Thesis Plan

Generating activity: transforming the Zoeten-laboratory on the former KEMA-terrain in Arnhem into a hybrid public sports building.

Patrick Levie
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MSc-3 RMIT Graduation Studio
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Personal motivation

When I started my studies at the Faculty of Architecture at Delft University of Technology in 2005, I already knew for years I wanted to study architecture. The ability to construct and design ‘spaces’ that people would use every day was so appealing to me that I didn’t even look at any other faculty. During my Bachelor’s I quickly discovered that my preference had proved to be the right one. To have a complete understanding of the functioning of buildings, in a theoretical, technological and architectural way changed my perspective on architecture and the way I looked at buildings from that time on.

In my Master’s I decided to focus on hybrid buildings, where the emphasis was on a mixture and synthesis of different programmes. I than thought that the ability to mix functions was knowledge that was absolutely necessary for any design. Although I still believe that incorporating different programmes into one building is a quality that is very valuable for contemporary designs, this studio didn’t quiet meet up to my expectations when it came to using and improving the existing (urban) context.

In my Master’s I took the time to broaden my perspective in the field of architecture. After two very informative internships and a RMIT like studio at the KTH in Stockholm, called contextual space studio, I discovered that the transformation, and by that continuation, of existing structures is a highly desired skill. The interesting part of working in the field of RMIT is the opportunity to deal with important cultural and social buildings in need of redevelopment, to ensure that their quality is preserved for decades to come. I find it very interesting to get in touch with cultural heritage and to be able to learn about architectural styles, different construction methods, social values of certain urban contexts and to use this knowledge to develop an appropriate design. Therefore I decided to graduate in the RMIT studio at the Faculty of Architecture.

This thesis plan tells my design objective for this graduation studio by explaining how I intent to solve an existing problem on a given design location by using scientific research, based on research questions and a thorough research approach.
KEMA: a short history

In the first decades of the twentieth century the demand for electricity in The Netherlands grew. The result was a national programme and the rise of a new industry: electro technology. Across the country small factories popped up that fabricated cables and components for the constantly expanding electricity network. Unfortunately a lot of these products turned out to be unreliable and convinced that testing needed to be done on high-voltage equipment, the VDEN (the institute representing the electricity suppliers at that time) established its own testing department in 1924. The demand grew so fast that less than three years later the decision was made to turn the testing department into an independent institute.

KEMA (Keuring van Electrotechnische Materialen Arnhem) was established in 1927 in Arnhem as a testing institute for the Dutch electricity sector. Founders were provinces and large cities with their own electricity companies, plus some private electricity suppliers. The new company was housed in an annex of Hotel Bellevue, located on the Utrechtseweg, at that time one of the main roads through Arnhem.

As the electricity infrastructure in The Netherlands grew, KEMA grew with it. In 1930 the shareholders decided to build a short-circuit laboratory, for tests with high voltages. A location was found on the former estate Den Brink, formerly owned by the family Pallandt, due to its location near Arnhem and the adjacent railway track. In the summer of 1933 construction started, but was abruptly stopped after a short time by the Ministry of ‘Vervoer, Openbare werken en Waterbeheer’, who wanted to have KEMA closer to Delft’s University of Technology. Only three years later the building was resumed and the complex, a laboratory, workshops and warehouses, was opened by Prince Bernhard. The capacity was doubled in 1939, when the construction of a research and development laboratory started.

(http://www.kema.com/nl/about/history.aspx)

Arnhems Buiten

In May 2005, the former KEMA-terrain’s new owner TCN, renamed the terrain: Arnhems Buiten. TCN’s got a high ambition for the region and recognises the valuable elements of Arnhems Buiten, like the park like landscape and the influence of the river. Economically wise they expect not only companies from Arnhem and Renkum to settle in Arnhems Buiten, but also to attract companies from outside of the region. Research has shown that the green surroundings create a positive effect on employees, which makes Arnhems Buiten an interesting location for entrepreneurs.

The varied housing market on Arnhems Buiten is closely related to its surroundings and varies from living on Den Brink in a park like environment to living on Rosande near the Rhine. Overall the plan is to create up to 360 dwellings on Arnhems Buiten, in a combination of living and working. Together, the developers BAM, Giesbers and TCN (the so-called ‘BGB’) started to define this ambition into a vision for the park. It will undergo a transformation from closed off business park to an open park for living and working.

Vision ‘Leven in het Park’

The developers of the BGB and the municipalities of Arnhem and Renkum translated this vision into ‘Living in the Park’. Because Arnhems Buiten is beautifully situated on the border of a lateral moraine and the river Rhine, the park holds an enormous diversity in function and physical appearance with its unique height differences and special sightlines. Only a small part of the park (circa 10%) is built-on with the rest of the park being characterised by its greenery and trees, which makes Arnhems Buiten a perfect example of a park. Besides working, living will play an important role on Arnhems Buiten, which gets its expression in the concept ‘Leven in het Park’. The special qualities of the park need to be maintained and emphasised to welcome new tenants, inhabitants, users and visitors.

(http://www.kema.com/nl/about/history.aspx)
Conflicting visions

‘Leven in het Park’ is the slogan of TCN’s future vision for Arnhems Buiten. An integral spatial approach should be responsible for the strengthening of the overall landscape and the mutual relations between the different zones in the setting of a park. They aim for a spread of different programmes, such as offices and industry, dwellings and leisure. Just like in an estate, activities, buildings and landscape give each other meaning. This year TCN changed the concept of Arnhems Buiten to Energy Business Park with a bigger focus on energy related companies such as KEMA and TenneT. This interaction between the landscape and the buildings between different zones is more complicated than it seems. Because of the main roads and the railway tracks, Arhems Buiten is cut up and divided into four different zones.

Economic movement

Developments on Arnhems Buiten are sustainable and carefully fitted into the landscape. Construction of new buildings is only possible on locations that are already built-on. At this moment the new main office for TenneT is being constructed on Mariendaal, the Mariendaal Center of Excellence. In 2015 KEMA moves to their new main office on De Hes.

As a result of this economic movement, the oldest and most characteristic part of Arnhems Buiten: Den Brink, is left empty with a lot of vacant buildings. TCN emphasises the redevelopment of existing real estate on Arnhems Buiten, therefore a closer look to the (vacant) buildings on Den Brink is very much advisable.

Borders & connections

The extremely rigid borders on the site create a sensation of separation between the four different zones: Mariendaal, Den Brink, De Hes and Rosande. The main roads and the railway track enhance the feeling of different areas in Arnhems Buiten. The connections between the different zones are few and very poor. Different areas of Arnhems Buiten are linked using bridges or tunnels, while the main entrance is on ground level.

Also responsible for the division of Arnhems Buiten are the different characters of the four zones. Den Brink has the atmosphere of the former estate, whereas Mariendaal forms the transition between the close by estate of the same name. De Hes can best be depicted as a campus and Rosande clarifies the relation of Arnhems Buiten with the Rhine.
Design principles

The way that the buildings in Den Brink form a part of the English landscape garden structure is a source of inspiration for Arnhems Buiten. Since 1963 the former KEMA-terrain, then Mariendaal and Den Brink, hasn’t changed its principle of spatial planning. There’s a park like landscape, with an alternation of open spaces and forests with independent buildings with an autonomous character in its flanks. The height differences, the varieties of open meadows and closed forests and more open groups of trees realise the effect of a dramatised nature. Height differences create places of intimacy and seclusion, while the rest of the landscape opens up in long sightlines.

Buildings in this landscape intensity the surroundings by emphasising their relation with nature and bringing the landscape up to the façade. This theatrical effect of Arnhems Buiten is most tangible in Den Brink where there’s no hierarchy in buildings and where the elements used to design the complex can best be described as: elements of surprise, sequence of spaces and framing views.

The tectonic working of the roofs with their cantilever, creates a feeling of stratification. It emphasises the already present horizontal articulation of the buildings. The concrete horizontal lintels enforce the horizontality of the façades. They’re most often placed under or above windows. Most of the buildings in the Zoeten-lab-ensemble have vertical elements in the form of a tower or a vertical plane. In most of the buildings these vertical elements are the focus point and usually point out the entrance. These elements are characteristic for the Nieuwe Haagse School, and give the buildings on the KEMA-terrain their coherent appearance, which turns them into one ‘family’ with similar features.

The importance of the short-circuit complex

Originally backed up by only a limited number of supply-undertakings, the testing department proved to have important prospects of development. The number of companies who entrusted KEMA with testing their materials for their own use grew steadily, as did the demand for testing materials for the national network. The necessity to work in more laboratories became a problem when the scope of the work increased. The urgent need for a laboratory for the whole Dutch electrical industry fuelled the discussion for a new location. When the question was raised in 1929 whether the company should erect a short-circuit laboratory it became clear that the Dutch electro technical industry was prepared to invest in a national short-circuit complex.

In order to avoid hindrance and to provide the new laboratory with a connection to the railway track, the short-circuit complex was built on the northern boundary of the newly acquired site: Den Brink. The other buildings were grouped around the short-circuit laboratory between two concentric half-circles.

In 1987 it was decided that running two short-circuit laboratories was inefficient and uneconomic. The Zoetenlab-ensemble was closed and some buildings, like the commando buildings, got new tenants. Unfortunately the Zoeten-laboratory and its testing buildings remain vacant to this day.

The machine building

The Zoeten-laboratory was also know as the machine building and was built in 1936 as the heart of the short-circuit complex. This machine building was built for the purpose of generating different currents of electricity for the adjacent testing buildings and consists out of three zones. An observation zone, the machine hall where the generators were housed, and niches for the transformers. After the third expansion in 1956 the machine building was used as a testing facility up until 1986. As of 1972 the short-circuit laboratory run tests simultaneously with the new short-circuit complex in Rosande, constructed in 1969.

In 1987 it was decided that running two short-circuit laboratories was inefficient and uneconomic. The Zoetenlab-ensemble was closed and some buildings, like the commando buildings, got new tenants. Unfortunately the Zoeten-laboratory and its testing buildings remain vacant to this day.
Problem definition

My advice for TCN is that Den Brink is the most interesting part of Arnhems Buiten to focus on. Of the four autonomous zones on Arnhems Buiten, Den Brink is the oldest area where the old landscape structure is best tangible. Den Brink loses its activities to the other zones, because of the movement of companies, but above all this results in the vacancy of several high quality listed monuments, like the Zoeten-laboratory.

The concept for Arnhems Buiten ‘Leven in het Park’, can best be executed in Den Brink, where the landscape with its height differences acts as a carrier for the English landscape garden. Although maybe not as clear nowadays as it once used to be, the principles of the English landscape garden are still very present. The characteristics and elements can be used for future developments and can boost the desire for mixed functions, like dwellings, offices and leisure. By emphasising the qualities of Den Brink and enhancing its advantages Den Brink can turn into the embodiment of ‘Leven in het Park’.

Dealing with the vacancy and the poor accessibility of Den Brink, by adding a new programme to attract visitors from the region and improving its connections to the urban fabric, will strengthen the value of Arnhems Buiten. The main problem lies in the fact that the realisation of TCN’s vision of ‘Leven in het Park’ is hampered by the seclusion of the four zones and the lack of public activities. Tackling the problem of ensuring TCN’s vision for Arnhems Buiten resolves in a focus on Den Brink’s vacant monuments. Designing an intervention in this part of the business park can result into more (economic) activities on Arnhems Buiten.

The possibility of creating a public zone on Den Brink, initiates the opportunity to transform the Zoeten-laboratory into a hybrid public building acting as a point of focus within Den Brink, generating new activities for the business park and its surroundings. This programme should focus on the possibilities of engaging in indoor and outdoor activities and should make use of the unique park environment of Den Brink.

Value assessment

For any future development there are several valuable qualities that need to be taken into account as essential elements of the urban context. The most important and unique element of Arnhems Buiten are the height differences, because of its location between a lateral moraine and the Rhine. These height differences are best experienced on Den Brink, where they were used to emphasise the English landscape garden. Elements of this English landscape garden need to have their continuation in a future design of Arnhems Buiten. Finally, the buildings in this unique landscape play a valuable role, as some of them are not only vacant, but also listed as monuments and therefore of high value to be redeveloped.

Considering the Zoeten-laboratory, there are several valuable elements that need to be taken into account in a design. First of all the characteristics of the Nieuwe Haagse School are very present and should therefore be continued in the exterior as well as in the interior.

The preservation of the three zones, with as a highlight the machine hall needs to be guaranteed, since these zones represent the functional organisation of the Zoeten-laboratory. Most valuable of these zones is the machine hall, with its detailing in the roof panels and the ‘board and batten’ tops of the columns.

Main research questions

This thesis plan shows the importance, quality and value of researching new functions for the vacant buildings on Den Brink. These new programmes can result into more (economic) activities on Arnhems Buiten, a wish from TCN in their concept ‘Leven in het Park’. This raises the following main research question:

How can an industrial building like the Zoeten-laboratory, built for the specific purpose of generating electric current, be transformed into a hybrid public sports building for Arnhems Buiten?

To answer this question it’s necessary to redefine the functionality of this building and selects key elements that are valuable for any new design, with the wish of TCN in mind that they want to establish a business park on Arnhems Buiten where dwellings, offices and leisure go hand in hand together. The Zoeten-laboratory has a tactic position on Arnhems Buiten, where due to presence of the short-circuit complex the building density is the highest. A public sports building can attract more users by incorporating more functions and turning it into a hybrid building. By giving multiple target groups the opportunity of using the Zoeten-laboratory in different ways and on different times of the day, the Zoeten-laboratory can act as a catalyst for numerous activities.
Sub-research questions

What possibilities are there to improve the accessibility of Den Brink?
- How can Den Brink have a better connection with Arnhem?
- What are the opportunities to connect Arnhem Buiten to its surrounding urban fabric?
- What target group(s) will use the facilities on Den Brink and Arnhem Buiten and what does this mean for the infrastructure?

What kind of sports accommodations are needed in this area?
- Which sports don’t get enough attention in the current sports offer of Arnhem and Renkum?
- Which target groups need accommodation for sports or other physical activities?
- Which innovative sports/physical activities are desirable and fit for Arnhem Buiten?

What functions can be added to a sports building to give it its hybrid character?
- Which programmes complement a sports function?
- How can these programmes be incorporated in the building and add to the public value?

What is the framework (the constructive/technological/architectural quality) of the Zoeten-laboratory, that can be used for an accommodation for sports and/or physical activities, both indoor and outdoor?

What is the brief (constructive/technological/architectural demands) for sports accommodations and how does this fit (or doesn’t fit) into the existing framework?
- What kind of activities are suited to be fitted in the Zoeten-laboratory and what kind of space do they need (urban sports, dance, badminton, roller derby, multifunctional courts)?
- How can the existing construction be transformed into a structure for sports?

How can I solve coherent problems, such as parking and support facilities and how can the urban context be of any help?
- How can the present zoning of the Zoeten-laboratory play an active part in the division of different programmes?

Who and how will the accommodation be managed?

How can I translate present iconic elements of the English landscape garden and the Nieuwe Haagse School into a contemporary version, suited for the programme and with respect for the specified values?

Research approach

The preferred research method I want to use is ‘research by design’. This research method means that the design process determines the research topics. Of course, as in every design process in the field of RMIT, the project will start with a big focus on research on the urban context, architectural elements and building technology to get an understanding of the already present qualities and valuable information for a future design. Design decisions can be brought back to and based on this objective information.

The analyses necessary to gather this objective information will be executed by doing observations on the site, analysing archive material such as maps and other drawings, reading information like ‘structuurvisies’ and other reports on the site’s redevelopment plans.

As the design process proceeds a proper feedback to the field of research is necessary. I want to test design principles by comparing certain steps with precedents. By asking the question: ‘how did other architects solve this (sub)problem?’, I hope to give a well substantiated proposal. References will be an important part of my research, therefore I’ll do several case studies involving sports, other physical activities and park designs to get an understanding of desired qualities.

Designing in physical models will lead to a ‘trial-and-error’ method of designing. Different models will help me solve design problems by testing different options. Also interviewing professionals in the field of research (for instance sports accommodations) will be part of my research method. By this I will be able to present different ideas and options to people, who can than help me develop these designs related to sports and the transformation of the building.

A constant part of the design process will be the reflection of my design steps to the value assessment to provide feedback if the design is coherent with the specified values. In my design for a hybrid public sports building the analysis of the context, the societal relevance and the architectural themes I wish to incorporate will generate the design process which is based on my research question.
Scientific relevance

Looking from a scientific point of view the research is relevant considering the unique elements that need to be taken into account for this research. The unique location of the Zoeten-laboratory in Arnhem between the Veluwe and the Rhine, with its location on a former estate Den Brink designed in an English landscape garden style, the building with its characteristics of the Nieuwe Haagse School and the unique function it once fulfilled contribute to a context that’s unparalleled in the rest of The Netherlands and Europe.

The challenge lies in the ability to adapt and transform all these qualities into a building with a new programme that will function for the coming decades and will therefore safeguard the values of the Zoeten-laboratory. The information gathered by answering the research questions and incorporating these results in a design will generate generic information for any design that deals with a similar problematic nature, such as a similar urban context related to a city, national park, river or landscape structure or industrial buildings with a specific structure that need to undergo a transformation for a new programme.

The design for a hybrid public sports building with a focus on physical indoor and outdoor activities can develop innovative ways of using outdoor and indoor spaces for different target groups and create new ways of making people participate in physical movement. New insight in how people are activated to engage in sports can add knowledge to the field of sports science.

Societal relevance

The societal relevance lies in the pre-discussed importance and history of the short-circuit complex and the qualities of its Zoeten-laboratory. The transformation of this building can restore the estate like quality of Den Brink, with its green environment and pre-war industrial buildings. TCN, real estate developer and current owner of Arnhems Buiten is desperately looking for high-quality ideas to turn Arnhems Buiten in their desired business park, filled with activities that strengthen the mutual relations between the different programmes.

By redeveloping Arnhems Buiten and turning it into a less secluded area between Arnhem and Oosterbeek, there’s the possibility of creating a public green zone that can act as one of the many green buffers around the city center of Arnhem. Especially the KEMA-terrain, where the Veluwe and the Rhine are so close to eachother, can be transformed into a high-quality park where leisure activities go hand in hand with residential areas and offices. With a solid understanding of urban and architectural interventions, this will lead to an attractive environment, not only for the people working on Arnhems Buiten, but also for locals from the municipalities of Arnhem and Renkum.

Generating new activities for Arnhems Buiten can be boosted by the design for a building with a focus on sports. In my research I intend to emphasise the already present knowledge that green environments and physical movement improve people’s health (for example: ‘Actieve parken, sociaal cement’ by VROM (2005)). Besides improving people’s possibilities of engaging in indoor and outdoor activities, a hybrid public sports building will strengthen social coherence within Arnhems Buiten and its surroundings.

Ethical problems

In 1957 Prince Bernhard opened the KEMA Nuclear Physics Laboratory. In may 1974 the KEMA Suspension Test Reactor was constructed and proved that KEMA’s concept was a safe way of turning to nuclear energy. The project was stopped in 1977 after changes in the national nuclear energy policy.

In the late seventies KEMA is involved in a huge scandal on the disposal of nuclear waste. From 1957 to 1972 KEMA simply dumped the nuclear waste on the terrain in pits and when local children die in the beginning of the eighties the matter starts to unravel. Initially KEMA denies the story, but shortly after that have to admit that they did bury nuclear waste on the terrain. Although a correlation between the deaths of the children and the presence of nuclear waste was never proven, KEMA’s reputation gets a big blow. They dismantle the nuclear facility and openly dispose the nuclear waste.

Although all nuclear waste has been removed from the KEMA-terrain, there’s a possibility that by redeveloping the KEMA-terrain the whole scandal will revive and leads to a new discussion, which could not only be harmful for KEMA but also for the future of Arnhems Buiten.
Research goal

The research goal for my graduation project is to develop a design that answers to the research question and respects the value assessment. The design should first of all focus on turning the Zoeten-laboratory and the former short-circuit complex into a point of focus for Arnhems Buiten. By redesigning and improving the connections within Den Brink and the rest of Arnhems Buiten to the urban context, the accessibility of the Zoetenlab-ensemble will improve. This will provide better access to the Zoeten-laboratory creating the opportunity of turning the building into a public building, serving its users. These qualities will be illustrated in a masterplan for Arnhems Buiten.

A proper research on the programme brief will result in suitable functions for the Zoeten-laboratory. These functions will cooperate and strengthen each other, turning the Zoeten-laboratory into a high quality hybrid building. The goal is not only to turn the Zoeten-laboratory into a building that generates new activities in the form of indoor and outdoor (sports) activities but also to help embed the transformed building into its surroundings by using the qualities of the urban context.

The new hybrid public building will house coherent functions that will be used by people from Arnhems Buiten, Arnhem, Oosterbeek and further. The Zoeten-laboratory will be easy to visit and the design will incite people to engage in the provided activity.

Intended end products

The products for this graduation studio are strongly linked to the official presentations and will all contribute to my design objective in the form of documents, drawings or models. The first quarter will exist of doing research and analysing the context of the design site. All analytical drawings and findings from the observations, archive material and (old) drawings will be combined in a final report. The information of this report will act as a foundation for any further research and design decisions.

The second quarter is dominated by the design of an urban masterplan. This masterplan (scale 1:1000 or 1:500) will show the urban and programmatic filling-in of the direct context of the chosen building. This will than act as a guideline and framework for the architectural and technological elaboration of the design. This framework will be supported by a written programme of requirements for the implemented functions. This brief can be used for the design of plans and facades and holds the quantitative and qualitative demands for the design.

The last semester of the graduation studio will focus on the architectural and constructional execution of the design. The design will result in a set of drawings ranging from an urban scale to a detailed scale of construction details. These drawings will explain how the building components are constructed and materialised. Part of this drawing set for the final design is a reflection on the design from a theoretical point of view, illustrating how the design answers the research question and how the products are a result of methodological academic research.

During the design process all products are liable to research outcomes that can change the course of the design process. Designing is not a linear process and needs constant steering in a certain direction to ensure that the results answer the research objective. Constant feedback needs to be taken into account and will be part of the time-working plan (see page 11).

Conceptual visualisation of the research goal (Levie, 2012)
### Time-working plan

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
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<tr>
<td><strong>Q1</strong></td>
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<tr>
<td><strong>Week 1</strong></td>
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<td><strong>Week 5</strong></td>
</tr>
<tr>
<td><strong>Question:</strong> what is the urban context of the location?</td>
<td><strong>Question:</strong> how do I want to transform the urban context of the site?</td>
<td><strong>Question:</strong> how do the brief and the building concept translate to a design?</td>
<td><strong>Question:</strong> what work do I need to do for P4?</td>
<td><strong>Question:</strong> what are the architectural elements of the researched building?</td>
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<td><strong>Goal:</strong></td>
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<tr>
<td>- Visit the site and archive</td>
<td>- Create a written (and drawn) brief for the urban context</td>
<td>- Look for references</td>
<td>- Get an overview of research topics</td>
<td>- Visit the site and archive</td>
</tr>
<tr>
<td>- Gather as much information as possible</td>
<td>- Incorporate the urban / architectural values from P1 report</td>
<td>- Adjust design brief</td>
<td>- Fine-tune approved parts of the design</td>
<td>- Gather as much information as possible</td>
</tr>
<tr>
<td>- Analyse the found information</td>
<td>- Incorporate findings in sketch design</td>
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<td>- Refresh the design brief</td>
<td>- Make analytical drawings and sketches</td>
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<tr>
<td>- Make analytical drawings and sketches</td>
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<td></td>
<td></td>
<td>- Visit the site and archive</td>
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</table>

### Important evaluation moment! Important design moment! Important research moment!

*These important moments initiate the research/design process and determine the main focus for the weeks to come. Every important design or research moment will be alternated by an important moment to evaluate the progress and test the design to my research question and value assessment.*
<table>
<thead>
<tr>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
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</thead>
<tbody>
<tr>
<td>Question: do I know everything there is to know on an architectural scale and what information do I still need?</td>
<td>Question: on a building technology scale, what can I conclude about construction / installations / materials etc.?</td>
<td>Question: what do I want to communicate in my P1 presentation?</td>
<td>Question: how can I document my research so I can use it for later design decisions?</td>
<td>Question: what is the research question and goal for my further design?</td>
</tr>
<tr>
<td>Goal: - Visit the site and archive</td>
<td>Goal: - Analyse the found information on a building technology scale</td>
<td>Goal: - Give a clear overview of research of past weeks</td>
<td>Goal: - Create P1 report</td>
<td>Goal: - Have a complete understanding of all analysed material</td>
</tr>
<tr>
<td>- Analyse final information and incorporate this into final architectural analysis report</td>
<td>- Draw schemes and drawings</td>
<td>- Show conclusions and value assessment</td>
<td>- Clarify and finish unclear information / drawings</td>
<td>- Write Thesis Plan draft</td>
</tr>
<tr>
<td>- Draw conclusions and turn these into values for the design</td>
<td>- Draw conclusions and turn these into values for the design</td>
<td>- Give design proposals for further research</td>
<td>- Finish a clear P1 report</td>
<td>- Focus on problem statement, research question and research methods</td>
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<tr>
<td>Question: with the preliminary masterplan, what program do I project on my building?</td>
<td>Question: what is the design brief for the program in my building?</td>
<td>Question: how do I prepare for my P2?</td>
<td>Question: what do I want to communicate in my P2 presentation?</td>
<td>Question: is the masterplan, my design brief and building concept clear?</td>
</tr>
<tr>
<td>Goal: - Determine the program for the building</td>
<td>Goal: - Determine the building concept with the chosen program</td>
<td>Goal: - Make set-up for P2 presentation in slides and written text</td>
<td>Goal: - Give a clear overview of research of past weeks</td>
<td>Goal: - Compare final products with research and P1 report</td>
</tr>
<tr>
<td>- Finding references for similar buildings with the same program</td>
<td>- Explain the design brief with qualitative and qualitative indications for the program</td>
<td>- Finish masterplan scale 1:100 / 1:500</td>
<td>- Show the program and its design brief</td>
<td>- Adjust necessary products</td>
</tr>
<tr>
<td>- Give an initial design brief</td>
<td>- Make initial design sketches</td>
<td>- Finish sketches, schemes and renders</td>
<td>- Give impression of initial design concept for the building</td>
<td>- Document P2 process in report for further use</td>
</tr>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>Question: how do I want to materialise the design?</td>
<td>Question: how will the building function?</td>
<td>Question: how does the building meet the requirements for the architectural and technology scale?</td>
<td>Question: what do I want to communicate in my P3?</td>
<td>Question: what is the feedback I got and how do I use this to improve the design?</td>
</tr>
<tr>
<td>Goal: - Look at the value assessment and determine materials</td>
<td>Goal: - Determine what installations are needed</td>
<td>Goal: - Draw sections and plans, scale 1:50 / 1:20 / 1:5</td>
<td>Goal: - Give a clear overview of research of past weeks</td>
<td>Goal: - Document all design decisions in report</td>
</tr>
<tr>
<td>- Define aesthetic appearance of the building</td>
<td>- Define where the installations will be placed in the design</td>
<td>- Make installation schemes</td>
<td>- Show the design in plans and sections, scale 1:50 / 1:20 / 1:5</td>
<td>- Incorporate recommenda-ations for further design</td>
</tr>
<tr>
<td>- Look for references</td>
<td></td>
<td>- Show aesthetic appearance in 3D and models</td>
<td>- Show technology and materialisation, scale 1:5</td>
<td>- Determine what needs to be improved for P4</td>
</tr>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>Question: what’s the final feedback for my P4 that I need for my P5?</td>
<td>Question: how do I make my model?</td>
<td>Question: did I process at the feedback of the past period into my final design?</td>
<td>Question: how do I present my final design?</td>
<td>Question: how do I look back on the graduation studio?</td>
</tr>
<tr>
<td>Goal: - Finish drawings on every scale for P5</td>
<td>Goal: - Decide on the use of materials</td>
<td>Goal: - Continue working on model</td>
<td>Goal: - Improve drawings</td>
<td>Goal: - Look at all written documents and drawings</td>
</tr>
<tr>
<td>- Make drawings for making a complete physical model of the building</td>
<td>- Print / laser drawings for final model</td>
<td>- Determine scientific relevance of the design</td>
<td>- Finish model</td>
<td>- Reflect on the entire graduation studio</td>
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<td>- Show aesthetic appearance in 3D and models</td>
<td>- Show technology and materialisation, scale 1:5</td>
<td>- Hand in final reflection</td>
</tr>
</tbody>
</table>
Relevant literature

Arnhem & Arnhems Buiten:


Heritage development:


Nieuwe Haagse School:


Park design:


Research methods:


Sports and recreational activities:


Other sources

*Archive TCN*

TCN Arnhems Buiten BV, Utrechtseweg 310, 6812 AR Arnhem.

*Beschrijving van de op het terrein van N.V. KEMA gevestigde instellingen*

Gelderse Bibliotheek Arnhem

*Gebouwen op BusinessPark Arnhem*

BusinessPark Arnhem, samenstelling: Mark Molenwijk, Pierre den Teuling & Conny Koel

*Lecture delivered before the Institution of Electrical Engineers*

Prof. Ir. J.C. van Slaveren, Londen, 1938.

*Masterplan Hes West*

BGB Ontwikkeling, 2010.

*Structuurvisie Arnhems Buiten*