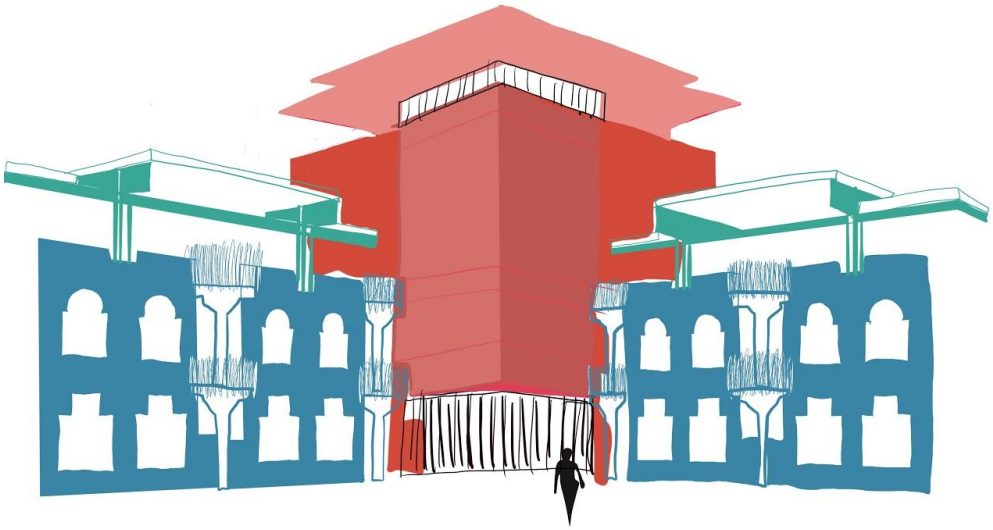
TRANSFORMATION STRUCTURALISM

A 21st Century university in a 70's Structuralist building



REFLECTION PAPER

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Content

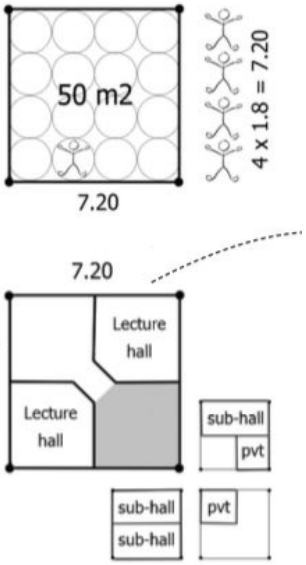
1. Relationship between Research and Design

The goal of the project is to find out to what extent it is possible to adapt the Faculty of Humanities in Leiden to meet the requirements of a 21st century university. The Faculty of Humanities is a university designed in the 70's. Although it will remain the same institute, the program of the 21st century version consists of different types of spaces than the faculty program of the 1970's. This is the result of a new, and modern way of learning. A 21st century university with more students and a higher demand for usable space, not only raises the question how Leiden University is going to transform the faculty, but also how it will facilitate students with housing in their future program. The design ambition for this project is to focus on what the changes in trends for learning are in order to transform the South cluster into a design for the university. An experiment on the North buildings will test whether it is possible to adjust the former university building to student housing. However the focus on the design will be on the University design.

1.1 Design question

How can the Faculty of Humanities be altered while preserving the original design intentions by Joop van Stigt?

In heritage architecture projects, understanding the existing design is the first step of the redesign process. To understand an existing design a thorough analysis was completed which includes a cultural value assessment. These pointed out the intentions expressed by Joop van Stigt. He aimed to create an open campus, a continuation of the city through the campus, as well as interaction between the surrounding residents and students and social interactions in the courtyards.



For the design of the building strict constant laws were developed by Joop van Stigt, in order to create a unique university typology. Repetitive units relating to the dimensions of human sizes formed a grid. This use of basing designs on human sizes is typical for the Structuralist movement and in the work of Joop van Stigt. Basing the floor plans on multiple of these human dimensions was an interesting attempt to create an efficient use of space. His aim for the university buildings was to provide learning environments with a functional and flexible grid where study spaces/ rooms range from two to four and sixteen pupils per room. The humansize dimensioned rooms were configured in a way to create a typical floor plans. Layering these floor plans 2 or sometimes 3 times on top of eachother formed building clusters. The building clusters were repeated sixteen times.
These sixteen buildings were situated around courtyards and connected through galleries on the first and second floors.

Fig 1. Layout variation based on grid size[1]

[1] ir. D.Mooij, Nieuwbouw Rijksuniversiteit Leiden, page 772

From the detailed program of requirements of the original Faculty of Humanities two thirds of the program stands from office rooms (400 pieces) of resp. 12,18 and 25 square meters. The other spaces are intended for small meeting rooms (approx. 50 square meters).[2] The repetition of same-sized units is very efficient in terms of building construction. The repetition in type of learning spaces however, may have only been useful for a university building of the 1970s.

Programmatic changes: Trends in 21st century university
The universities of the 21st century are designed to answer to a different type of learning. The shift to a knowledge driven economy with less attention to factual knowledge and more to the ability to think critically is a driving demand for a more qualitative and highly skilled creative and flexible workforce. This means that the future workforce requires students with a different way of learning. The result is that the spaces that are required for learning have also changed. New environments for learning are being designed in response to changing pedagogical styles to incorporate new information technology and adapt to a rise in numbers and abilities of learners.[3] Formal teaching spaces like that which have resulted from a repetitive grid based on human sizes are outdated. There are several types of new learning environments that require different sizes and environments. Comparing the current program to the new demand in space, according to linking pedagogy and space by Dr Kenn Fisher pointed out that there were a few types of spaces that were missing in the design for the 21st century university, namely a lecture hall with height, a collaboration incubator, informal spaces such as cafes or study spaces in the atrium and student rooms.[4]

To determine how these spaces will fit into the current design by Joop van Stigt it was necessary to test the flexibility in his design and the flexibility in his floor plan. He had already aimed to take flexibility into account to be able to meet the constantly changing needs by making flexible space arrangements in his floor plans. For example, lecture halls and libraries could be classified as workrooms and workrooms merged into lecture halls. For this purpose, facilities are included in ceiling grids and installations for lighting.

However, rearranging the existing floor plan was not enough to meet the requirement of the types of spaces that were needed. This resulted in adjustments to the buildings for example limited ceiling height in the existing buildings required a new space for a lecture hall with height. Closing off the courtyards was necessary to make usable outdoor space that can be used throughout the whole year. An entrance hall with a large collaboration incubator and informal spaces such as cafe and restaurant had to be created, which required a new building and resulted in demolition of the center building to replace it with a building that could meet the new demands. And altering the existing building to student housing meant that extra precautions needed to be taken to assure comfort. New additions, replacements of an existing building and refurbishment of the existing were all considered in the new design.

[2] ir. D.Mooij, Nieuwbouw Rijksuniversiteit Leiden, page 771
[3] Spaces for learning, a review of learning spaces in further and higher education, http://aleximarmot.com/userfiles/file/Spaces%20for%20learning.pdf
[4] Fisher. K, Linking Pedagogy and Space. (2005)

Intervention

The large scale of the complex and the special attention for every type of learning space required a categorization to make the intervention susceptible. The intervention of the existing design can be divided into three approaches that would lead to a design for a 21st century university, namely;

1. Uniting the building clusters to create 1 coherent building
2. Facilitating the spaces for new ways of learning
3. Adding a student living area for a home base to study

To unite the building clusters, an atrium was added to cover up the courtyards and close off the inner streets so all the buildings would be unified. A new entrance hall created one main entrance for the university, enhancing the feeling of unity between the building clusters. As stated by AMA Alexi Marmot Associates in *Designing Spaces for Effective Learning* "entering a college or university building should create a sense of excitement about learning. The entrance is the first point of contact between the institution and its clients and will establish the prevailing culture for visitors. Its next priority is to offer clear, accessible information about the institution and what can be achieved there." [5] A clear wayfinding throughout the design will give a clear indication of how to move through the building to get to all the different spaces. To manage this, the learning spaces or cluster-entrances were configured around a clear wayfinding path. A red path that tied the clusters together. This new primary routing is more than just routing, but also a place to study, meet and collaborate. This way of moving through the university was implemented in order to facilitate knowledge sharing through design. Creating opportunities for knowledge sharing as well as creating different ways to use the building rather than a repetition of the same type of spaces were the key aspects that steered both my research and design.

Fig 2. Final render of clear wayfinding and new atrium covering the existing courtyards by Valery Eshuis

[5] AMA Alexi Marmot Associates for the Scottish Funding Council (SFC,)
Designing Spaces for Effective Learning A guide to 21st century learning space design(2006) Retrieved from
https://issuu.com/gfbertini/docs/designing_spaces_for_effective_learning_-_a_guide_f, page 8

The second intervention facilitated the new ways of learning by altering the existing floor plans to make them more flexible, adding a lecture hall and informal places to study such as the rooftop cafe. The existing buildings were altered by changing the interior and keeping the exterior facade and its overall composition largely, where possible, in tact. Adding a lecture hall in the back of the building was part of a new design. The design for the new lecture hall was done by using the same composition as the existing building facade, but a different construction. Rather than using the large 950 mm high beams that were used in the previous design , here I-beams covered with gyloc plates for fire safety were used. The stepping up of the roof was not used, rather a flat roof of the same height as the highest part of the existing roofs was used. This new design resulted in a lecture hall with more ceiling height on the inside while having an exterior design that fit in with the existing neighboring facaded.

The third intervention prioritizes the comfort of the students to create apartments for students. A home base where they can study and these requirements result in a different intervention to the existing interior, climate design and the facade. Therefore the design intervention was approached separately to achieve a design that better fits housing needs and creates maximum comfort to be used as a home base for studying. This part of the design was not presented in the end to focus on the completion of the university.

These three interventions will secure the university to programmatically and spatially meet the demands of a 21st century university.

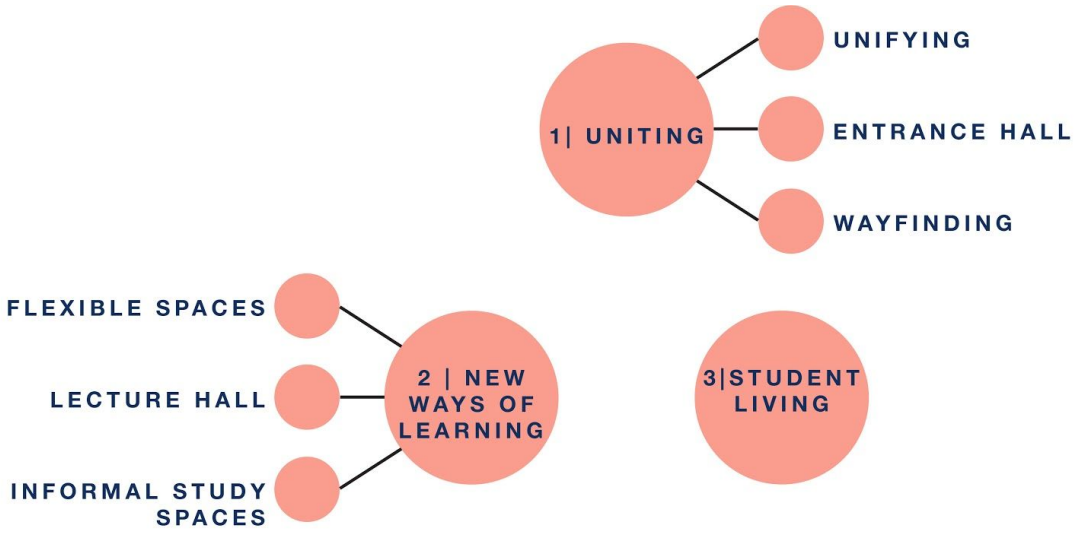


Fig 3. diagram of intervention

1.2 Research question

How can the structuralist university adapt to the 21st century university learning requirements? Is it possible to use the North part of the building for student housing?

To be able to embrace the many contradictions and constraints in the building is a challenge and requires research to fully understand and prioritise the initial intentions of the architect.

My first priority to achieve the design aims is to maintain the structuralist characteristics. To do this, I identified the most valuable characteristics of the building and how to work with or around them. Retrieving data about user experience gives an extra tool to find out where the biggest issues are, to what extent the set-up is functional for a university and to what extent the rigid frame is useful. [6]

In order to achieve a result in the design characterized by comprehension of the vital aspects of the existing structuralist buildings it was beneficial to make use of a combination of various research methods. The different angles of the research provided me with a rich amount of information to fully grasp the essence of the buildings, the Structuralist movement it represents, and the surroundings where it was built.

Case studies of Structuralist buildings such as the Amsterdam Orphanage have served as the theoretical background for this design project. The analysis of the Amsterdam Orphanage by Aldo van Eyck served as a method in understanding the structuralist movement. A Building Archaeological Analysis and Cultural Value Assessment report was made to find out what the values of the different parts of the buildings are, in order to maintain elements with high historical value as much as is technically possible. Fischer's method of value-mapping was used to indicate which parts of a heritage site had high, medium or neutral building archaeological values. This provided me with a tool to help in illustrating design-making in the way of treatment (conservation, repair, restoration or reuse). The high values must be taken advantage of and protected or sometimes strengthened when making alterations in the existing design.

At the start of the graduation the Amsterdam Orphanage, was used to discover what structuralist principles were. From that analysis the ideas of Sequences of space and the social factor (truly considering for whom it is being built and what their requirements, or specifically in the case of the orphanage, what the kids' sizes were) were some of the main principles that intrigued me about structuralist buildings. In van Stigt's Faculty of Humanities design, these principles are visible in the use of the courtyard and the sequences of the space in the building floor plan following the human size.

The trade-off between design analysis and intervention to meet new requirements
The analysis of the design of the Faculty of Humanities pointed out the importance of the brickwork of the facades and the mushroom-shaped concrete columns that form a rhythm and color scheme that is related to that of the buildings elsewhere in Leiden on the Witte Singel and Trekvliet. The design of the cluster buildings breaks the large complex into smaller pieces. A natural cohesion has been created that fits in with the rhythm of the houses on the Witte Singel. This homelike character of the façade makes it extremely suitable to place houses in it given the amount of windows. However the steel-framed windows have issues with cold-bridges. And when looking more closely at the technical requirements to create comfort it appears that making interventions in the building for climate purposes is complex. For very

[6] KCAP Architects&Planners. (2016). Humanities Campus Leiden [NL] Masterplan

specific reasons that have to do with minimizing the floor dimensions and the use of mushroom columns the floors have been pre-stressed. As a result of the prestressing reinforcement, part of the load is transferred directly to the column, so that the lateral force to be absorbed by the concrete cross-section is reduced. In addition, the column moments will decrease. The amount of reinforcement in the floor makes the ability to make shafts for the wet spaces (natte ruimtes) complicated. It is possible to make shafts in between the reinforcement, but that means that the dimensions of the shafts are also limited and that extra effort is needed to be able to process the climate installations.

2. Relationship between Heritage and Architecture

The graduation studio topic consists of two architectural research topics that come together, namely that of the trends in 21st century university building designs and the topic of dealing with structuralist buildings/ or young monuments. The Reuse of buildings is an emergent theme in architecture. The department of Heritage and Architecture at the Technical University in Delft specifically focuses on making alterations to the existing built environment. In order to do so, a clear goal is needed for the future program. In this graduation project the main focus lies on the relationship between the old and new. Finding the right balance between old and new requires a trade-off between architectural design, building technology and cultural value.

In a wider context, the faculty of Humanities in Leiden belongs to one of many buildings in the portfolio of Leiden university. The portfolio consists of many buildings located in the historic city center of Leiden and some buildings in The Hague. The inner city campus aims of the university directly affect the inner city of Leiden. They are therefore not just related to the architecture field, but also on a higher scale of the urbanism track.

3. Research method and approach in relation to Heritage and Architecture methodical line of inquiry

The methods used in my research were based on the ones typically used in the Heritage and Architecture track. Methods used in the heritage and architecture track are based on architectural design, cultural value assessment and an analysis of the technical aspects of the design. The combination of the three aspects gives an interesting playing field. In some cases, a solution benefits different aspects at the same time, in others, a decision is made at the expense of another aspect, forcing the architect to make a choice and define which aspect are prioritized. In the specific case of this project an extra layer of research is required to meet the demands for the aim to transform the current program of a 1970's university that is housed in a structuralist building to a 21st century university. The goal is to modernise the existing program that Joop van Stigt had in mind.

The program of the future 21st century consists of very different types of spaces than that of the current university. Two very different functions (university and student housing) require different approaches.

Because the vast majority of the program of this project is about the university, most of my research has gone into transforming the university. The approach of the university redesign gives an indication of the way a structuralist young monument can be transformed. The many repetitive factors in structuralism make it very convenient to transform into different functions, because changing the design of a part of the building does not mean all is lost, seeing as a similar design can be found in another part of the building complex. This is an advantage very specific to structuralist buildings. If it were to concern other monuments with less repetitive aspects, a change in the program as drastic as making apartments from a

previous office or university function means that the sacrifice in the existing design would have to be more strictly considered on the basis of the cultural value analysis.

One of the methods I was thought to use in the Heritage & Architecture track is the Building Archaeological Research Method. This is a helpful tool to understand the essence of the existing design, but does not support the decision making to alter the design. A tool that I used to back up my decision making successfully was an expansion on studying the direction 21st century universities are taking. For the approach of the university redesign research was necessary in the new ways of learning and the required spaces for this. Only then it was possible to know specifically what part of the existing design needed to be altered. By looking into other universities and reading about new trends in learning I have made a list of requirements to try to fit into the design by jvs. It was important to translate this to real square meters in order to be able to find the right space to fit it.

The student housing mostly needed a technical enhancement and security. The apartments were fit into the design and I looked into the technical enhancements that are necessary to make student housing livable as defined by the requirements of the building regulations (*'bouwbesluit'*).

During the design I made sure that the programmatic and architectural transformations respect and highlight the historic building; while at the same time improving any problems the building might have, always considering the users' experiences and needs. Following these steps allowed me to achieve a successful combination of old and new in this project.

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

This transformation project of a university can be a prototype for the University of Leiden to take into consideration for future Portfolio expansion or purchase of new buildings.
But it can also be an example of how to make interventions in young monuments, specifically structuralist post-war buildings. Ways of learning are changing so rapidly due to the globalization of the world, the effects of this on the economy, and the rapid growth of technology leading to the creation of a different type of workforce. Employees are encouraged to work in flexible spaces and settings, where social interaction is encouraged. Translated into a university setting that prepares students for the workforce, means mimicking the flexible spaces focused on social interaction, making it necessary for a successful university design.

5. The ethical issues and dilemmas encountered in doing the research, elaboration of the design and potential applications of the results in practice

Joop van Stigt designed the building in such a way that the flexibility of the interior and the possible extensions were kept in mind. This has been tested and it is clear to see that to a certain extent it is true that alterations are possible in the existing buildings. However, to meet the requirements or regulations of the climate design such as better insulation and more installations for higher comfort the possibilities were limited. Making holes in floors for shafts required extra attention. Aside from that the buildings all require an inventive climate design seeing as windows and ceiling heights do not leave much space for additional insulation.

In retrospect, understanding Joop van Stigts initial intentions and making those very clear beforehand was the most beneficial research method to decide what kind of intervention to make (preserve or demolish) to make appropriate decisions to preserve the essence of the design. Maintaining his most precious work and highly valued characteristics resulted in a playing field of possibilities where interventions could be made that would not affect the value of the building negatively.
The entrance hall is an example of an intervention that could have only been made after understanding the initial design intentions by van Stigt. The new entrance hall was made in the middle of the design resulting in a minimal change in design from street level. Although a difference in design is necessary in order for the entrance to be clear. The new entrance hall is built in the same grid and on the same building line (rooilijn) of the previous building. The building height was established based on the maximum the building's foundation was dimensioned for and also a to remain closer to the volumes he intended. The new building is created to facilitate the needs of the design. The aim is to create an entrance building which unfolds to the courtyards to create a continuous fluid routing and visual lines in both the internal world (consisting of the courtyards) as well as the campus (openness to the campus through visual lines), maintaining a connection between the building clusters. In this way his design ambitions were not only maintained but also strengthened.

6. Conclusion

In conclusion, the building has values that are based on various aspects such as the use value, the way in which structuralist characteristics have been experimented with and the architectural language that gives the building its character.

The use, specifically a change in use challenges these aspects of values. Proper use largely determines the extent to which the building needs to be changed. Buildings like these are young monuments and have been in use for a few decades, meaning that they can now be tested to meet new requirements. The ever changing use of buildings/ the program of buildings also results in learning how to change designs to new needs. Flexibility in design is therefore an important factor to keep in mind for future designs of buildings. However, the future is hard to predict and trends can only give a limited amount of information on where to be flexible in a design. Joop van Stigt aimed at creating flexibility in his design by making his floor plans easily adaptable to size. Regardless of his flexibility aims, he was not able to foresee the necessity for more informal spaces and in stricter requirements for building sustainability and climate design.

The adaptation of the building must be done within certain limits and with careful consideration as not to harm the character of the building. The large scale of the complex and the special attention for every type of learning space required a categorization to make the intervention(s) susceptible. It is not always possible to choose one position to adjust everything. A division in three categories allowed me to choose a position at each stage namely, at a larger scale of the building, the use of the spaces (interior) and the qualitative function change to student housing. The requirements and goals of the new design can be defined at three different levels, and by staying within the limits of cultural values it can be determined whether it will be replaced or improved. Because of the different types of spaces that are required and the differences in requirements the position or the method of approach is sometimes to add (lecture hall), demolish (entrance hall), repair (existing floor plans) and maintain (facade exterior).

In addition, the repeating factor of structural monuments gives an advantage to alter parts of the design, while preserving its original state in another part of the complex. The northern clusters were chosen to place the student housing there, given that the location is more suitable than on the south side where the buildings together form a stronger university function. This way the original cultural heritage is preserved on the southern cluster, while the capacity to provide more space to accommodate students and provide new spaces for learning is solved by the transformation of the northern cluster.

The redesign of the Faculty of Humanities can be seen as an experiment of how to approach a large structuralist building to meet new requirements by still maintaining the vision of the architect and respecting the history of the building, and simultaneously transforming it into a building that meets the needs of a fast changing world.

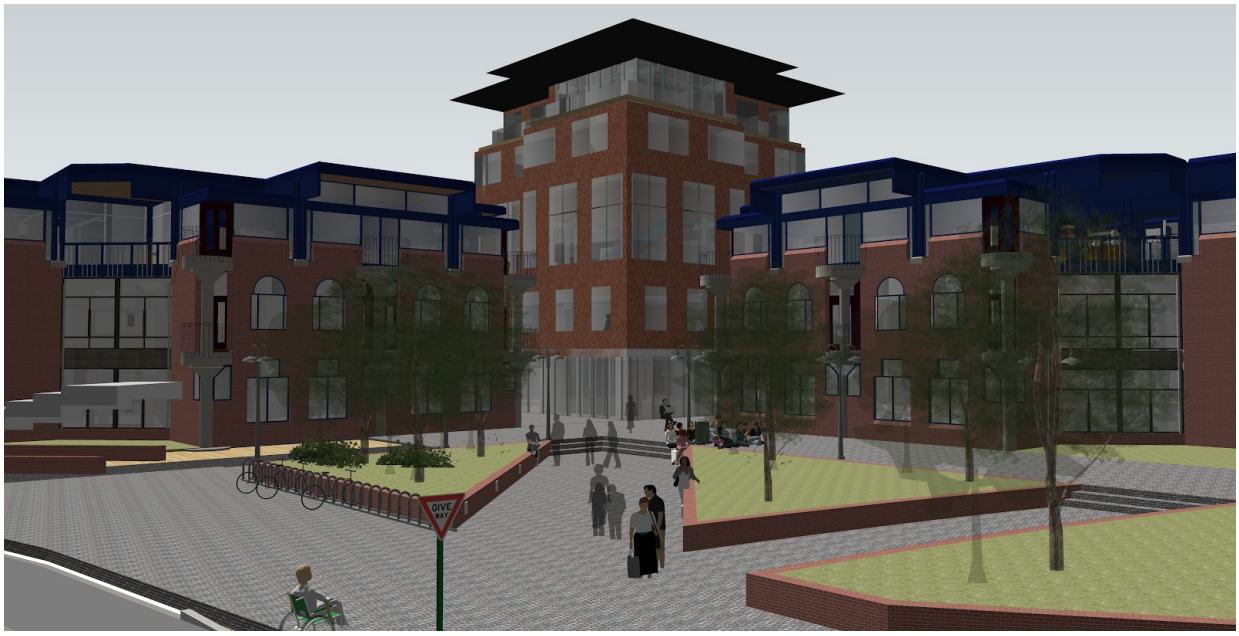


Fig 4. Final render of Entrance hall by Valery Eshuis