Graduation Plan: Architecture  P2

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Studio
Theme: The Computational Architecture Design Research
Studio focuses on design as a collaborative enterprise informed by findings drawn from different disciplines. A particular emphasis is placed on the influence of engineering sciences of performance evaluation regarding to wind, light and energy and structural tectonics. Traditionally studios focus on conceptual development at first, the design research studio sets out to start conceptual development in parallel with the development of computational approaches responding to research questions from the building sciences. In the ideal case research is as creative as it is rigorous and architectural design is ideally suited to incorporate knowledge from different domains and translate it into built form.

Teachers: ir. Huib Plomp, Dr. ir. Michael S. Bittermann.

Argumentation of choice of the studio: Compulsory part of the Joint Master METU-TU Delft program. Before enrolling in the program, I thought about the technical problems such as complex geometry, structural calculations, solar studies, fabrication, CNC, etc., that can be done with the computer in a fast pace. It was more an interest in skill, tool-learning, that would let me do things faster. As the program goes by I am more interested in computation as a method for solving complex tasks, how to deal with complexity and multi-objective optimization.

Title
Title of the graduation project: Computational Architecture: focusing on structural and layout complexity.
Problem Statement
How to involve computation to do better architecture.

During the first semester of the dual degree program, I started a research about plank timber curved surfaces. The idea of a plank line is that it bends in one direction, twists in the second direction, and is stiff in the third, like a thin board of wood. One of the interests was to research on how birds build their nests. They get stability by stacking a number of sticks. They use their instinct and use a higher number of sticks than needed. It can be said that it is a statistics instead statics.

For the Graduation project, that approach would not fit the scale of the project. Instead, I studied ribbed timber shell structures. The typical construction of ribbed timber shell structures consist of wooden planks to form the ribs. These planks are approximately 3 x 16 cm, and several interlocked layers are used to form each rib. These planks are screwed together; usually no glue is used. Each layer of planks is continuous in one direction. The critical feature is that the wooden planks can only be bent, within reason, in their weak axis of inertia, the long direction. If they are bent in the other direction, they break easily.

The built examples in this particular construction type helped to understand the construction properties and singularities of these structures.
The cases chosen where:
The paper can be downloaded from here or from the blog with the complete list of references at: http://javierzaratiegui.blogspot.nl/2012/12/msc3-literature.html.

Basically, a grid is formed on the ground, and by scaffolding it is pushed to the designed shape. Latter, it is triangulated to add stiffness where needed.

How this relates to a museum? I am studying what type of center I want to design. After an urban analysis of the area, I came with the conclusion that there is no need for a major urban intervention, as there are not key problems to target. Certainly, other parts of the city would get more benefit with such effort. So I began to think about what type of center would satisfy the demands of the citizens of Den Haag. First I rejected the common museum space that people visits once. Those mainly attract users from outside the city and to improve the neighborhood I decided to design a social space that brings people together around art, debates, culture, politics, etc.

One of the first steps to climb, was the financial implications of such decision. To gather citizens often, the price should be low or free.

For the economic viability of the proposal I plan several strategies:
1- A sample of the Mauritzhaus collection will be exhibited, bringing a number of visitors (that is a studio imposed strategy).
2- Via museum card or museum membership: holders of the card would access the center for free.
3- Donations, investors, and Crowd-funding: the political and social thematic of the center would encourage companies to invest in it and politic parties as a mean to know what the habitants think and for their own purpose to gain affiliates.
4- Gift shop and restaurant: the income of both facilities would first be earmarked to cover the expenses of the center and, when it generates profit, would be spent on social projects.
5- Magazine: edited and printed at the museum to advertise the activities from the museum and other interesting events at the city.
6- Along with it also I have considered establishing relations with the following:
- De Affiche Galerij: De Affiche Galerij consists of a glass display case measuring 100 metres long. There is space for 60 different posters in illuminated frames. De Affiche Galerij is part of the Spui tram station. It can be visited all day long and costs nothing. The Hague Municipal Archives is in charge of organising expositions.

- Gemak: The Gemak arts centre is designed as a place where contemporary non-Western art can intersect with politics and society and where the hot topics of the day can be explored by means of visual images and public debate. The Gemeentemuseum Den Haag and the Vrije Academie in The Hague joined forces in 2007 to set up the arts centre called Gemak. Central to the idea of Gemak are current trends in the arts, politics and social discourse, and the connections between these three. Gemak’s exhibitions are never isolated events; they are generally accompanied by lectures, interviews and debates, where art provides the inspiration rather than the subject. The activities often concern social issues and politics, though they can just as easily be about football or photojournalism.

- Historical Museum of The Hague: In the Historical Museum of The Hague you will become acquainted with the colorful history of The Hague.

- Humanity House: The Humanity House takes you on a journey, where you will see, feel, hear and experience what it’s like to survive a disaster or conflict. In the museum the unimaginable becomes imaginable.

- Loos Duinen Museum: What was used in olden days as a granary is now the Loosuinen Museum. The old ‘Korenschuur’ has been restored and now stands in the historic market garden village of Loosduinen.

- Museum for communication: There are exhibitions about the senses, communication in art and the human being.

- Prison Gate Museum: The Prison Gate is the former prison of the Court of Holland. The medieval building and its unique collection of punishment and torture devices introduce the visitor to the history of criminal law in Holland.

- Sarnamihuis: The Sarnamihuis is a museum and documentation centre focused on the history, language and culture of the Indian population in the Netherlands and Suriname.

- The Hague Museum of Photography: The Hague Museum of Photography organises around six exhibitions a year covering a wide range of periods, disciplines and genres in the history of photography, often focusing on the human figure.

- Yi Jun Peace Museum: The museum pays homage to the late Yi Jun (1859-1907), a resistance fighter who opposed the Japanese colonisation of Korea (1910-1945). In the summer of 1907 Yi travelled by railway to The Hague as part of Korea’s delegation to the Second Hague Peace Conference. He was commissioned to announce to the international community that Korea was an independent state and that the Japanese invasion was unlawful.

- Atelier Van Lieshout: Recurring themes in the work of AVL are autarky, power, politics and the more classical themes of life and death.
Because the social implication of their programs. I wish some of the exhibitions can take part in both centers, and specially the building at “Lange Voorhout” can organize tours around several of these museums, host and/or continue activities, relating their programs.

To outline some of the topics covered in the first year agenda in the form of exhibitions, conferences, projections...
- Nuclear discussion/Nuclear security summit 2014: debates and conferences.
- Turkish museum opening: The first Turkish museum in the Netherlands officially opened on 8 September in The Hague. The Turks Museum Nederland can be found in a former community center in Moerwijk, a neighbourhood where many Turks have traditionally lived.
- European capital of culture: Apart from The Hague other candidate cities and regions in the Netherlands are Maastricht, the city of Brabant, Utrecht, Almere and Friesland.
- Peace and Justice: “Shell case”: For the first time in history, a Dutch court verdict is expected about the case of a European company, Anglo-Dutch oil giant Shell, which appeared in court today to account for damage it caused abroad, says Friends of the Earth International. Lawyers for both parties pleaded at a key hearing in The Hague today and the court announced that the verdict is expected on 30 January 2013
- Death cell museum: raising funds for the Stichting Oranjehotel to convert the death cell in the Scheveningen prison into a museum.
- Homeless: Winter measures stop for homeless. The municipality believes that everybody should have a roof over his head when temperatures drop below freezing: Is this the best we can do?
- Rio + 20: Earth Summit 2012 will be the fourth Summit of its kind and represents another milestone in ongoing international efforts to accelerate progress towards achieving sustainable development globally
- Energy saving tutorials: aimed to transmit children and adults about easy habits that reduce energy consumption as well as techniques to grow food.

Of course this is a brief example and the content should be thought out with the suggestions of the citizens.

So, with this in the scope, I want that the place is easy to visit, and a place to gather. The multipurpose room and the conference room would be the main spaces of the building.
Goals

As part of the thesis, I aim to include the diploma project as a new case study for free form timber shell constructions, under the scope of optimization, and to be more specific: multi-objective optimization.

The structural calculation is a crisp topic. The manufacturability is also easy to measure and the different solutions can be compared. But combining both together might not be so easy. The most efficient might not be easy to build, so a less efficient structure might be used, in order to make it easier to construct, or lower in price, for example. One of the main goals is how to deal with multi-objective criteria.
Process
Method description
I am defining a model for the project, to quantify the items related to the goal and their importance (weight). Once I have a model, I won’t miss the different aspects, and don’t have to handle everything in the mind => free to think.
I am using a neural tree to define my knowledge model. Neural tree and fuzzy logic are used.

So the first decision was what to do with the actual building. I decided to involve computation from the beginning, since it is the specific theme of this studio.
The three different values to input were:
- not to change the existing building;
- renovate it;
- demolish and do a new one.

I established a neural tree for the success of the double degree program. I included both parts, TUDelft diploma, and METU thesis that contribute with different weights to the overall value. To give the weights I compared the duration of both parts of the program, and increased the value of TUDelft since it is an “IF CONDITION” for the METU part to occur, and since it is now, and the other it is a future event (0.70 and 0.30).
At TUDelft my two main goals are learning, and succeed with the Graduation (0.60 and 0.40).

The first difficult choice is what to do with a building of a renown architect, Marcel Breuer. The first instinct was not to demolish it, because of the historic value. Then renovation could be an interesting point but, since this is not a renovation studio, we can’t get the real plans of the building. In both cases I would hardly include it as a case study in the research I started, so both of them scored low in the neural tree.
For the layout of the building, I want to try different approaches:
1-stacking: following some direction.
2-growing: stack first volume and then input rules for the next.
3-ellipsoids: arrange the program in ellipsoids within the boundary of the building, and the proportions of the rooms, and minimize the overlap.
Some of the objects will be grouped, according the program needs. This would be done applying common knowledge but through algorithms, so that it can be adapted as new ideas or topics come up.
The first step has been fuzzyfying the program areas and determining main relations between the program parts.

Next step is to punish the overlap of the spaces
GENERAL PUBLIC
- RECEPTION - 90 m²
- HIGH ATTENTION
- OFFICE + WARDROBE - 15 m²
- ORIENTATION EASILY - 140 m²
- HIGH PERCEPTION
- SHOP - 90 m²
- END OF MUSEUM "PATH". ALSO INDEPENDENT ACCESS FROM BASEMENT.
- CAFE/RESTAURANT.

PERFORMANCE
- 450 SEAT RETRACTABLE SEATING - 260 m²
- SEATING STORAGE - 10 m²
- WARDROBE - 15 m²
- INDEPENDENT FROM MUSEUM = INCREASED AUTONOMY
- WEIGHT + FIRE EXIT DISTANCE → BASEMENT
  (COULD BE PARTIALLY IN THE GROUND)
- ACCESSIBILITY FROM EXHIBITION SUPPORT AREA
- ACCESSIBILITY FROM RECEPTION

MULTIPURPOSE → WORKSHOPS
- EDUCATIONAL SPACE (400 SEAT) - 130 m²
- STORAGE - 20 m²
- MEETING ROOM - 25 m²
- PRIVACY FROM THE MUSEUM VISITORS "PATH"
- MAYBE RENTABLE AS MEETING ROOM → IN THAT CASE OWN AREA

ADMINISTRATION (STAFF)
- RECEPTION - 10 m²
- SERVER/TECH - 5 m²
- KITCHEN/Lounge - 17 m²
- STORAGE - 8 m²
- MAIL/COPYS/STORAGE - 10 m²
- OFFICES 7 x 5, 4 x 10 → 70
- WORKSTATIONS - 30
- LIBRARY - 80 m²
- VOLUNTEER OFFICE - 10 m²

OFFICES TOGETHER + MAIL/COPY/STORAGE
- KITCHEN + STAFF
- RECEPTION + SERVER/TECH
- WORKSTATIONS + LIBRARY = PUBLIC ACCESS

SERVICE
- PUBLIC WC - 80 m²
- ACROSS THE BUILDING
- STAFF WC/SHOWER - 10 m²
- ADMINISTRATION AREA
- SANITARY - 15
- BASEMENT, BECAUSE THE ENTRANCES WILL BE CLEANED MORE OFTEN, SO ATTACHED TO THE ADMINISTRATION BUT NO USUAL PERCEPTION FROM VISITORS.
- MECHANICAL - 100 m²
- WITH THE SHIPPIING/RECEIVING → GARAGE.
For the form finding, I imagine a piece of cloth wrapping the result of the layout. The layout will still react to new inputs, like the natural light, or structure demands. Chain models, like Freit Otto will be used, as digital software. Also visual perception will be introduced to arrange spaces, entrances or other parts of the program according their needs.

Also, the exhibition areas will be analyzed to verify the optimal position of the art work. The structure would be analyzed by FEM (finite element method). The manufacturability is another key part of my research. Whether the structure is the most efficient or not, it has to be able to be manufactured. The planarity of the skin panels and developable capabilities will be considered, and will make changes in the final shape (form finding). So the whole process is considered as a loop till equally good solutions are found.
Literature and general practical preference


Bittermann, M.S., Ciftcioglu, Ö.: “Solution Diversity in Multi-Objective Optimization: A Study in Virtual Reality”. IEEE World Congress on Computational Intelligence, Hong Kong June 1-6, (2008).
Reflection

As an architect, I am concerned about the social implications that our profession has within society. Also aware how the social agenda has raised at TU Delft Faculty the last years. The Million Dollar Block project from Laura Kurgan, opened my eyes into the role we have as architects.

Therefore, when facing the topic proposed by the instructors, I questioned myself if an Art Museum would be helpful for Den Haag’s citizenships. I could have questioned the site, and after an analysis of the urban context, come with a better emplacement for such facility. But to keep a common ground for the group, I decided to stay within the boundary of the site. If there are infinite possibilities within the boundary, what is the need to go beyond the boundary? So I decided that a deeper reflection on the function and the type of the Museum was needed.

I read some digital newspapers articles everyday while I take my first coffee. And lately, the European crisis, and political articles take most of my attention. I see similar interests among the Facebook posts of my friends. And not only in Spain but in other parts of Europe, Asia, and America.

Then, a poll from a Dutch digital newspaper popped up:

At that moment I convinced myself that this project had to show a social implication somehow, and taking the input of the exhibition/art museum that the professors demanded. So I studied the social movements that are happening or have started the last years.
To widen the scope and not focus on the Spanish one, I took the Occupy movement as a reference.

The Occupy movement is an international protest movement against social and economic inequality, its primary goal being to make the economic structure and power relations in society fairer. Different local groups have different foci, but among the prime concerns is the claim that large corporations and the global financial system control the world in a way that disproportionately benefits a minority, undermines democracy and is unstable. http://occupyutrecht.nl/notulen

Part of response to the late-2000s financial crisis and subprime mortgage crisis and the impact of the Arab Spring.

Social center: Also known as a free space, social centers may be designated “safe space” where specific forms of dialogue and activism are encouraged and protected from harassment, or they may be intended to serve as open space for community interaction among widely disparate groups without censorship.

It seems to me that the site chosen for the diploma project is located perfectly for such kind claim. Close to the Government, the Royal Palace and aristocracy, it is time that the people takes a site at one of the most expensive spots in the city.

It is a palace for the people.
# Time planning

## Methodology
- Literature
- Perception
- Fuzzy Neural Tree
- Evolutionary Optimization

## Group Analysis

## Application of the methods
- Urban Analysis
- Concept Development
  - Urban Scale
  - Building Scale
- Building Design
  - Design of the spaces
  - Preparation of 1: 500 & 1: 200 Plans
  - Optimization of Light Quality
- Building Detailing
  - Preparation of 1: 100 Plans
  - Design Materialization
  - Preparation of 1: 50 & 1: 20 Details
  - Preparation of 1: 10 & 1: 5 Details
- Writing of thesis
The Kunsthau Tacheles (Art House Tacheles), was an art center in Berlin, Germany, a large (9000 square meter) building on Oranienburger Straße in the district known as Mitte. Huge, colorful graffiti-style murals are painted on the exterior walls, and modern art sculptures are featured inside.

The Palais de Tokyo is a building dedicated to modern and contemporary art, in Paris. The eastern wing of the building belongs the City of Paris and hosts the Musée d'Art Moderne de la Ville de Paris (Museum of Modern Art of the City of Paris). The western wing belongs to the French state and hosts since 2002, the Palais de Tokyo. The Museum also publishes the magazine Palais, The Magazine features articles around a central artistic theme selected for each edition. The theme generally coincides with the exhibition concurrently featured at the museum.

MAASSILO http://www.maassilo.com

http://www.creativefactory.nl/
### The social cave
While entering in the 100% recycled foam Cave, visitors are invited to interact with the projected "shadow" of the visitor beyond the barrier wall, initiating a conversation that transcends traditional digital-physical boundaries.

### Flux Factory
Flux Factory is a non-profit art organization that supports and promotes emerging artists through exhibitions, commissions, residencies, and collaborative opportunities. Flux Factory is guided by its passion to nurture the creative process, and knows that this process does not happen in a vacuum but rather through a network of peers and through resource-sharing. Flux Factory functions as an incubation and laboratory space for the creation of artworks that are in dialogue with the physical, social, and cultural spheres of New York City.

### ARCAM.
I selected this museum because of the importance of the manufacturability in the design of free forms.
(baljurk = evening-dress) is situated in the centre of The Hague, next to the old Passage. The construction of the Passage in 1882 has transformed the urban tissue.

Archipelontwerpers

Flower Pavilion
The flower pavilion merges technological and organical design into one. The overall design refers to a most important part of sustainability, namely production processes.

Quist, Wim.