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Complex Projects

Article

P 5



AMBIDEXTROUS PORT

LOGISTICS HUB FOR GOODS AND PEOPLE

Arda Ertan Yildiz

INTRODUCTION

Throughout history, cities have been the culmination of civilizations achievements; they are the result of certain features such as macroeconomic tendencies, societal revolutions and cultural synthesis of a society and its people. Rotterdam's history started as a fishermen's port, although historical sources suggest that already by the end of the thirteenth-century fish has been transhipped from small barges sailing the river Rotte into larger rivercraft.

During its development close spatial and functional associations are created between the city and the port. Berths such as Maashaven built during the start of the 20th century acting as a major transshipment area. However, those areas were not just a logistic zone but also acted as an element that integrates community to the port. Products travelled through Maas river end up in Maashaven Markt which acts as a public space for urban development context while acting as an economic stimulant.



Maashaven, 1933

The town grows ever more prosperous by extending the connections with the North Sea situating itself in major arteries of the transportation network. Thus, through 20. Century docks and terminals relocated to reclaimed lands from sea to the west of Rotterdam, kilometres far away from the city centre.

With the relocation of port activities, previous port sites developments within the city became obsolete. This obsolete waterfront strip creates barriers for the city with its impermeable, colossal and inefficient structures limiting access to waterfront both physically and mentally.

Transformation and redevelopment of these areas already happening in cities such as London, Hamburg and Rotterdam (Waalhaven) by enhancing and transforming the port-city integration. These areas create a potential for creating an improved, efficient and sustainable logistics network. Comprehensive inland connections between River Maas and its hinterland led to the development of an inland logistic network on a higher geographical scale, beyond the perimeter of port development, acting as a subsystem in the logistic chain.

Facing these issues create key urban challenges for the city development such as revitalizing waterfront areas, building a new city logistic system which is reaching its limits with congested roads, utilizing mobility network for interconnected accessibility and adaption of technological advancements of logistic chains.

The graduation project 'Ambidextrous Logistics' investigates these challenges through the design of a Logistics Hub, a terminal to transfer both goods and people. Its aims to offer a new understanding for evolving the waterfront to integrate the community with the existing port development while considering possible economic benefits. As a result, a complex program that incorporates certain logistics flows to utilize inland waterways by reforming the missing connection between different urban actors and the port is proposed.

Project located at Rotterdam Zuid, which is being one of the main nodes of the city, considering the poly-centric characteristics of Rotterdam.

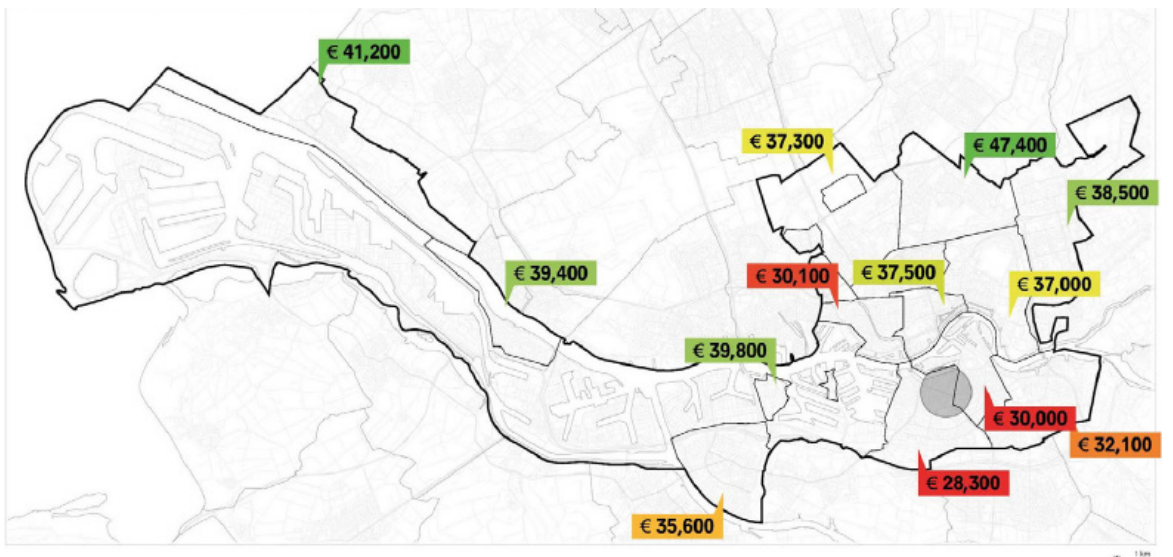
According to the city municipality, its waterfront is going to be more productive with new economic activities which will provide a shift from low skilled workforce to highly educated. Thus, water transportation for both goods and people are considered the fundamental element of the project in order to provide adequate access. Advancement of the water public transport network will provide direct connection to the revitalized port area, contributing to the new image of Rotterdam. In addition, it will provide better accessibility to Maashaven's old

harbour areas and stimulate the development at the waterfront together with Iconic Bridge and Resilient Mycelia Projects.

According to the data of Rotterdam Municipality, compared to the Rotterdam North, South has significant less income per capita and lack of investment. By analyzing the case studies, it is evident that areas provided transportation over the water and connected to primary infrastructural systems got improved logistic accessibility and creates new opportunities for further development in broad urban context. Creating such strategic connectivity of the site provide different transportation flows thus, can immensely improve the logistic network of Rotterdam Zuid and attract more companies which will potentially increase the economic prosperity of the area. The rest of Zuid will also benefit indirectly from the suggested connections as they will result in getting more attraction from the city.



Projects at Site



Average Household Income

CONCEPT AND DESIGN

Ambidextrous Port arranges multiple transportation flows through different elements of the program;

1. Logistic programs aim to integrate two different flows, goods and people by redefining the industrial activity and provide access to the waterfront for the public. By transporting people over the water, it also contributes to the zero-emission vision of the municipality. It is fundamental to sustain a forward-looking logistic understanding for relying less on road infrastructure. It to speculate the conventional understanding of a logistic warehouse which mainly consisted of storage spaces and support facilities. The existing typology is already started to define itself after port movement to west of Rotterdam from the area by including/converting some areas into office spaces. However, still, the area does not reflect its full potential. The proposed program integrates different flows of logistics while developing new ways of utilizing warehouse typology.

2. Warehouse Market, aims to create an interface between goods and people. The warehouse can be used as a storage area for goods produced or sold at the warehouse market locally contributing to the waterfront's new economy and distributed from the distribution centre locally and internationally through inland waterways. Space is in constant interaction with the robotic grid loop which creates a machine landscape. Much of the goods inventory is managed and processed through layers of interfaces and aims to integrate the new retail experience.

3. Offices, that mix white collar and blue collar to promote communication.

4. Leisure Program, aims to promote the identity of the waterfront by adding the public program to the waterfront and create the missing connection between the people and the waterfront.

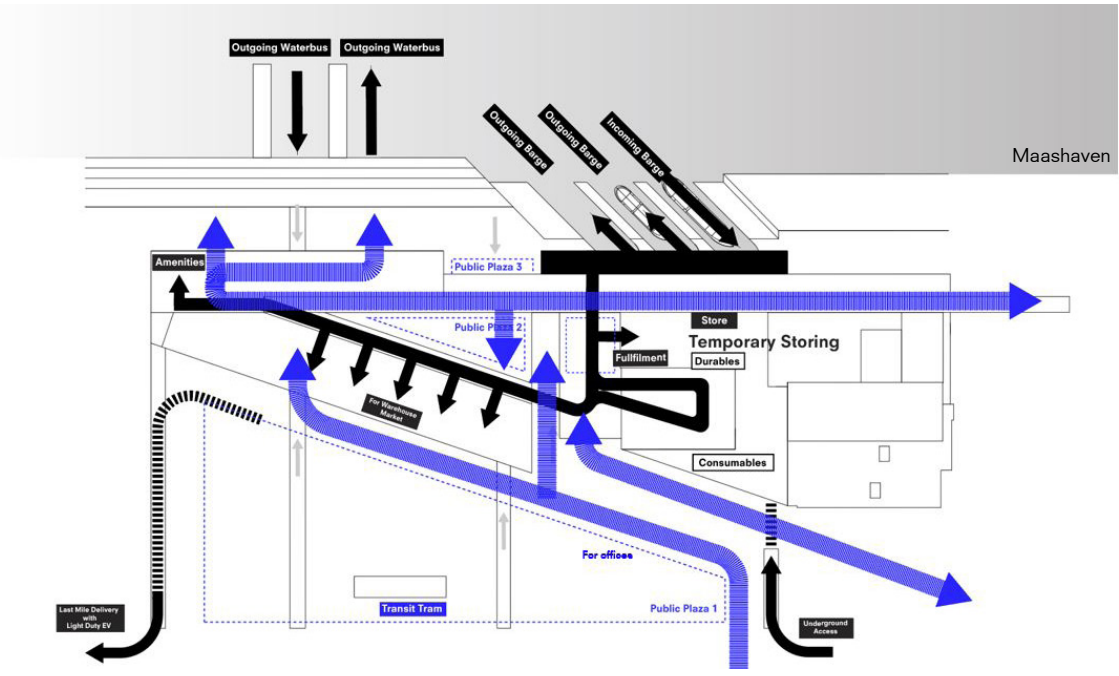
Ambidextrous Port is configured through the critical analysis and mapping of different flows. These flows defined in two different subsets which are "goods" and "people". It serves both the local community and infrastructure of the city by incorporating these different flows to develop the waterfront with public functions while investigating the different type of interactions between machine and human through robotic grid loop.

The conventional understanding of the warehouse where the human is the operator of space changed with the implied robotic grid. Autonomy of the goods emerged through the flows of the robotic grid which suggests a new set of organisational and spatial principles for a set of programs. Logistic programs are attached to robotic loop in a sequence which creates a constant grid to transfer goods. It also intersects with certain spaces such as offices and warehouse market where goods interact with people. The proposal is organised in fragmented and skewed volumes which enables such interactions at maximum capacity.

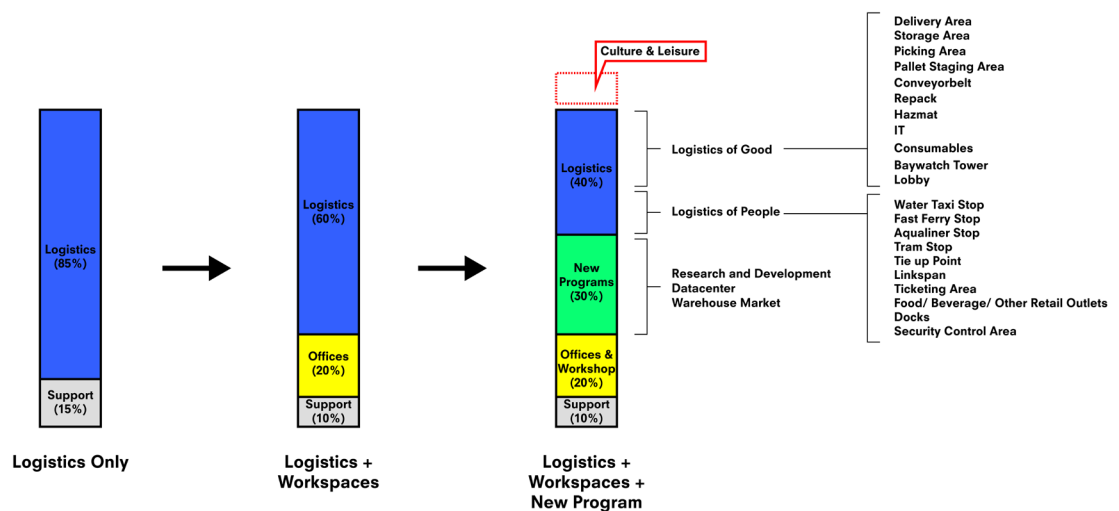
Currently owned by Dossche Mills (Meneba BV), the site includes an existing building that is operated as a factory. The proposal reuses a part of the existing waterfront building, which is adapted and structurally strengthened without complete demolition. Building situated at proximity to the waterfront which provides the space for transferring goods to landside while exposing the building and flows through it.

"Architecture has always been a machinic landscape. Our challenge now is to offer suitably seductive responses, to proliferate typological inventions and to generate dispositional modes of practice that see the political problems of logistics as fundamentally architectural."

Jesse LeCavalier



Mapping different flows through the site

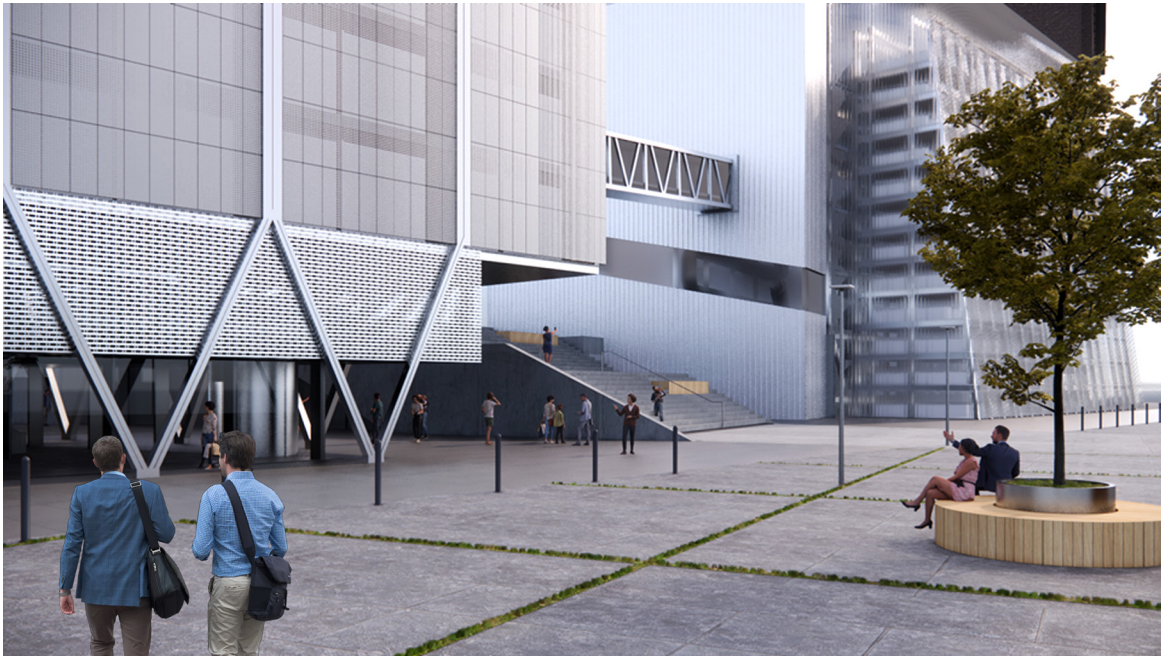


Program

Architecturally the building conceived as two different parts; however the flows of goods and people are continuous in both parts. The logistic part consists of three loading bay at the waterfront providing direct transfer of goods to the storage area. The interface operated through machines with minimum people interaction (for maintenance) Robotic loop connects the logistic bay to the storage area and fulfilment zone. The fulfilment zone is within a layout embraced by storage spaces divided according to the type of goods that are stored. The area storage area climatized and subdivided with steel and semi-transparent glass panels, keeping the visibility but creating a threshold between the logistic area and the rest of the spaces.

Both parts of the design are accessible from both roadside and Maashaven through water transportation. The building provides a wide public square transforming site into an attraction zone for Rotterdam Zuid. Public functions such as warehouse market and shops are located on the ground floor. The ground floor is mainly serving as a dense flow zone with shopping programs located between two different modes of transportation, tram and water transportation. The integration of these different modes of transportation is crucial to keep the constant flow efficient on the macro scale. While shops on Northside provide a conventional shopping experience, the warehouse market explores a new way of interaction with the logistic chain. Integration of logistic programs in a single complex program provides an opportunity for goods to be transferred directly from the warehouse to the market via robotic grid loop. The selected goods are ordered with kiosks and delivered to the customer with the help of the loop. This new experience is totally different from conventional shopping which switching the mobility of goods and people, making people static unit of the process.

The public waterfront axis is continued with a ramp extending the axis over the loading bay to public stairs next to the storage area. Stairs structured with several levels providing different perspectives of the logistic area. 100m long connection bar provides access to the amenities and secondary public space which is on the same level as the coworking area which is used for various event available for the public. The upper floors include more private offices which are also accessible to the secondary public plaza.



Public space next to warehouse market



Stairs to restaurant

CLIMATE DESIGN

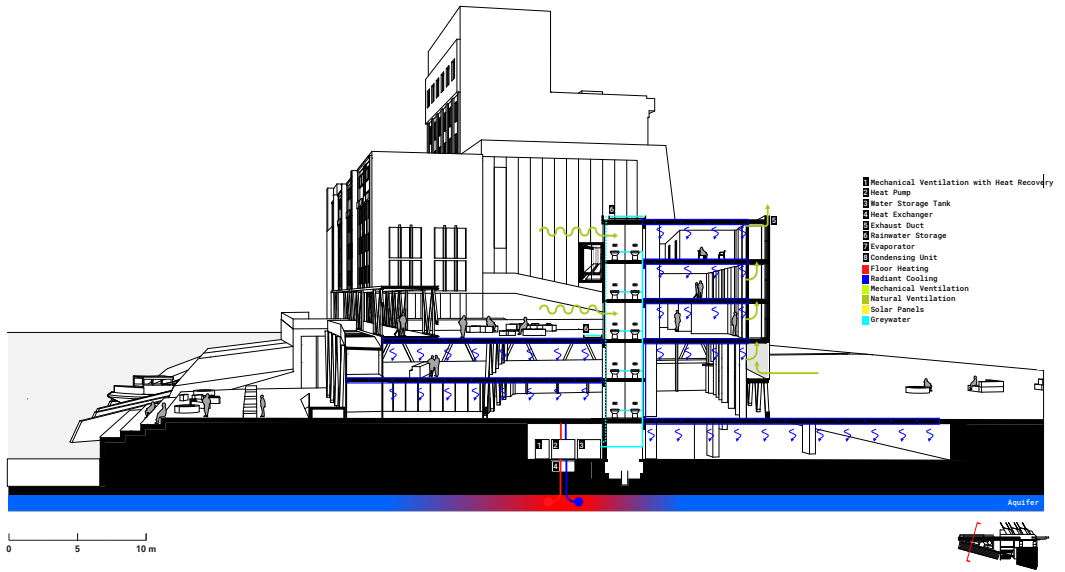
For the climate design several elements are addressed such as heating system, ventilation, rainwater and energy collection.

The heating system of the building consist of floor heating system which is connected to the heat pump and heat exchanger. In winter the building is heated with sun and the floor heating. In summer, radiant cooling system is cooling the building from the ceiling.

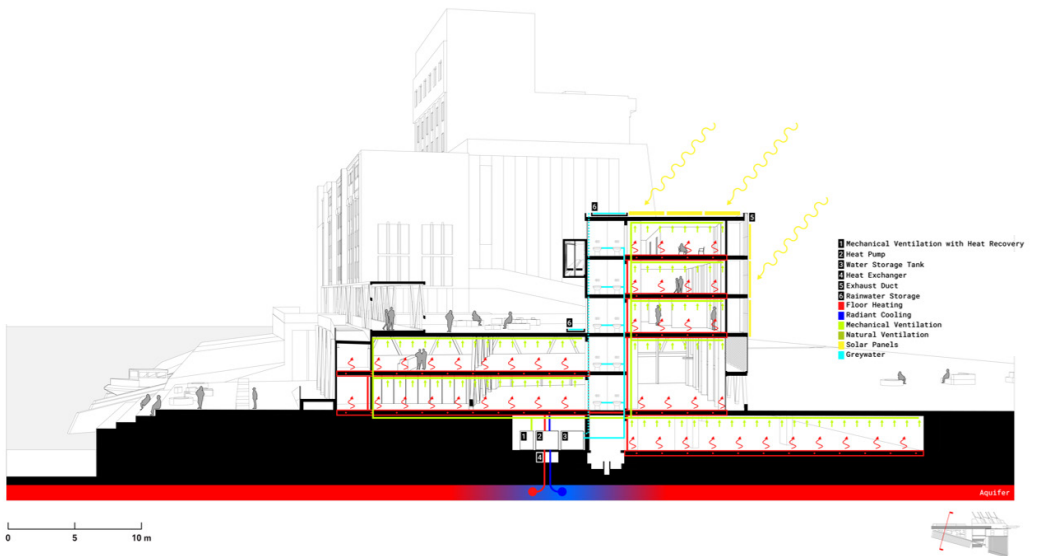
Both mechanical ventilation and natural ventilation is used for the building. Mechanical ventilation system can be controlled individually for each space. Carbon dioxide sensors are placed for each space, which will keep the carbon dioxide at adequate level and start it automatically when it rises. The facade of the office part is constructed with certain set of repeatable perforated panel grid, in which segments of the grid is used to passively suck the air from first floor and exhaust it from the duct which is on the upper roof. In addition, office spaces have direct access to windows which can provide additional ventilation.

Due to the large footprint of the design, many upper roof area and public space allow to collect rainwater. This rainwater is trasferred thourgh the mechanical space to the rainwater storages. After the collection process it is filtered and used as greywater to flush toilets or watering the greenery which will provide efficient use of the resources.

Energy collection of the building is done with solar panels on the rooftop areas, in addition south part of the building has a 700 sqm facade which is covered with PV paint which provides part of the energy demand of the building.



Summer



Winter

STRUCTURAL DESIGN

For the structural design, Y shaped steel columns are used for warehouse storage and warehouse market in order to provide large accessible spaces. Y shaped columns have height of 6 meters and span of 6 meters. From the first floor Y shapes columns turn into steel pillar columns due to programmatic differentiation of the spaces. The columns are connected to each other by I beams and steel bracing is used for the stability of the structure. The structure of the robotic loop linked to the slabs and at office area connected directly to the concrete core by steel connector elements. The core of the warehouse market placed in a way to create stability between the transferred goods on one side and the office spaces on the other side.

MATERIALIZATION

The materialization of the design considered within the particular program and overall experience of the design. The set of materials are derived from the waterfront area and former industrial buildings of the site and further palette of materials added with different transparencies and textures.

When approaching the site, ground floor and warehouse market's facade is completely transparent increasing interaction with the public square in front of it. Semi transparent materials, such as polycarbonate sheets used in the warehouse storage area, making the process of fulfillment partially exposed for public.

The facade of the South side of the building has perforated steel panels on a grid, creating a uniform metal block further emphasizing the warehouse market. The panels have a gradient of perforations ranging from 60mm to 10mm depending on the program behind it and their lightning requirements. Their varying levels of light allows different transparency levels when it is observed from street level. On the balconies facade panels are openable allowing increased ventilation.

Public spaces at the roofs are covered with strips of greenery and wood decking for people to rest, the facade looking directly to the public space on top of restaurant, is foldable, that provide direct access to the cafe inside workshop area.

Considering the different materials with varying transparency levels allow logistic flows visible to the outside where they are intersecting with public flows and where fulfillment processes are happening it is differentiating the spaces for safety reasons.



Approaching the site



From public space on second floor

DESIGN REFLECTION

Aspect 1 The Relationship between Research and Design

In this graduation project, this research aims to utilize inland waterways to improve public transportation and shipping. As a methodology historical relationship between the port and the city is investigated and the specific case of Rotterdam studied. Relevant references are studied to understand how certain logistics flows operated.

Plans of institutional stakeholders for transport over water researched and quantitative data is used to understand the potential of inland waterways. Data is compared with other corresponding data sources to define and scale the problem better. Literature analysis support how warehouse and terminal typologies evolve and developed and speculated on how the typologies will evolve. In the schematic design phase, the challenge of transforming certain flows into masses was a challenge, for a typology such as logistics several constraints and design inputs need to be incorporated, the method I applied was instead of the space itself, I tried to map the process linearly by trying to understand the sequence of spaces that process needs configure the design accordingly.

Aspect 2 The Relationship between Theme and Complex Projects

The studio topic "Migration of Ideas" trying to understand how the ideas appear in different geographies at different time spectrums. Those ideas can migrate through the movement of people and migrated idea manifest themselves affecting its surrounding in many ways such as economically, socially or culturally. The ideas also get affected by external circumstances and sometimes completely transformed into a new entity. Such incursions create new interpretations of the already existed ideas. The thesis aims to investigate the different flows of logistics particularly goods and people through urban mobility strategies and utilizing inland waterways to improve the efficiency of logistic lifecycles and how those ideas evolve. The case studies from different cities helped the process to compare and evaluate the existing situation in Rotterdam and looking at the development of certain typologies historically that project accommodate helped to understand how does typologies developed and speculated.

Aspect 3 Research Method and Approach in Relation to the Graduation Studio

Complex Projects studio has developed a guideline to convey the graduation process with multiple inputs not only individually but also with the studio group. Covid19 impacted the interactive aspect of the education however weekly submissions such as newsletter and group presentations helped to track the other groups working in the same city on different sites and to develop a comprehensive response. Intermediary presentations and articles helped to keep the process on track. The main difference in the approach of CP is to discuss and evaluate the scale and impact of the projects in multiple scales and tendencies. This approach leads the design process and directs the research process on a certain spectrum of topics such as country scale, urban development, building scale, economic aspect, social aspect and technological aspect. These inputs create a reciprocal relation between each other and help to tackle the architectural challenges comprehensively.



Public Workshop



Warehouse Workshop

DESIGN REFLECTION

Aspect 4

Relationship Between the Graduation Project and The Wider Social, Professional and Scientific Relevance

Besides the architectural research, this graduation project responds to key points that contemporary port cities encounter. Design focus understanding the long term vision of the city over the forthcoming years, imperatively available knowledge of economic, social and cultural transformation process is researched within the scope of design. Forces of economic objectives, public transportation objectives and logistic objectives of several parties such as Port of Rotterdam, RET and Rotterdam Municipality are translated into a systematic organization of infrastructural and public spaces. In addition recent technological developments of fulfilment sector is investigated and applied to the design which makes distinctive segments of the design such as robotic loop are complementary to the logistic industry and supply-demand relationship.

Aspect 5

Ethical Issues and Dilemmas Encountered

Throughout the research process, ethical issues are considered the deployment of new technologies to the architectural spaces. The design looked at the process of human-machine relations and how they will disrupt their existing operations. The process of digitization fueled by rapid advancements affects every discipline which creates a massive shift in existing relations of people and machine. Although it creates and enlarges some of the sectors, inevitably it puts some of the conventional tasks into unknown threats. According to World Economic Forum products such as robot arm and technologies such as automation and AI will supplant around 85 million jobs by 2025, which will dramatically change some of the spaces that are existing currently will also needs to be redefined or completely disappeared and new will be created with new technical constraints. Nonetheless, the potential that digitization offers more potential than the risk it possesses and will improve the quality of architectural spaces that we live in.



Warehouse Market



Offices



Event Hall Interior



Restaurant



Event Hall Daytime



Event Hall Nighttime

BIBLIOGRAPHY

Blom, I. (1975) Rotterdam, De Havens

Wijnands, J., Aarsbergen A. (2010) Rotterdam world class port

Hoyle, B.S., (1998), 'The redevelopment of derelict port areas'. The Dock & Harbour Authority, Vol. 79, No. 887, 46-49

Young, L. (2019), Machine Landscapes, Architecture of the Post-Anthropocene

Economic Development Board Rotterdam (2008) Snel Weg Over De Maas: Personenvervoer over water in de Rotterdamse Regio

Aaarts, M, Port-city development in Rotterdam: a true love story

Spigt, N. (2010) Transport over water: Case of Rotterdam

Frazer to C. Price, (1979) (Letter mentioning Second thoughts but using the same classification system as before), Generator document folio DR1995:0280:65 5/5, Cedric Price Archives (Montreal: Canadian Centre for Architecture).

Pensieri, P. E, (1969) Superstudio Domus 479 38-43].

Hein, C., Jacobs W. (2013) Port cityscapes: Dynamic perspectives on the port-city-waterfront interface

van den Bosch, F. A. J. , (2011) The strategic value of the Port of Rotterdam for the international competitiveness of the Netherlands, Erasmus University.

Rienstra et al., (1995), Options for Sustainable Passenger Transport, Vrije Universiteit Amsterdam

Gemeente Rotterdam, 2007, Stadsvisie Rotterdam; Ruimtelijke ontwikkelingsstrategie 2030

Port of Rotterdam. (2016) Five challenges on route to the port of 2050. Retrieved from <https://www.portofrotterdam.com/en/news-and-press-releases/five-challenges-en-route-to-the-port-of-2050>

KLM Aerocarto. (n.d.). Luchtopname. scheepvaart, havens rotterdam. [Photograph] Fotocollectie Rijksvoorlichtingsdienst Eigen. national archief. Retrieved from <https://www.nationaalarchief.nl/onderzoeken/fotocollectie/af3fc584-d0b4-102d-bcf8-003048976d84>

Rotterdam Wedy. (n.d.). Maashaven. [Photograph]. <http://fotos.serc.nl/zuid-holland/rotterdam/rotterdam-45607/> Seer rotterdam. (n.d.). Katendrecht Rotterdam. Retrieved from <https://www.seerrotterdam.eu/en/katendrecht-rotterdam/>

Walta, W. (1964, February 14). De markt aan de Maashaven. [Photograph] Fotocollectie Anefo. national archief. Retrieved from <http://proxy.handle.net/10648/aa59ecd4-d0b4-102d-bcf8-003048976d84>

