Reflection paper

Architectural Engineering
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P1

At the beginning of the first semester, I chose metabolic flow analysis as method within the harvest-track. This method can be applied to a variety of scales, but due to my personal tendency to place my projects within their broader context, I have used this method as a top-down approach in both research and design. I started my research paper with a large-scale analysis of different flows within the West-Port of Amsterdam with the goal of finding an opportunity to fit my project within the flowsystem as the missing shackle and to find the perfect location to build it. Although my attempt to analyse the whole port was a devoted one, I realized that this preliminary research was very time consuming. The research has been valuable for choosing part of the program and it has helped me to get a grip on the context and development of the West Port area and some of the research even came back to the project around the P3. However, if I would have chosen a program from the start, I could have spent more time on the actual research and design. The main feedback which I took with me to P2 was to really start making (design) decisions and realize not all answers will result from research alone.

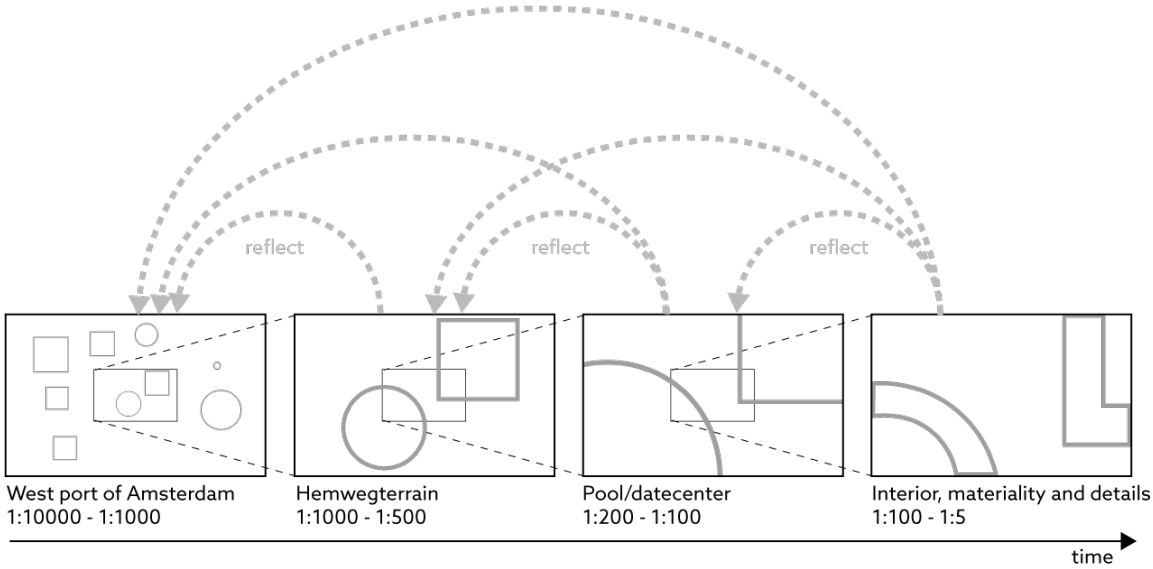

Figure 1: Diagram of top-down design approach. Own creation.

P2

After P1 I finally decided on the program for my project (the indoor swimming pool and datacentre) and could focus on developing the flow diagrams. My research focussed on the heat exchange between the two programs. Between P1 and P2 I have been mostly focussed on the research paper. Because of the limited time, which might have been caused by my delay at P1, I had a hard time focussing on the design. However, the design-research during this time was (similar to the preliminary research) mostly focussed on analysing the site and context. I visited the site multiple times, researched the development projects around it and the heritage buildings that are present on the site. This top-down approach could have been the result of the metabolic-perspective I had developed as result of the research. The last weeks of this period I started with form studies of the building, which were a response to the heritage buildings on the Hemwegterrain. At P2 I was still undecided on the shape of the building, but I knew what I wanted the area to offer programmatically as energy hub and hot-spot for Havenstad. The outcomes of my research paper consisted of a generic strategy and a climate-strategy. These two can be considered a very large-scale approach and a very small-scale approach, but the scale of the building design did not come out of the research, therefore this still remained an open question during the P2 presentation. Reference project have helped me a lot at this time to get an idea of what I wanted the design to become. Also, I had decided on a few goals I wanted the design to achieve (inclusive design, climate goals, programs).

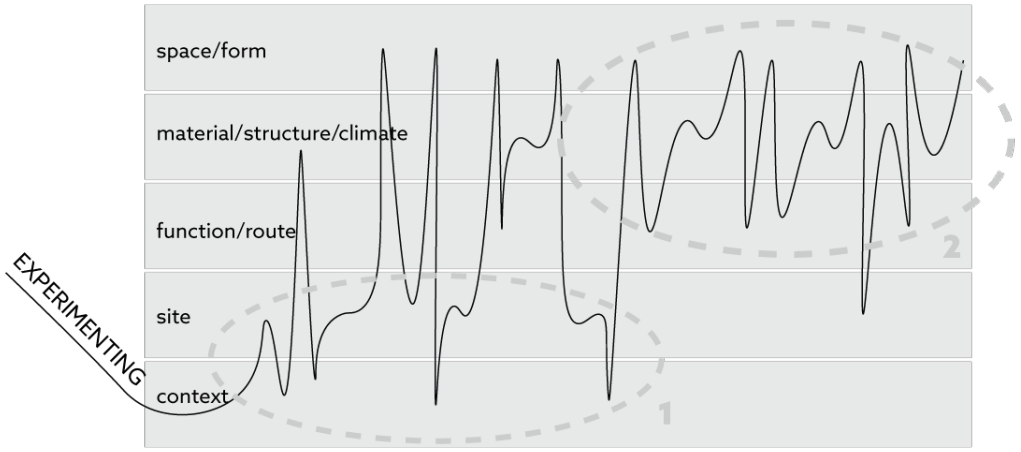

Figure 2: Diagram of design process through different domains over ime, based on 'the five generic elements' from Van Dooren et al. (2014). Own creation.

P3

Between P2 and P3 the real design-research began, I quickly started to make decisions through form studies and found a somewhat generic shape which has from that moment on been a guiding line through my project. Designing the site configuration and program has also helped me here a lot, as well as model making. During this phase I really started experimenting, reflecting and adapting on all domains of the design. The design goals I had formulated before P2 as well as the reference projects also helped me to make decisions. At the P3 presentations I had worked on all elements of the building (concept, context, site, facades, floorplans, climate, construction and details) but none of them had been worked out completely. During this phase my tutors helped me to refine the shape, scale and program of the design. The feedback at the P3 presentation was mostly to work things out further and to reconsider the floorplan. At this point the design consisted of a lot of different elements and it seemed unclear what was the main feature, reconsidering this helped me a lot after P3. Also, I was advised to reconsider the routing and accessibility.

P4

After the P3 presentation I had to rethink many elements of the building. Although a lot has stayed the same, it was an important step to rethink why I wanted certain things to stay as they were and others to change. After deciding the main configuration within the building, I could focus on experimenting with the floorplan of the areas within this configuration. This phase consisted mostly of working out the drawings I previously made and material research. Because the experience of the building is an important part of my design, 3D impressions of the exterior and interior were helpful in this phase. I would have liked to make more models before the P4, but unfortunately have not found time for it so far.

P5

In the coming weeks I want to focus on the representation of my project. I would like to make at least one model on a scale that best represents my project, a few renders and all drawings in one coherent style. I aim to have a project in which the guiding theme is clearly visible and continues through all the scales that I have been using during this project. But overall, I hope to create a project that represents me as a designer.

Some things that I have learned during this graduation project and that will stay with me are;

1) Designing means making choices and taking position, research does not always give the answer and not all design choices can be objectively substantiated.

2) Integrating technology early into the design process can help make an integrated design in which construction, climate and design work together as one.

3) Experimenting and letting go of ideas is necessary to find new unexpected solutions which in the end might be better than the initial idea.

Aspect 1 ***The relationship between research and design.***

The research results focussed on the decentralizing of datacentres and making them part of a heat exchange network. The results suggest that it would be wise to place small datacentres close to or in the urban fabric to make the heat transfer distance small and possibly even integrate the datacentre into a public building as to recover most of the heat produced. This strategy could be connected to the idea of 'Web3' which could possibly become the next development of the internet[1,2]. This model also requires a decentralized infrastructure and the further growth of the datacentre sector. The growth of this sector and fast changing climate make the issue of sustainability even more urgent. So far, most sustainable regulations in datacentres focus on reducing the energy consumption of the equipment, but recovering heat for other programs is only applied in a few buildings. Furthermore, my research showed that placing datacentres within the urban fabric (instead of in the countryside and sacrificing valuable land like Zeewolde) can offer many possibilities for the exchange of energy.

Aspect 2 ***The relationship between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS).***

My graduation project is an architectural design of a public building as part of the MSc Architecture. Apart from the relationship between technology and design in the heat exchange between the pool and datacentre, the project also fits in the Architectural Engineering studio through its integration of building technology in the architectural expression of the building which is created by a particular bearing construction. The topic harvest resulted in the metabolic approach in which energy in the form of heat was the main theme for my project. During the design phase I applied this method also for water and facade materials.

Aspect 3 ***Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.***

In my project, metabolic flow analysis was the guiding approach during the research. This methodology was related to the harvest track within the architectural engineering studio. For my research paper I chose to focus on energy flows in the form of heat.

Aspect 4 ***Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.***

My graduation project and research paper could be considered a statement and example on how to deal with the growing datacentre sector considering the spatial and environmental impact from an architectural viewpoint. In my project I offer a generic solution (decentralized datacentres as part of a microgrid energyhubs) as well as a worked-out example of this decentralized datacentre integrated into a public building. The second framework that my project addresses is the future development of industrial (port) areas within cities. The position that I have taken in this project is to adopt the port as part of the city, instead of moving the industry away. By taking this position I have attempted to offer a different strategy on city expansion in which places are reserved for future industrial functions, without sacrificing qualitative urban space.

Aspect 5 ***Discuss the ethical issues and dilemmas you may have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.***

During the design phase ethical issues that have been considered are accessibility of the pool for physically impaired, ethnic and economic groups of society and gender. The public swimming pool is a program which is remarkable for its diversity in users (different backgrounds, genders, ages, cultures etc.). The design can influence the accessibility and approachability for these users. I have considered physical accessibility, representation, privacy, entrance fee and safety within the design. Some of these aspects can contradict each other. An example is how gender equality in the design of dressing rooms and toilets could negatively influence the feeling of safety in practice. However, many of these topics can only be addressed through architecture to a certain degree and will mostly be influenced by pool regulations.

1. Gardner, E. and Christiaan, F. (15 January 2022) ''*Hoe zou een internet gebaseerd op vertrouwen eruit kunnen zien?*'' De Chrononauten. Retrieved from: https://dechrononauten.nl/0034-2/

2. Stiru, A. (17 February 2022) ''*Web3 komt eraan: hoe gaat internet veranderen?*'' RTL nieuws. Retrieved from: https://www.rtlnieuws.nl/tech/artikel/5286548/web3-dao-bitcoin-nft-metaverse