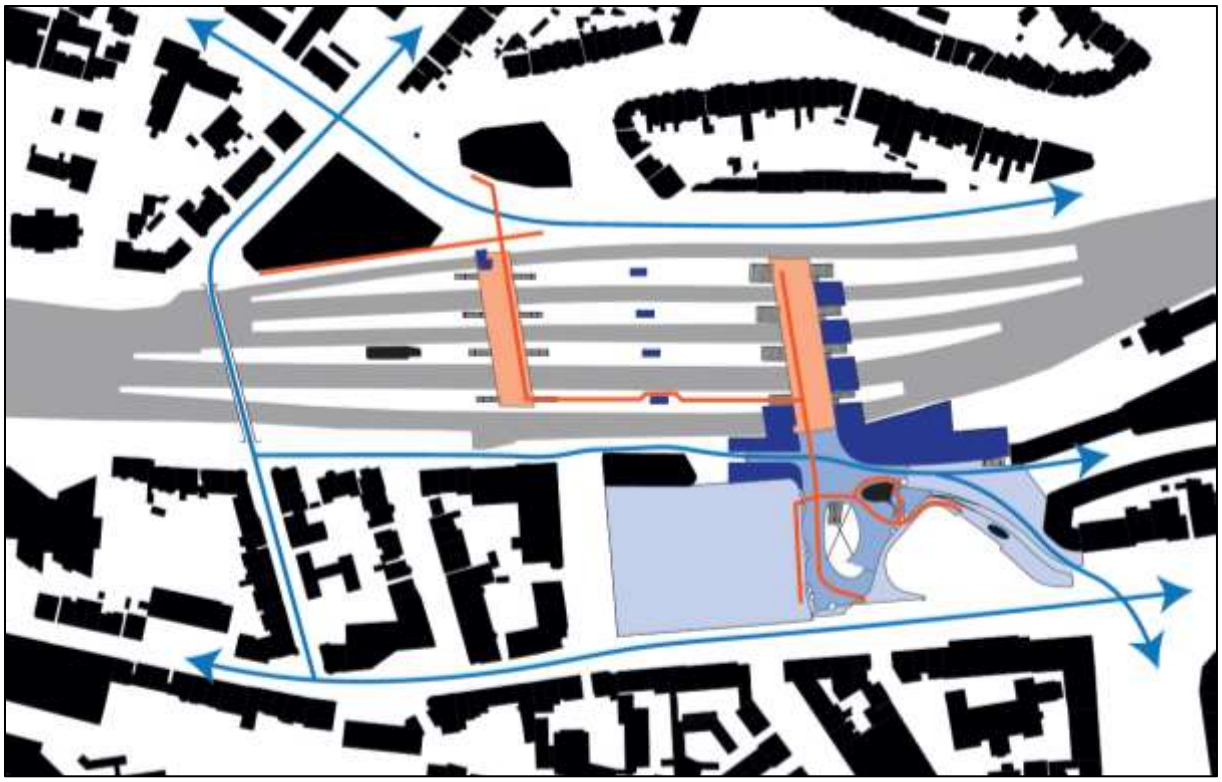
These design principles aim at integrating the station within the city and they form the hypothesis of my research. The aim of the research was to perform case studies in several international multimodal train stations located in dense urban areas in order to examine whether the defined principles were recognizable in these station designs. I analysed the following locations:



// The graduation research method

Analyses of these station locations were performed through the use of Nolli maps. From each station location, I drew a Nolli map covering the station and its direct urban surroundings. This provided useful insights into the public realm and the private spaces. Cadastral information of the Nolli maps has been retrieved from OpenStreetMap. After creating a basic Nolli map for each location, I started making analytical drawings over the maps, see the example at the bottom of this page. By doing so, I visualized seven different aspects:

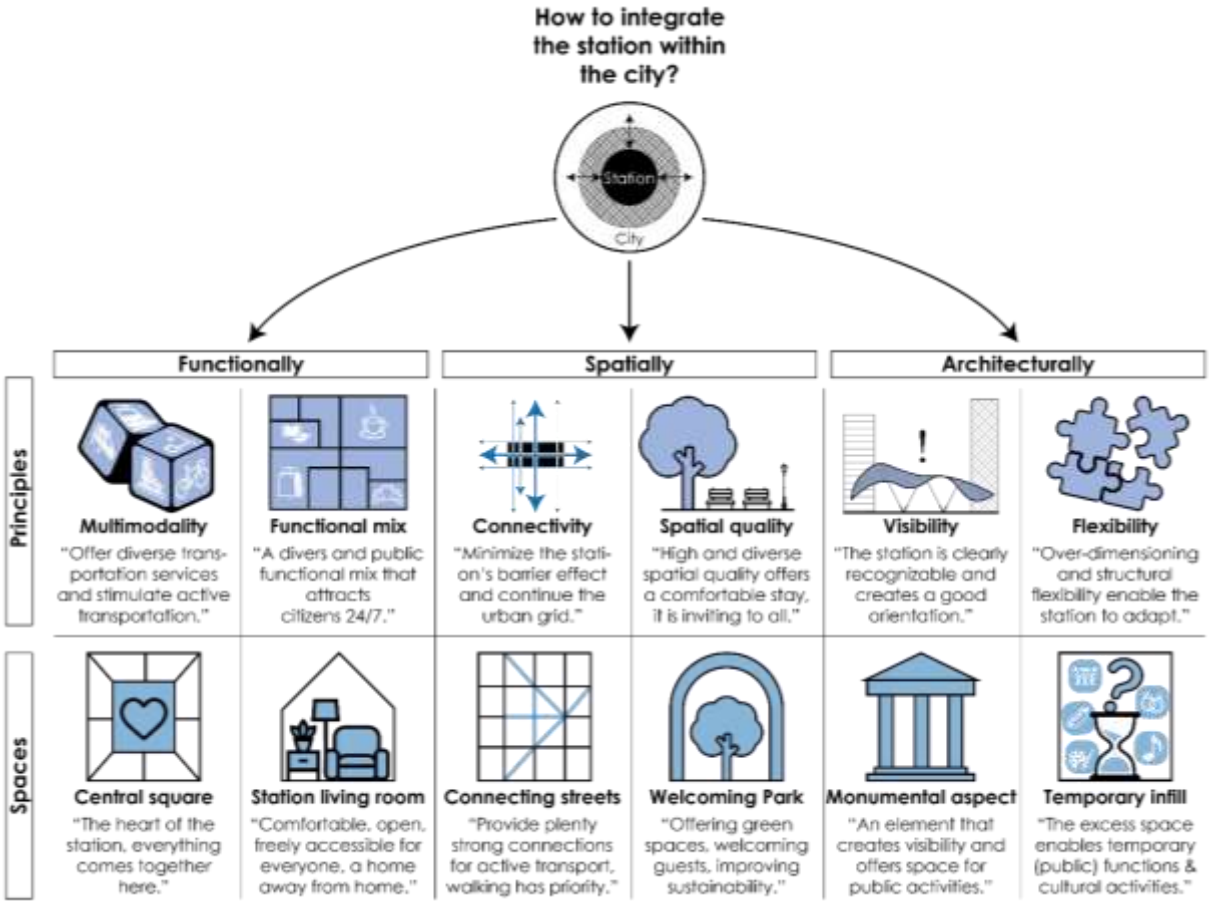
1. The spaces used by the different modalities that are part of the station.
   This layer gives insight into the configuration of modalities within the station complex (nodal configuration).
2. Important transfer routes through the station.
   This layer gives insight into the pedestrian zone within the station complex. Transfer routes are generally high in pace and are predictable as they are dependent on the station's timetable.
3. The OV-chip-gated areas.
   The OV-chip-gates enclose an area that is called the travellers' domain. Although a station is a public building, one can only enter the OV-chip-gated areas when in possession of a valid transportation ticket or OV-card with sufficient funds.
4. Bicycle lanes in the station area.
   Bicycle lanes connect the station's bicycle parking to the city's cycling grid.
5. Public routes running through the station and/or connecting it to the city.
   The public routes show pedestrian flows that are unobstructed by OV-chip-gates. Travellers are likely to use these routes to, but these routes are part of the public domain rather than the travellers' domain.
6. Public functions in the station.
   This layer depicts the public functions present in the station. This is mostly retail: a small supermarket, some to go snacks or flowers, aiming to satisfy the needs of travellers.
7. Public spaces in the station.
   The public spaces oppose the OV-chip-gated areas and are usually characterized by a high spatial quality and abundant public functions in their vicinity. The public spaces are the spaces where the station has the most citylike characteristics, in line with the six design principles.



// The research results

The research points out that the six design principles are rather accurate in integrating the station within the city. However, new insights led to the formulation of six design spaces. Each design spaces accompanies a design principle and embodies the essence of the design principle. The aim of the design principles is to form an addition to the programme of requirements that designers and alike work with for their client. By incorporating these spaces on top of the other requirements for the design, the integration of the station within the city can be secured.

The defined six design principles and design spaces have been incorporated in my own design for the new Amsterdam Zuid Hyperloop Terminal. In this way, the research directly influenced the design. But this relation works in both ways. During many of my preliminary design exercises, I also gained new insights in the location of Amsterdam Zuid and the problems that can arise around urban station locations. Hence, the six defined design principles, were by no means my first attempt at defining design principles. During the graduation process, research and design continually influenced each other. The design principles were revised several times based on newly acquired insights.



/ The relation between the graduation project and the master program

After the Bachelor of Architecture and the Built Environment, I chose to continue my studies with the Master of Architecture (after taking a gap year of Civil Engineering in order to broaden my knowledge on building constructions). The Master of Architecture was no surprise as I started my bachelor with the aim of becoming in architect. Were many fellow students switched to other fields after the bachelor, I remained to stay in the field of architecture. This is was where I belong. However, I do have a great interest in the other fields (landscape architecture, urban design & building technology) as well.

Within the field of architecture, there are all kinds of different projects one can work on. I worked on multiple different projects throughout the curriculum: a holiday house and a rowing sports facility in the first year, an urban plan and the renovation of an apartment block in the second year and finally a museum as the bachelor's graduation project. During the first year of the master, I worked on a municipality building with combined offices and childcare facilities on Sint Maarten and I designed a bridge as part of an elective course, which was also very inspiring.

I really enjoyed each individual design project, there is not one type of building that I would not want to work on as far as I am aware of. However, I do prefer projects that are multidisciplinary. For example when design and construction intertwine, as is the case when designing a bridge.

As a child, I have always had a great love for railway infrastructure and station buildings. Because of their sheer size, railway stations are on the edge of architecture and urban design and landscape architecture. On top of this, the infrastructure of a railway brings about its own design problems, resulting in a highly complex and multidisciplinary design project. However, during both the Bachelor of Architecture and the Built Environment and the Master of Architecture at the TU Delft, station design rarely ever was a part of the curriculum and it was never part of the design exercises. For my graduation project, I decided it was about time.

But I did not just want to design a railway station, I wanted to design the railway station of the future. Therefore, I defined that I would add a hyperloop terminal in order to push my own limits and investigate this high-tech transportation method. As there was not a single graduation studio offering either a station design or a hyperloop project, my only option was Explore Lab. I applied for the studio and had my intake in which I presented my ambitions. Everything went well and I got accepted. Because Explore Lab is the studio designated for students that have a passion or fascination for a project that is not available in any other studio, the studio consists of a multitude of different individual graduation projects. There is no general topic or course planning, except for the five main presentations that are part of the graduation procedure for all master tracks at the faculty.

Explore Lab enabled me to pursue my fascination for station design during the final course of the curriculum, for which I am very grateful.

/ Relevance of the research and relation to the wider context

Because Explore Lab is a studio with individual projects, there is no general research method or approach that is considered characteristic for the studio. This merely depends on the students setup for the graduation project. However, guidance is provided in the concept phase of the research in order to construct a research plan. As described, my main research method is the execution of case studies. Furthermore, literary research provides the context and introduction for my research and increased my knowledge on the topic.

What struck me when doing my research, is the lack of attainable design solutions. Literature on the integration of stations and the implementation of public facilities in them remains to be mainly theoretical. Bureau Spoorbouwmeester made one attempt at defining six design principles, but I found these to be rather vague. In response to this, I defined my own six design principles that are different from Bureau Spoorbouwmeester's principles but do have some overlapping.

During my research, I found that some case studies had extra examples or I found limitations to design principles that had to be solved. This happened through the identification and formulation of the six design spaces, that make the design principles even more attainable and implementable. These can be viewed as an additional programme of requirements that designers can implement when working on design projects for stations in urban contexts.

// Relation to the wider context

In my opinion, the literary research that I performed is rather thorough. I believe it creates interesting links and connects different sources. Substantively, the literary part of my research does not really bring new game-changing information to the table, as it is used to describe the context instead of creating new conclusions. However, I do believe that it is a personal and unique piece, which could inspire other designers by giving a different way of combining sources and arguments and looking at things.

Through my design principles and spaces, I hope to inspire colleagues and aspiring station architects to really create well-integrated urban stations that form a continuation of the city and have a comfortable and vibrant public realm throughout the complex. The urban station is really a development in recent years and although we are on the right track with for example the 'Nieuwe Sleutelprojecten', there is still so much more to be achieved. Let us celebrate the station and create new urban centres in and around them. I hope my design project can be an example of these ambitions and provide an explicit example of what the implementation of the design principles and spaces could lead to.

// Transferability of the research findings

Up to this point, the conversation focussed on station design. However, stations are not the only large-scale structures that can be found in dense urban areas. Other examples can be found in convention centres (RAI, Jaarbeurs), large sports facilities (olympic villages), office parks or shopping malls (Woonmall Villa ArenA, Hoog Catharijne). Although some of these examples already contain public functions to some extent, the problem also lies in monofunctionality.

What I advocated for in station design, is a functional mix that attracts citizens 24/7 as this induces a feeling of safety and helps in creating vibrant places. In order to make public realms and urban grids more continuous, these large scale complexes need to be modified to fit the city's scale. I would even argue to implement residents in the area, as this ensures social control at night as well.

Design measures and interventions that aim at integrating the station within the city, do also work on these other large-scale complexes. At the RAI Convention Centre in Amsterdam for example, sports facilities and cafés have been implemented whereas four residential towers are currently being constructing. The aim of these interventions is to continue the multifunctional city and remove borders. I believe that it all comes down the small-scale mixed-use city that is being described by Gehl and his associates. In the future, the station building might not exist at all, as stations could be an integrated part of the urban area. In that sense it might be that city planners and policy makers can define per area how much city versus how much mobility characterizes an area, instead of creating plans for one transportation hub, it might be decentralized into smaller hubs spread across the urban grid.

/ Ethical issues and dilemmas

// Research

The main method for my research has been performing case studies into the different stations. Whereas the introduction with its literary research was an objective approach, my case studies were not. They were based on my views and beliefs regarding station design and this influenced the way I interpreted the stations I looked into. As a result, I felt very secure about the introduction as it was backed up by the literature. However, I felt less secure about the exactness of my case studies. What if I saw it incorrectly?

Something that contributed to this feeling is the fact that I do not consider myself as an expert (yet). I only started looking into station architecture a year ago and although I fully immersed myself in the field by reading literature and doing my internship at Arcadis during which I actively tried to speak with as many industry professionals as possible, there is still so much more to learn. On top of that, I am not wearing the title of Master of Science yet, nor am I wearing the title of Architect. This made me self-conscious about my interpretations and my results in the research.

However, I did describe my method and my approach, so my work is transparent and repeatable. I guess the final evaluation will point out how well my research is received by my research tutor, so I am very much looking forward to this moment as I am curious about this final verdict. Also, I hope that I can continue on doing research in the future as I become more experienced in the field. Currently, I am reviewing possibilities to stay with Arcadis, if this works out, I hope I can extend my current research within the work field.

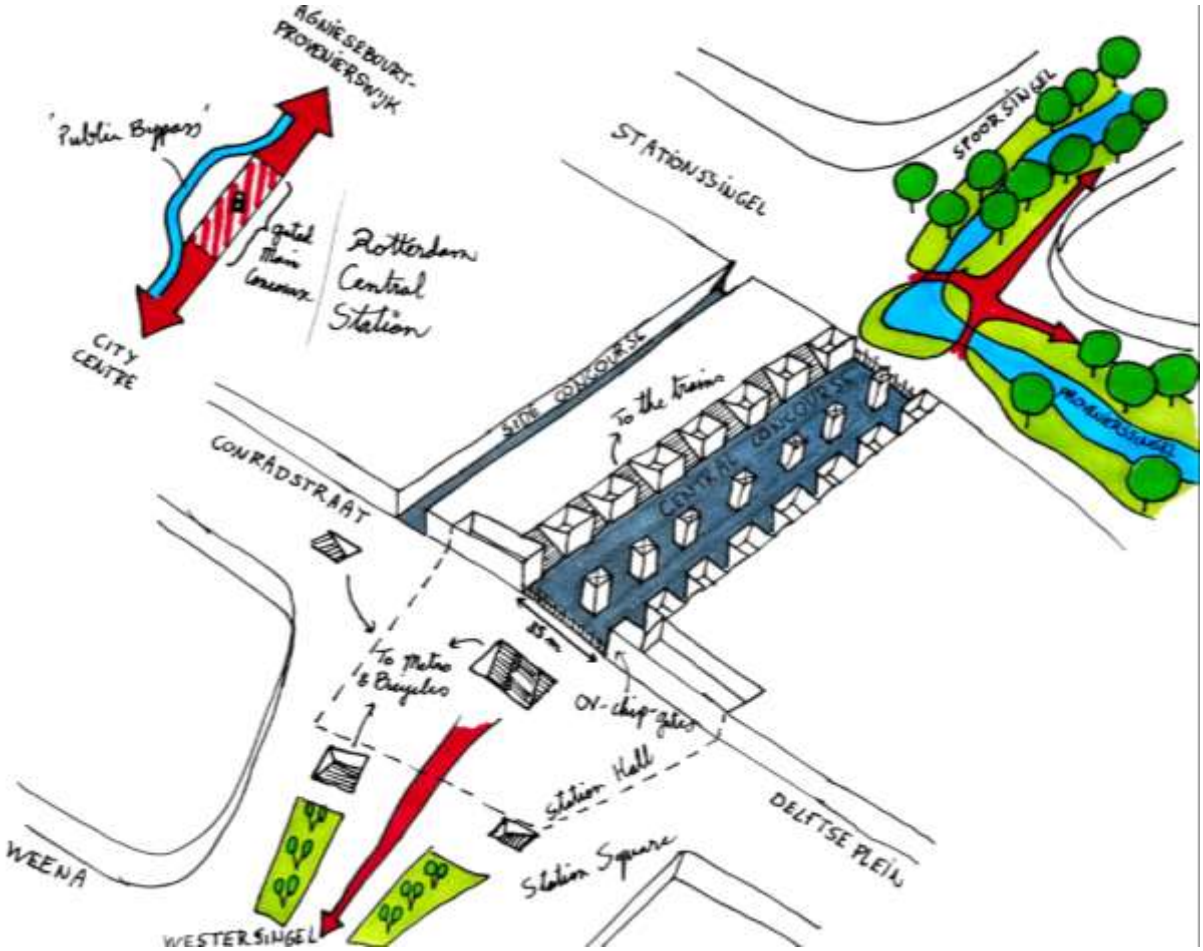
// Design

At a station, there are different spaces that vary in function and nature. According to Bureau Spoorbouwmeester's 'Nieuwe Stationsconcept', you have four domains, one of which is the traveller's domain. The traveller's domain is being formed by the platforms mainly, the spaces used for (dis)embarkation and transferring. Ever since the introduction of the OV-chip-card and its accompanying gates, a big part of many station is now closed to the public in a way. Only people carrying a valid transportation ticket are allowed behind these gates.

I totally understand that at some point in the process from entering the station area to boarding the train, there needs to be a ticket control in order to separate valid ticket holders from passers-by and potential fare jumpers. By creating a large area designated for travellers, the station becomes more organized and flows can be better accommodated. However, as many stations also function as an important connection from one side of the city to the other via the main concourse, I believe it is unethical to just surround this concourse with OV-chip-gates as this excludes people without a valid travel ticket to use this route.

Stations are a de facto public building, but the development of OV-chip-gates compromises this aspect of the station by creating a selection procedure on who may or may not enter the station. Although I am really fond of OV-chip-cards, I do believe the gates require a better solution. During my case studies, I saw some stations that tried to solve these issues. At Amsterdam Centraal, five concourses run underneath the tracks. Of these, two are entirely public, meaning there are no OV-chip-gates here. These two concourses provide citizens with a comfortable connection from the inner city to the water front, and from the streetcars at the Northside of the station to the ferry's and the busses at the Southside of the station. The other three concourses are gated and provide the connections to the train platforms.

Rotterdam Centraal (see the next image) is another example: the central concourse is gated, but next to this concourse there is a secondary concourse for non-travelling pedestrians and cyclists. Although I must add that the secondary concourse feels somewhat like a consolation prize. The urban plan and landscape design are entirely focused to guide citizens towards the great station hall and the spacious central concourse with its grand architecture. However, if one is not in possession of a valid transportation card, a sharp curve to the left is required to find ones way to the public bypass concourse, that has been designed to be a lot more modest.



At stations like Zwolle, Arnhem Centraal and Amersfoort Centraal, all concourses are entirely closed-off from the public realm by OV-chip-gates, which I cannot condone. Therefore, in my own design, I made sure there were plenty concourses to connect both sides of the city through the station complex. Also, I kept one unique feature of the Minerva concourse at Amsterdam Zuid: the dual concourse layout in which half of the concourse is gated and half of the concourse is public. In practice, this means that there are two concourses, albeit in the same space. This enables travellers to interchange between different platforms without having to cross the gates and it enables citizens to walk through the station without needing a transportation ticket. Reuniting the station within the public realm.

// In practice

/// Accessibility

Transportation in general is not accessible for all. Some people cannot afford a car and in more recent times with the war in Ukraine, fuel has become very expensive. Trains can also be quite expensive. As a student, I have the privilege to use free transportation in the weekends, hence, I always try to schedule my travels to be during the weekends. But if I travel during the week, I easily pay fifty euros for a round trip. Although we define trains as being 'public transportation', one can wonder how public that is.

This arises the question who will use hyperloop. Our train network is already in place for a long time, but a hyperloop network has to be built from scratch, leading to massive investments. How are these investments going to be returned? Probably through ticket fares. Hence, I foresee that initially hyperloop will be used mainly by business men and women that travel for work. But I hope that as investments are returned and governments become more financially involved with hyperloop, ticket fares may be reduced and the transportation service can be affordable for more people.

Apart from the financial aspect, hyperloop pods are rather small and tend to be a bit cramped. Making hyperloop accessible for people with a disability, can prove to be a challenge. A wheelchair uses more space than a normal seat, but it also creates the need for larger doors and wider aisles, which hugely impacts the capacity of the pod. On top of this, hyperloop is meant to be a fast system, with only a minute to disembark and board the vehicle, this can prove to be a challenge in its own right for people with disabilities. I hope pod designers can find design solutions in order to make hyperloop an inclusive modality. Regarding my own role as an architect, I made sure to incorporate tapis roulants and larger elevators in order to improve accessibility throughout the station, all the way to the hyperloop platform.

/// Sustainability

I hope that hyperloop can provide a sustainable alternative for medium-distance aviation, especially within Europe. Because of the geographical layout of Europe (being mainly a single land mass), it is relatively easy to transport over land. But on distances of over six hundred kilometres, trains are not competitive for aviation. Hyperloop could be the solution for fast sustainable transportation over land.

The claims of hyperloop are very promising: it should emit a fraction of the emissions. Because hyperloop will be an automated and electric system. I believe this to be true. But maintaining a low-pressurized environment in the tubes requires vacuum pumps to operate 24/7, which costs energy. Also, hyperloop 'tracks' are tubes, consisting of much more material than just regular railways. Therefore, I wonder how big the initial environmental load of the construction of a hyperloop network is and how long it takes for the operation to see a reduction in the carbon footprint of the modality.

/// Induced demand & sustainability

Although I am very fond on our well-designed transportation system and the emergence of new transportation technologies that bring more distant areas within our reach, I am also worried. Transportation has increased vigorously over the past decades and is expected to even triple by 2050. I am afraid that technological breakthroughs and improvements in transportation, only lead to induced demand. As improvements at the transportation network do not just satisfy the needs of current users, they create demand by attracting new or more frequent users.

I foresee a 'travel mania'. If it is possible to work in Berlin and live in Bordeaux on a daily basis, there are going to be people who will chose this way of living. The possibility creates demand, which is enforced by the internet. People are willing to spend a fixed amount of time in transit, but as transport gets faster, travelled distances will increase. We saw this with earlier technological advancements in transportation. Hyperloop will be a next step in this development.

Although hyperloop may be a very sustainable way of transportation, it might not be more sustainable than current modes of transport if ridership surges. This might sound unfair as hyperloop is said to be way more sustainable than for example aviation. But most people only fly a few times a year, whereas hyperloop can make these sorts of travel accessible on a daily basis. One can wonder whether we actually need this strong connectivity. Will we ever be satisfied with our transportation, or are we in a rat race to travel as much as possible and thereby decimating the positive environmental impacts that our technological advancements have created so far?

// The challenge of Explore Lab

Explore Lab gave me the freedom to define my own graduation project, The New Amsterdam Zuid Hyperloop Terminal, for which I am very grateful. However, such a large and complex design project is normally undertaken by hundreds of professionals that work on the project for years if not decades. I experienced this first hand during my graduation internship at Arcadis - Stations and Architecture, in Amersfoort, where I also worked on the project of Amsterdam Zuid together with a very large team.

However, in my graduation project I was working alone and this was a very challenging experience. As an architect, I really like it when different disciplines come together: architecture, landscape architecture, urban design, technological and structural design and even societal aspects. This means that I like to broaden my horizon when working on the project and for a project as large and complex as a station design, that proved to be a lot.

Because Explore Lab is an individual project, no one had the same assignment as I had and I was in no way able to compare my work with fellow students. I remember from earlier courses that I was always working on the same project as my peers and this made it a lot easier to discuss progress on one hand and change out ideas on the other hand. Within the group of students, there was some sort of group awareness of where you had to be in the process on a specific moment and this was often encouraged by the tutors who used to show examples and explained expectations. Also, there was a course manual that could be reviewed by the students. At Explore Lab, there was no specific course manual for my project. Only the graduation manual.

The lack of reference in this individual exercise, did not only influence me. I believe it was also more difficult at times for my tutors to guide me. They also had nothing or no one to compare my work with and although they obviously made a great effort at guiding me, I sometimes felt like we were all a bit lost in the process.

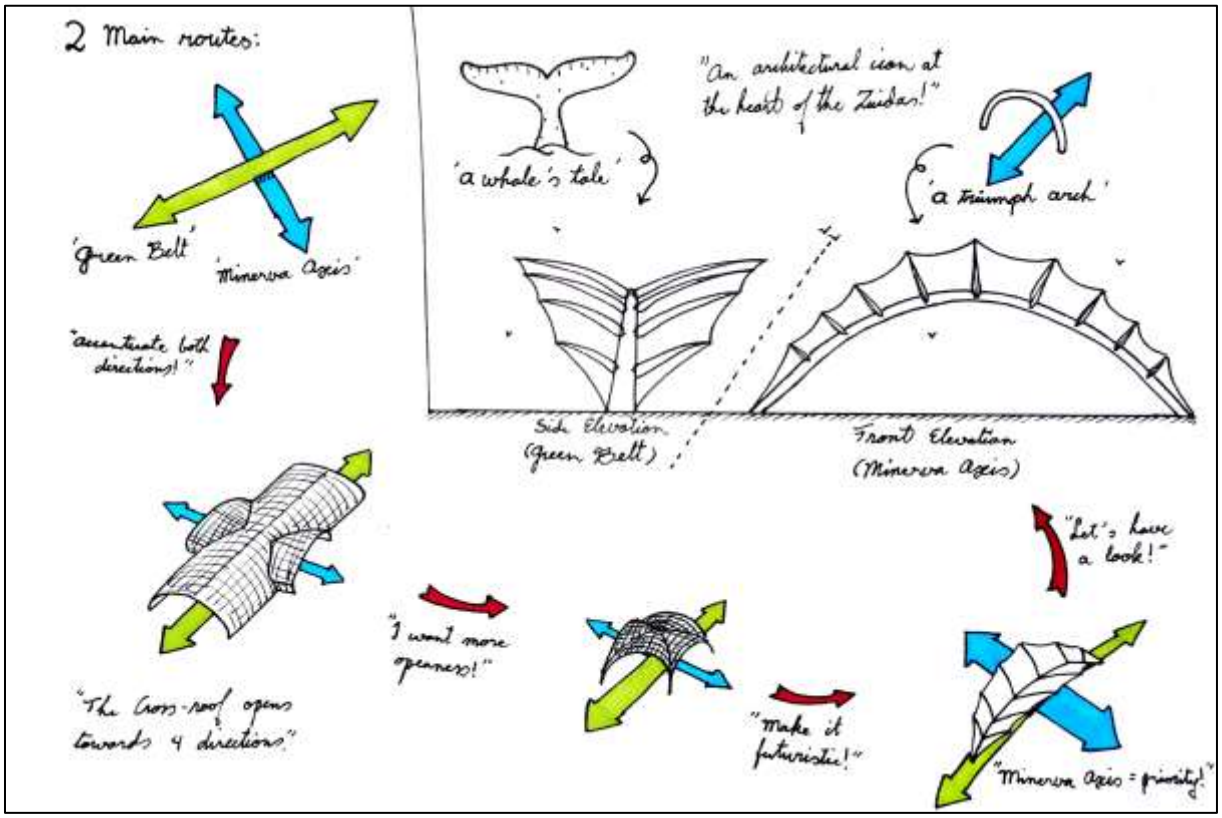
The fact that there was no clear description or framing of my graduation project, made it difficult for me to stick to a central theme. This was enforced by the fact that it was not until the last two weeks that I finally finalized my research and defined my research findings. Although some design principles had been formulated months before, it was never certain whether they would remain in my final version of the research and for the newer findings, it was a challenge to implement these in my design at the last minute.

Something that I found very challenging during this design process, was convincing my tutors of my design choices. In earlier design projects, I never ran into this problem, so I was really surprised to run into it at my graduation project. Somehow, it was never just accepted if I presented my progress, as there were always a lot of questions being asked. I believe this had to do with the lack of a consistent central theme throughout my process that could have helped in informing design choices and selecting relevant argumentations for these choices.

Although I understand the importance of a solid foundation for design choices, whether they are based on site analysis, literary research, case studies or research by design, I do think that intuition can also be part of the design process. However, the difficulty in convincing my tutors made me doubt myself and the quality of my work. Although I firmly believed in my design, it felt like I was wrong somehow. Instead of going on, I kept going back. Overthinking my work and my decisions, not making any new steps. I was stuck most of the time, which led to the extension of my graduation project over the summer.

One aspect of my design that was probably the most controversial to my tutors, was the roof covering the vide. In many of my design processes, I start immediately with a very strong idea and this idea is kept throughout the process. In this case, I found that I wanted a glass-and-steel arched roof, much like the classical train sheds from the 20th century, back when travelling was a sensation. This roof would be similar to Berlin Hauptbahnhof's, see also the bottom-left corner in the image on the next page.

The aim of the roof was to facilitate flows in two directions, namely North to South and East to West, as I found these directions to be crucial pedestrian connections on the site. However, apart from this the choice for the roof was mainly intuitive and as a result, I received a lot of criticism on this particular design choice.



This criticism led me to rethink my design choices and I killed my darling. The roof as inspired by the classical glass-and-steel trainshed was no more. I found that this curved type of roof would close off the space that it enclosed from the surrounding cityscape and I wanted to have more openness. So I experimented with many different shapes and eventually ended up going for a leaf-like roof that would cover the vide, but would bring openness to the project by not obstructing visual connections and facilitating air movement.

Apart from this, the roof has a different appearance depending on the direction one comes from. On the public axis, running from Zuidplein through the Minerva Concourse to Gustav Mahlerplein, the roof is like a triumph arch, celebrating the station within the area. On the green axis, which is a parklike infrastructure that connects the Amsterdamse Boschscheg to the Amstelscheg and is situated on top of the former infrastructural bundle, the roof appears as a landmark in the distant. Spreading its wings over passers-by as they proceed their journey.

The roof is a large intervention and I do fully understand that such a big feature should have a solid reason of existence. Apart from the morphological importance on facilitating the flows, the roof creates a landmark that gives identity to the location and helps in placemaking, which is one of the design principles that resulted from my graduation research. On top of this, the shape of the roof has been optimized to harness solar energy, capture rainwater and guide wind flows over the complex. The roof features as a large climate-control-system for the area combined with a water-treatment and power plant.

Without the feedback of my tutors, I might not have questioned my initial idea, which would have resulted in a different, perhaps lesser, design. I am grateful for the feedback of my tutors and I learned a lot in the process of designing my roof.

/ Epilogue

I spend a lot of time working on the roof and creating proof for its importance, as it just felt wrong to leave it out of the design. Similarly, I spend a lot of time on other similar design choices. I hope I managed to put together a strong and coherent argumentation on why these design choice are correct and coherent indeed. I will find this out in a week at the P4, when I present my technical design to my tutors.

For the coming week, I will work on my technical design as there are still a lot of details and structural elements to delve deeper into. After this, I will update my 3D-model and extract elevations, sections and floor plans. Lastly, I will work on my presentation, making sure there is a coherent story to be told.

Luckily, I had a lot of practice on presenting my work, as I just finished organizing the Hyperloop Knowledge Day on the university where I worked together with Arcadis, Delft Hyperloop and Hardt in order to broaden knowledge on hyperloop among students and facilitate interesting discussions between professionals from different fields of the industry. Apart from giving my preliminary graduation presentation, I learned a lot by looking at the other presentations and more technically by discussing all the ins and outs of hyperloop and Amsterdam Zuid.

Although there are still many things I would want to work on regarding my design, I feel as if I'm ready to graduate. Currently, I am discussing with Arcadis whether I can stay and become a junior architect at their Stations and Architecture department. Therefore, I am looking forward to finalize my graduation project towards the P5 and get ready for this exciting next step in my career.

Thank you for looking into my work and feel free to reach out to me.