Reflection Methodology of Process

high-rise in timber

perception of materials in contemporary architecture
by the design of the new United Nations Environmental Council

Chair: Materialisation
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"I might describe it as an aversion, or an uneasy feeling, with regard to concrete ... I had the opportunity to visit a house designed by an architect and built out of concrete that was left exposed to view. As soon as I set foot in it, however, I instinctively felt that something was wrong. Undoubtedly something was not how it should have been. When I went into boxes like that, I couldn’t breathe, my muscles would tense up and my body temperature would drop suddenly..."

Kengo Kuma

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1 Kengo Kuma, 'A Return to Materials', article in Architectural Positions, p. 155
The way how architects design is a process through a lot of stages, using the right techniques, using the right tools and input at the right time. This process can also be described as systematic in different measures, but is thereby also effected by the conscious or unconscious opinion of the architect. To structure this design, a lot of theories are available showing on how to control this process. But the benefits and credibility of a used theory on handling the design process can only be tested in practice. At the end of a design process the used design theory or strategy can be evaluated and reflected upon, so the architect can learn from that process for any kind of new design process in the future.

The main focus of this paper is to show the way of working during the design process used in the graduation studio of SADD (Strategic Architectural Design Development), from February till December 2012. For this studio, a new headquarters has to be designed for the Environmental Council of the United Nations (UNEC) which therefore will also function as a new iconic building design for sustainability. The first part of my design process over the past year was therefore also a research to the perception the used building materials in building design, because I wanted to relate that perception of people to the materials that should be used in the new iconic UNEC building. Actually, I have always been fascinated by the way architects talk about perception of buildings and the applied materials within these buildings. Kengo Kuma is for me thereby most interesting, because he relates this perception or architectural awareness to the use of natural materials (mostly timber) within his designs.

The second part of this paper will reflect on the used methodology during the whole project and thereby I will also focus on an example of this process by describing the design process of the façade structure of the building. Hereby I have tried to show how the research and the methodology that I have been focussing on for the last year is also put into practice. Finally I will reflect on the whole process.

Ard-Jan Lootens
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‘Using a methodological approach: A basis cycle in the decision levels of the Design process’
an essay by Ir. M.C. Korpershoek, TU Delft, 1992
Chapter 1: Project description and research question

The United Nations Environmental Council (UNEC) is a proposed 6th UN Council and shall have a global coordinating function in sustainable development. It will be a central organisation that collects, produces, propagates and exchanges information on sustainability worldwide, concerning ecological, social and economical issues. This UN Council should therefore have an icon function in sustainable building design worldwide. The building will be located next to the existing UN Headquarters (UNHQ) on the East Riverbank in Manhattan, New York City.

The new headquarters for the Environmental Council of the United Nations has to be designed as an icon in sustainable building design worldwide, but how should it look like? Or in other words, what should be the perception of this building? Of course one of the main topics is sustainability, but how to express sustainability in the design of a building? Should it be expressed in the exterior of the building, clearly visible and shown in the façade? Can it be shown in the dimensioning and relations in between all building parts? Or the used materials for these building parts?

Obviously it is not enough to claim that the design of this building will be sustainable ones the façade of the design looks green by applying a façade system with greenery. Maybe this will show a more sustainable image to the public on the street, but to me the integration of sustainability within a building design is far more then creating a ‘green’ image to the public. To me it will be a challenge to generate more awareness among the public, like Kengo Kuma does, about the topic of sustainability. In a same way the existing main building of the UN administration, designed by the Swiss-French architect and urban planner Le Corbusier and the Brazilian architect Oscar Niemeyer, also showed the more technical possibilities for the use of materials like reinforced concrete as icon for industrial improvements of the last century.
CHAPTER 2: Methodology

Design process in general
A thorough research is preceding to the design process, based on literature, reference projects, technical specifications and personal observations. During the design process will the obtained requirements out of this research be translated into an architectural styling by the help of vision towards the building concept. The challenge within this process is the integration of interplay between architecture and structural engineering. Combining these aspects is implemented with a detailed analysis towards the applicability of the building elements and their properties. An evaluation, if necessary with external input by experts, of every design cycle is thereby resulting in a decision within every research progression. Made decisions are coordinated along the process during regular meetings with the tutors of the SADD studio. This external feedback on the made decisions provides needed process reliability by reconsidering the outcome with other insight. Milestones have to be set for guarding the overall design progression. In addition, this developed methodology is contributing to a clear overview of the several phases in the design process. Due to this approximation is a constant structural verification of all the architectural developments secured, in which the final result will evolve to a well-balanced design. A summarize of the process is illustrated in diagram 1.

Diagram 1 – overview of the design process

Design process in phases
Part 1 – research on reference projects
Research to high-rise architecture in timber by making use of reference projects is needed to get a better understanding about how this building concept functions. These reference projects will be investigated by the use of technical data of the buildings itself, as well as writings of the architects who have been involved during the building process.

Part 2 – research on surrounding of UN compound
Because of a connection has to made between the new building of the UNEC and the existing buildings on the UN plot, an extensive research has to be made to the exact connection between the new extension and the existing buildings. Besides this research, also the relation between the newly formed building and the surrounding area has to be made by an investigation to the connection between the new UNEC building and the park next to the plot. This park can also function as the new entrance to the whole UN plot, so the possibility to emphasize the park as main entrance to the UN plot should also be part of this research.

2 Own illustration, by J.A. Lootens
Part 3 – structure- and façade concepts

After this additional research, the design of the building can be further more developed by refining the structural sizes and build-up of the main structure. The connection between the high-rise tower on top of the UN platform is crucial in this stage of the design process. Besides, the design of the UN plateau itself will also take shape by generating different possible façade concepts.

Part 4 – interior of the building

The interior of the building will be designed by the detailing of the rooms and needed spaces out of the program of requirements. Along the process several interior impressions will be made as well to see the kind of mood that is desired, in which also the amount of daylight per room can be adjusted to suit the program best.

Part 5 – generating details

Finally, the materialisation of the whole building will take place by making technical details in which the application of all used materials can be explained. During this stage, the climate design of the whole building should also be implemented within the more detailed connections within the façade and main structure.

Within this studio our tutor Ir. M. Korpershoek also deployed a methodical approach of designing, which will be used through all these steps of the design process. This approach is also included in Appendix I. The used diagram for every design part is also shown in diagram 2.

Diagram 2 – basic cycle for a methodical approach

This reflection paper is mainly focussing on part 3 of the whole design process, that will be the used structure- and façade concepts. The described phases by the diagram of Ir. M. Korpershoek will thereby be discussed to reflect on the design process.

3 Korpershoek, Maarten, A methodical approach, TU Delft
In this chapter I would like to address the research that I did in the first stage of the design process to the perception of people to the buildings that we live in and the materials that we use within these buildings. This was really important for me to get a better idea about the strategy for the design of an iconic sustainable building for the UNEC building. But even after this research I still have to conclude that the perception of buildings and spaces with the applied use of materials can be different for each individual. What I tried to grasp within this research was one common goal of mankind to strive for new ways of buildings and a new build environment that we now call ‘sustainable’.

**Sustainable icon in historical perspective**

When I was thinking about how this icon for sustainable design worldwide should look like, in shape, use of materials and dimensioning in sizes, the first image that crossed my mind was the image of ‘the primitive hut’ by the French architectural philosopher and theorist Marc-Antoine Laugier (image 1). Especially the simplicity within this image is very powerful as a statement of Laugier to show the essence of architecture in the composition of the building parts, next to the fact that Laugier also shows timber as most essential building material. But can this image by Laugier therefore be seen as an early statement for sustainable design? Or was this something only based on the development of architectural style? To me this image was the starting point of my research for a better understanding of architectural perception in relation to the image of a sustainable icon.

![Image 1: The title page of the ‘Essai sur l’architecture’ from 1753 by MarcAntoine Laugier. This image shows the primitive hut as instrument for reason and essence in contemporary architecture](image)

**Architectural perception by Marc-Antoine Laugier - the primitive hut**

The title page of the ‘Essai sur l’architecture’ from 1753 shows the allegorical ‘architecture’ of the primitive hut, origin and essence of architecture. Laugier hereby criticizes both the ‘vagaries’ of the Baroque (Borromini) and the monotonous uniformity of French Classicism (Versailles). He looks for a final and definitive foundation of the classical system. Which would be that the freedom of varying by the architect must be based on one of every arbitrary debased completely annotated essence. 4 Laugier finds this within a mythical origin in which man as a noble savage has a good relationship with nature, not affected by cultural repression.

The derivation of the architecture of the primitive hut is not a new phenomenon, but already known from images by Vitruvius and Viollet-Le-Duc (image 2 and 3). But this naturalism by Laugier now gets a new value. Laugiers hut differs from previous huts, because he was the first to ‘propose the design of the hut as a structure of vital importance for the present time’. Where in the traditional treatises the hut was shown as a ‘remarkable illustration of a distant past or factor in evolutionary theory’, for Laugier the hut becomes a principle that can be deployed immediately in the present time. 5 The contemporary architecture should therefore always be based on this principle. In this way the primitive hut of Laugier gets the value of a language purification, a pristine, uncontaminated source as a new starting point in architecture.

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4 Boekraad, Cees, *Van hut tot machine – Laugier, Patte, Piranesi en Smithsons*, p. 46
5 Boekraad, Cees, *Van hut tot machine – Laugier, Patte, Piranesi en Smithsons*, p. 49
The primitive hut underlines architecture in a moral way, it shows that superfluities correspond to irrational oppression. The hut of Laugier, a Greek design in its elements (columns, entablature, tympanum) and Gothic in its composition (structure), is the diagram of the original and for Laugier still valid identity of Nature and Reason. The logic of the hut is one of imitation, in which Laugier not differs in use of proportions from the old architectural styles. In this way the primitive hut of Laugier shows architectural beauty in the proportions, dimensions and relations between all building parts, which can be related to a sustainable design for the future by the fact that Laugier shows that every contemporary architecture should be based on this principle.

Architectural perception by Le Corbusier - the Modulor

Where architectural perception in the theory of Laugier is based on Nature and Reason, the architectural perception in the design theory of Le Corbusier (Charles Edouard Jeanneret) are based on Nature and Functionality. The Modulor was developed by Le Corbusier in the long tradition of Vitruvius, Leonardo da Vinci’s ‘Vitruvian Man’ and the work of Leone Battista Alberti in an attempt to discover mathematical proportions in the human body and then use that knowledge to improve both the appearance and function of architecture. Le Corbusier described this system as following:

“… a range of harmonious measurements to suit the human scale, universally applicable to architecture and to mechanical things.”

Le Corbusier was also intrigued by ancient civilisations who used measuring systems linked to the human body: elbow (cubit), finger (digit), thumb (inch) etc., he was actually troubled by ‘the metre’ as a measure that was a forty-millionth part of the meridian of the earth.

The main building on the UN site (the Secretariat Building) is also designed by Le Corbusier according to the system of the Modulor and forms therefore a perfect example of how a building can be designed based on a principle of proportions. Besides, Le Corbusier shows with this design the technical possibilities in modern techniques by the use of reinforced concrete for this 39-storey building as icon for the future. In a same way the new UNEC building can also be an icon for the sustainable possibilities in modern techniques by the use of new developed building systems and the use of new materials. Kengo Kuma refers to this matter when he said:

“If we want to get back the spirit of respect for nature, we are going to have to discover new materials that can replace concrete and use them to construct buildings, create cities and improve people’s sensibility. It is a challenge, not just for Japan but for the whole planet…”

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6 Boekraad, Cees, Van hut tot machine – Laugier, Patte, Piranesi en Smithsons, p. 36
7 Ostwald, Michael, The Modulor and Modulor 2 by Le Corbusier, p. 146
8 Le Corbusier, The Modulor: A Harmonious Measure to the Human Scale, Universally Applicable to Architecture and Mechanics, p. 20
The choice in used building materials
One can argue that a new sustainable icon for the future should also be based on a principle of proportions, according to the tradition of architectural principles of Laugier or Le Corbusier. But how about the choice in used building materials? Since Laugier uses timber for his design theory as most essential material, while Le Corbusier uses reinforced concrete. To answer this question it is important to deeply understand why we construct buildings in the first place. The German philosopher Martin Heidegger tries to explain this in his essay about ‘Building, Dwelling, Thinking’ (original publication: ‘Vorträge und Aufsätze’, 1985). Heidegger also explains the danger in using modern techniques in building design, to such an extent that this can even imply the end of all humanity. He explains this vision on the use of modern techniques in two publications: ‘The Question concerning Technology’ (‘Die Frage nach der Technik’, 1954) and ‘The Turning’ (‘Die Technik und Die Kehre’, 1962).

Architectural perception by Martin Heidegger – The Question concerning Technology
Heidegger described his vision on technology and perception within architecture in ‘The Question concerning Technology’, in which according to Heidegger science and technology are very dominant in Western culture. Modern technology is not a neutral force, but this technique wants to challenge and control all of nature. Nature is now controlled by mankind in our growing demand for energy supplies. According to Heidegger the human existence is threatened to perish under the dominion of modern technology. Therefore mankind will need a different way of thinking, in which the achievements of science and technology could be maintained without the possibility that human existence will no longer be possible on this earth. Opposite to technical thinking, in which activity and control are centralized, Heidegger argues in a way of reflective thinking that focuses on authenticity and perception.10

Building, Dwelling, Thinking
Like Kengo Kuma, Martin Heidegger is searching for the human perception of architectural design regarding the way how we live in buildings and our awareness of the surrounding space and used materials. In this publication Heidegger wants to point out what construction really means, and also to what extent construction and actual living are related to each other:

“Living and building in relation to one another are treated as ends and means. However, as long we only mean this, we summarize housing and construction as two separate activities and thereby we imagine something that is correct. But by doing so, we are also masking by the ends-means relation between living and building the most essential part of living itself: that building itself is living.”11

Heidegger shows that building in itself is living, but in everyday life this close relation between building and living is lost because it is no longer experienced by mankind since living in buildings has become absolutely normal and has therefore also become completely separated from our real human nature (‘as noble savages’). The actual significance of building, namely living, fell into oblivion. Heidegger continuous his essay by pointing out how the actual significance of building can be restored:

“… The actual need of living does not exist primarily in the lack of housing … the actual need of living lies in the fact that mortals always have to look first for the real essence of living, they have to learn how to live … How can mortals however respond differently to this appeal than to try for their part to bring life to the fullness of their being? They accomplish this when they build to live and also think in order to live.”12

In this way Heidegger shows that people should build in the same way as how they live, that our perception of buildings in itself actually becomes a reflection of how we build homes and want to live in specific places. ‘Building, Dwelling and Thinking’ are activities which should belong together and which people should use as ways to learn about and be part of the world. Heidegger observed that our thinking, as abstract as it may seem, is closely connected with our experience of place. This has something to do with the fact that man exists in places, that it is from places that he forms his relationships with the world or simply that he lives in the world. For sustainable design this means that we should build with materials that we are related to out of our original nature as ‘noble savages’ (Laugier), which would be natural materials like timber.

10 Heidegger, Martin, Techniek en de ommekeer, Dutch translation by H.M. Berghs, 1973
11 Heidegger, Martin, Over denken, bouwen, wonen, Dutch translation by H.M. Berghs, 1991, p. 46
12 Heidegger, Martin, Over denken, bouwen, wonen, Dutch translation by H.M. Berghs, 1991, p. 64
As a reaction to the observation by Heidegger, that our thinking is closely connected with our experience of place and use of building materials (our architectural perception), the Swiss architect Peter Zumthor stated in his essay ‘Lightness and Pain’ the following:

“… I am impressed by the natural, self-evident presence of an ensemble that rings true, a milieu or a room that fits. Did the harmony between the work of nature and the work of man, the interplay between density, lightness and void, between sounds and smells, light and shade, materials and forms occur naturally or was it carefully composed? The casual passer-by, inhabitant or stroller, who could be me, is not concerned with such questions. He is concerned with houses and spaces that fit, that blend with their surroundings and are attuned to their use. He is concerned with places and houses that make him feel at home, that leave him free to live in peace while giving him inconspicuous support, that make him look good, and that charm him with unexpected attributes.”

Zumthor hereby explains that it should be the role of the architect to use the tools out of nature to create an interplay between materials and shape that might occur naturally, but in fact is carefully composed. A casual passer-by, inhabitant or stroller is not concerned about questions of sustainability, the design itself and the use of materials have to make him feel at home. Therefore the use of structural timber within a building design will give the user inconspicuous support to his inner self.

Kengo Kuma underlines this statement of Zumthor, that our perception of architectural design should not be focussed on materials as only a ‘finish’, when he said:

“…The conclusion I have reached after reflecting on materials in various ways is a simple one: the material is not a finish. Period. If the word ‘material’ has already acquired the connotation of ‘finish’ perhaps it would be better to drop it hastily and speak of ‘substance instead’. What we have to do is dissociate ourselves from the subdivision into structure (concrete) and material (finish).”

Architectural perception by Kengo Kuma – A Return to Materials

We are in a unique moment in architectural and building engineering history when shifting world needs has asked us to question some of the fundamentals of how we have built for the last century and how we will build in the next. The image of ‘the primitive hut’ by Laugier shows not only the true beauty of architecture in form and composition, but also the use of natural materials in the build-up of a structure. For me this image embodies the subconscious wish of mankind to live (all human activities) in a structure that is formed and created by only the use of natural formed materials like timber. Therefore it is the role of the architect to fulfil this wish by the design of a building in which the used materials also contribute to the architectural perception of a sustainable building. Kengo Kuma shows thereby how the use of natural materials can contribute to that awareness in the architectural design, in which material is not only a ‘finish’ but also the structure. Natural materials in itself should generate the whole architectural design. According to Kengo Kuma this doesn’t imply that we have to go back to traditional building techniques, but that it is in fact a challenge for the architect to design with natural materials in combination with the most advanced technologies. Concluding, Kengo Kuma stated in his article about ‘A Return to Materials’ the following:

“More than and prior to defining a style, what I desire is to create a certain type of place and a certain type of condition that can be experienced by the human body. Starting out from human sensation, I want to arrive at an architecture that utilizes everything, from traditional techniques to the most advanced technology.”

Future design – from hut to high-rise in timber

The architectural positions of Kengo Kuma show that he is striving for an architectural perception in which the type of place and condition can be experienced by the human body. This should not only be the case for architectural design based on traditional techniques (hut principle), but should also be the basis for the most advanced technology in future designs. In case of a possible high-rise for the new Environmental Council for the United Nations this means that by the architectural positions of Kengo Kuma the possibilities for a high-rise in timber should be investigated.

13 Zumthor, Peter, ‘Lightness and pain’, Peter Zumthor Works, p.8
High-rise timber buildings are in fact not a new concept. 1400 years ago tall pagodas in Japan, like the Horyu-Ji Temple (image 4), were built up to 19 storeys in wood and still stand today in high seismic, wet climate environments. Current innovations worldwide have triggered a race to create taller wood buildings, including a 12 storey building in Melbourne Australia, a 17 storey building in Norway and a 30 storey hybrid timber and concrete building in Austria; the LifeCycle Tower (image 5).

The case for tall wood buildings introduces a new way of constructing tall buildings with a renewable, durable and strong building material that is manufactured by nature. To find truly sustainable solutions to buildings for the future, we must look at the fundamentals of the way we build and live. According to Kengo Kuma this will change our perception of architecture. To achieve this, we have to go back to the origin of our inner self and build with natural materials in combination with modern technologies.

Image 4: ‘Horyu-Ji Temple’, Ikaruga; Japan
5 storey timber building (ca. 32 m.)

Image 5: ‘the LifeCycle Tower’, Dornbirn; Austria
20-30 storey timber building design (ca. 70 m.)
CHAPTER 4: Design development of the tower façade

In this chapter I will try to illustrate all the phases of the design process that I have done to come up with the final design for the facade structure of my building design. Within the whole process, the design of the facade structure was part 3 (see chapter 2), which is also of course very well affected by the design of the overall structure of the building. Therefore I will give an overview about the combination of this two topics. The different phases that I use for describing this design process are based on the research methodology of chapter 2.

Phase 1: Exploration

Important in the exploration phase of the design process was to understand the use of the material of timber for high-rise buildings and the application of this material in existing building systems. So therefore I have been searching for reference projects around the world to investigate all the possibilities of this use of timber in a structural way, that can be combined with an esthetical use of this same timber structure in the facade. Next to that it was during this phase also really important to investigate the possibilities of this system for positioning on site and therefore the effects of this key values for the design and shape of the building. The first project that had my attention was a tower of 16 storeys in Norway, that is totally erected with the use of structural timber; see image 6 and 7. Next to that also massive timber panels have been used in the outer facade to give more expression on the outside of the building to the used structural system.

![Image 6: Barenthus, Oslo; Norway](image6.png) ![Image 7: build up of the structural system of tower](image7.png)

Since this reference project is not yet been built, I also had to look at other reference project for high rise in timber to get a more elaborate and clear understanding of the use of massive timber for high rise projects. Eventually a study project for high-rise in Austria was chosen to function as example for my research, because by the design of the ‘Life Cycle Tower’ in Dornbirn, a new system is tested for application of timber high rise for buildings up to 30 storeys. This building concept is actually not only based on the use of timber, but uses a combination of timber and concrete. Because of the evaluation stage of this relatively new building concept, I decided to focus on a combination of concrete and timber for my design project. This will then be the next step towards the possible complete use of massive timber for high-rise buildings in the future. During the exploration phase the assembly of this system is been analysed, just as all the other technical aspects like fire protection and the position of installations, see image 8 and 9.
Phase 2: Critical reflection
Aiming for defining of the goals and starting points of the building concept that I should use for the structure and facade of my building design, I analyzed some more examples of buildings in which the structural build up seems to be inspired on nature. This was for instance the case with one of the building designs by Toyo Ito, namely the TODS building in Tokyo, see image 10. In this case the superstructure of the building is represented as a tree-shaped structure around the whole facade, but in fact this tree-shaped structure is build up out of prefabricated concrete elements. So this building design for me was a nice example to show that architects around the world think in structures based on rules of nature, but the used material for this structure is mostly concrete. For me this also immediately was a new goal to realize within my building concept to show that this can be combined. So that within the concept of the structure and the facade, the use of timber can be shown structurally as well as aesthetically. For me this was the starting point of my research on the facade system, because why should you try to replicate nature in the structural design of a building without using a natural material?

Phase 3: Divergence
During this phase I was testing different possibilities of the combined material out of the analyses of the previous phases. This was also the phase in which I tested the used systems in the reference projects in relation to the building design of the new Council building. Next to that I was also searching for a way of how to express natural elements in a building system, because building systems are always based on standardisation. For an iconic building with the focus on sustainability for me it was far to obvious to show it as an exact replication of a natural tree-shaped structure like Toyo Ito did for the TODS building in Japan. Therefore I tried to find a way of dealing with this problem of a natural image versus the possibilities in high-rise with standardized systems by studies to the works of Piet Mondriaan. Before I even started to develop different options I used the work of Mondriaan to see if
there was a way of turning the image of a tree into a more systematically approach of a facade system based on lines and squares. By doing so, actually the image that I had in mind of a tree-shaped facade became more abstract; inspired by the work of Mondriaan (image 11).

Inspired by the works of Mondriaan, I tested during this phase of divergence different options for the composition of the facade for the tower. Starting with timber elements that stick out of the facade (by the design of the Barentshus), towards a system in which the timber panels in the facade actually became the ‘leaves’ of the tree structure. At first the system of the facade was also a reinterpretation of the existing high-rise on the UN plot, the secretariat building. This caused that the facade system was developing in a way that there was enough contrast between open and closed, but there was not enough variety in depth. Therefore I also tested a system in which the timber panels actually become the inner layer of the facade, while the outer layer of the facade is formed by an external glass system. So the tower can still be related to the existing tower of the UN compound, but the new building system is shown in a more delicate way.
Phase 4: Convergence

At this stage the available options were already narrowed down by predicting the way how they should work, but I still wanted to be convinced about the way how the new facade system should work. Therefore I made some models in which was tried to express the aesthetical possibilities with this new system, but in such a way that the system was mostly visible at night (see image 13). This was done so the iconic structure of the building would form a more standard glass building within the New York skyline, just like the existing Secretariat building of the UN, during the day. But at night time the structure of the building within the second layer of the facade will become visible for the spectators. This will eventually create the iconic image of the building. The other researched alternatives with the use of timber panels or elements directly within the surface of the outer layer of the facade were less promising. Especially, because all these alternatives could not be related directly to the existing UN high-rise building and the iconic value of the building concepts was less strong.

Image 13: Testing the iconic value of the researched facade system during night time (own illustrations)

Next to the aesthetical qualities of this new building system in the iconic shape of the building for the exterior, it was also important to see what the qualities of the chosen building concept would be for the interior of the building design. Based on the new building structure in combination with the new facade principle, also a new quality can be added to the interior of the office spaces within the building design. An impression of this new quality for office buildings in New York is shown below, see image 14.

Image 14: Impression of the interior for the offices
Phase 5: Decision
Eventually the final version of the facade design was put together as a combination of the different parts examined in the earlier phases. The facade can actually be divided in a couple of layers, which together will form the new iconic facade concept of this new UNEC building.

01 Base
The base is formed by the slab of the UN compound, on which the tower is build with massive timber cores and a supportive system of massive timber columns and beams.

02 Superstructure
The total structure is completed with a system of prefabricated concrete slabs that will guarantee the stiffness of the floors. But in addition, also a superstructure is needed to create enough stiffness for the whole tower. In this way the superstructure of the building becomes an abstract version of branches that are spread over the whole facade.

03 Timber panels
Within the same surface as the superstructure of the building, a layer of timber panels forms a permanent sun shading for the interior program. This timber panels in total form 20% of the surface of the outer facade, and spread over the whole surface this timber panels will refer to the used structural timber structure of the building design.

04 Glass curtain wall
The outer layer of the facade is formed by a glass curtain wall in an aluminium framing. This is especially done to create a relation between the new high-rise building of the UN compound and the existing Secretariat building. Next to that, the appearance of the building will differ in the day- and night situation. A fully glazed high-rise structure in the New York skyline during the day and at night an iconic structure on the UN compound.

05 Sunscreens
Sunscreens that can be handled individually are also added to the facade concept. In this way the building can also act like the leave structure of a tree, because the sun screens close towards the sunlight; like leaves of a tree will do in the same way ones they are turning towards the sun.
CHAPTER 5: Reflection

In this part of the paper I would like to put forward my critical reflection of how I have experienced working with this specific design process, described in chapter 2. The main reason for this critical reflection on the design process is to understand the positive and negative aspects of this method for the total of my design process in general. The positive aspects can be used in a next design process, while the negative aspects can be regarded really helpful to improve for me the way of designing and my design products in the future.

First of all it was very helpful to work with this clear phased methodical approach for the design process, because then you are able to see what the exact status of the design process is for every individual building part. Thereby it was for me also interesting to think about a decision model for the design process (see chapter 2) and the cycled phases that you actually have to go through to come up with the final design. This is especially interesting because in such a way you force yourself to show in a diagram how you think about the way you want to design and try to organize your design process. The exploration phase of my design process can in the end maybe be regarded as a design phase that took me too much time to go through. But this was especially due to the fact that I really wanted to do some research to the perception of people to the buildings they live in. By doing so, I was hoping to find a certain kind of basic design rules but in stead it became more a philosophical approach that can differ for each spectator. Therefore in the future I have to be more precise in the beginning of the design process with describing the exact goals that I want to perceive, before I start researching. So this is also a learning point for phase 2, namely the critical reflection.

Reflecting on the divergence phase, it was interesting trying to find different design solutions. But in the end I have to say that I was maybe already influenced to much by the research and the reference projects that I focused on, because the different design solutions for the façade differ from each other but not that much. In the future I have to push the boundaries of the different design solutions much further, so I will come up with a much more divers spectrum of possibilities and different qualities. During the convergence phase, I tested all the different solution for the façade within a 3D model. This was really helpful to understand the qualities of each solution, but also gave me a complete overview of each solution in contrast to the rest of the design project. The only problem by focussing too much on the 3D model was in my case that I made too much choices based on this 3D model, in stead of explaining this choices to myself in sketches. To clarify some steps that I made in the design process, it would be really helpful for me to use more sketches as a design technique to keep track of the relation with the design process. Now sometimes I felt lost within the 3D model, just testing options without a clear goal but only to test the spatial and aesthetical qualities.

By implementing the best aspects of each design solution during the decision phase, the end result became a layered façade build up based on several individual design solutions. This showed that I tried to take all the positive aspects out of each solution to implement this in the final design of the façade structure.

Concluding on the design process over the last year, I can say that it was a helpful and positive experience to work with such a methodical design approach to organize your thoughts and ideas. It was especially nice to formulate for myself the specific decision moments during the whole process and to discuss this decision moments with the tutors of the SADD studio. In such a way I was able to keep track of the given time span for each design phase. By this reflection on my design process I have better insight in the weak points, so I hope by concentrating on these elements in my design process I can improve my way of working in the future.
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Appendix I

Using a methodological approach: A basis cycle in the decision levels of the Design process

an essay by Maarten Korpershoek
University of Technology Delft
March 1992
Using a methodological approach:
A basis cycle in the decision levels of the Design process.

Ir. M.C. Korpershoek
University of Technology delft.
Decision levels in designing methodical

As an instrument of approach for complex problems this system is developed.

It is the fundament in methodical designing.

With this system approach one looks at complex problems as a whole and leaves this translation intact without analyzing them profoundly.

To get a work field and field of interest that is better to comprehend the problem (system) its divided in different levels. It is important to limit the working (attention) field in a way that within one decision level the different sub problems are of the same level of importance. It is for instance not logical to be handling the design with a functional program and be working on the details of the window frames of the same design. That's why we distinguish in different levels. Next to that it's important that structuring the fields of interest are chosen in a way that an appropriate process is being followed keeping the main goals in mind. So it is important that the right decision is taken on the right time on the right level.

Kenneth E. Boulding (1956) distinguishes in his hierarchy system different complexity levels. Characteristic with this is that the complexity throughout the different levels increase chronologically. Every higher system level carries the characteristics of all the previous system levels.

The process of allowing new and detailed influences step by step can be compared with the zooming in of a camera. A camera with zoom lens can frame a complete landscape and by zooming in can define more and show more details of for instance trees and zooming even further the branches and leaves.

The process expires from a wide field of view wherein the relations on a specific level between the different subsystems become visible, until in the end a smaller viewing field becomes clear in which the different parts are researched this however can happen at the expense of losing the overview and the consistency of the different parts. One can divide this process into different steps. In this connection one talks of different levels of aggregation. One even speaks of the aggregation stadium.

Focused on the design process this analogy of the system hierarchy of Boulding can be divided into different levels and can be ordered hierarchal compared to each other.

This means that decisions made in a certain level are used as principles for the next levels. This structuring of levels implies that the decisions made in every level, seen in time, are made after each other. This seems logical, but after closer analyses of the design processes it shows that one is hardly trusted with it.
example of a decision tree
decision levels that follow each other in time and order of importance
Meaning and significance of a methodical process

It is often thought that a methodical approach hampers the creativity of the designer. But just the opposite is true.

It actually stimulates creativity and provides a clear framework as a designer with a wide pallet of possibilities.

1. Phase of exploring
   preliminary inventory

   The wishes and principles for knowledge supplied by the client are being adopted. In various relevant areas, an inventory is made.

2. Phase of principles
   working with unconscious assumptions

   Through various unconscious assumptions you implicitly have as a designer in your head, but not really pronounces, forces you to make a methodical process to articulate these assumptions explicit and debatable so you can also open up to other views in a discussion. Things that can be seen as true, as taken for granted, can in this way be discussed.

3. Phase of divergence
   generate alternative solutions

   It is of most importance to develop the widest palette of principle solutions as possible.

   Precisely because of developing very different principle solutions and by systematically analyzing these solutions will help you as a designer to keep a clear view of the entire spectrum of possibilities.

   Without fixating yourself as a designer too much on a particular direction. Because this could be the case quite quickly by an inexperienced designer.

   Such a designer comes quickly in the situation in which he has a tunnel vision in which he only sees one solution that will also be his favourite idea that he would work out anyway. In such a case he stares to much at only one solution and therefore loses a clear and sober look at all the potential possibilities.

   It is important, therefore, to generate the greatest possible scope of alternatives. The more perspectives are handled, the better. A very diverse collection of designs is rather leading to surprising solutions.

   This phase requires a very intensive search for very different principle solutions.

   Very essential here are the solutions, not two-dimensional on paper, but three-dimensional physical models that have to be presented.
4. **Phase of convergence**
   **testing of alternatives**

Alternative solutions are weighed based on predetermined evaluation criteria. The testing criteria follow from the objectives established in an earlier phase as a consequence of values of interest. The explicit formulation of these values is essential to come to a well-formulated assessment criteria. It is also important to formulate how the benchmarks can be measured.

5. **Phase of reasoned choice**
   **selection of best alternatives**

Based on the assessment of alternatives a choice has to be made for one or more best alternatives. The explicit choice for these alternatives will again form a starting point for the further design process.
Use of different techniques for generating solutions

Many great architects and even entire offices have their own method. The Force is in the Mind; the making of Architecture (Krashny, 2008) addresses a number of methods of various offices.

For generating principle solutions a large number of different techniques can be used. (Computer)models, (construction)drawings, diagrams or concept sketches are made with these techniques (sketching, painting, modeling, shaping with the computer). Not only the medium affects the outcome here, also the depicted image (principle sketch, plan, elevation or section).

Important is to present the alternative solutions in physical models, to make them easily readable for everyone.

It is of interest to consider which presentation technique is the most suitable one for the assignment, weighing factors like time, cost, communicative power and presence.

Time will determine how many different variations you can make with a certain technique; it is impossible to make 50 models with 3D printing, however this can be achieved using paper or foam. The costs are not always relative, but in the long term they will certainly play a role. The communicative power of a model or drawing determines how strongly it is transferring the idea of the designer to the viewer. No matter how beautiful the model is, if it does not carry the essence of an idea, it is not a good representation of the idea of the designer.

The look is important and may vary per stage of the design process. A too refined look in the concept stage may wrongly lead to the illusion that things are already committed, while a poorly developed look in the presentation stage can lead to a semi-representation of the ideas of the designer.

All techniques and forms of presentations are legitimate, when properly balanced which technique and which form of presentation is best in which stage. The practice however shows that in many cases a physical spatial model is the best form of representation of an idea, which is quickly and easily readable for everyone.

Use of models during the design process

In Ontwerpsystemen, een inleiding tot de ontwerptheorie van Richard Foqué (1975), a number of models of the design process are analyzed. Foqué compares several models and names the strenghts and the weaknesses. He writes about the educational value of the models: "It opens new perspectives for the designer himself, creating a critical awareness with respect to his own actions and expands his horizon."
Basic cycle for a methodical approach

Phase 1
Exploration
Provisional analyses, provisional starting points and goals

Phase 2
Critical reflection
Definitive starting points, definition of the problems and goals

Phase 3
Divergence
Generating a diversity of principle solutions

Phase 4
Convergence
Predicting the consequences of the solutions

Phase 5
Decision
Decide the best solution

Second line of working
The attitude in the second line of working is one of reflection for the experimental working methods.

Critical reflection on starting points and goals
Formulating criteria out of the goals
Testing the models to the most important criteria
Literature


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Strategies for making decisions in the process of Design.

Ir. M.C. Korpershoek
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