THE TRANSFORMED ICONS OF DUTCH STRUCTURALISM

The revitalization of structuralist principles
1. Blaakse bos (Cube houses) (1978)
   Architect: Piet Blom
   Location: Overlaak 70, Rotterdam
   Group members: Joris Hartmans, Jelle Hettema, Lydia de Vries

2. Raadhuis Ter Aar (1970)
   Architect: Joop van Stigt
   Location: Aardamseweg 4, Ter Aar
   Group members: Marjan Sadeghi

3. Amsterdam Burgerweeshuis (1960)
   Architect: Aldo van Eyck
   Location: IJsbaanpad 3, Amsterdam
   Group members: Jelmer Dankers, Valery Eshuis, Jonathan Verhoef

4. 't Karregat (1973)
   Architect: Frank van Klingeren
   Location: Urkhovenseweg 16, Eindhoven
   Group members: Michelle Bettman, Anne Ebbenhorst, Morsal Habib

5. Muziekcentrum Vredenburg (1978)
   Architect: Herman Hertzberger
   Location: Utrecht
   Group members: Jeroen Bogaard, Jeroen Moerman, Josephine Uitenbogert
Structuralism cannot be seen without the influence of post-war modernity in architecture as advocated by CIAM and later Team 10. As an important player in these platforms Aldo van Eyck was an early instigator of the values and structural, social approach to architecture that would define the movement, his Burgerweeshuis being the most visible example. His students - Blom, Hertzberger, Van Stigt - would together with Van Eyck join in an intellectual architectural discussion searching for a reaction to the brutalist and inhumane tendencies of the modern movement. In articles and magazines like FORUM they assembled an ideology covering the social, human aspect of what new contemporary architecture should incorporate, focusing on buildings that facilitated equality and livability through a strong sense of human scale, humble materials and intended space for social interaction. One way of materialising these concepts that can be seen with all of these architects, would be a set-up of repeating elements, spaces and parts of buildings in a structure to shape the whole of their buildings. These structural approaches theoretically allowed for flexibility, the ability to expand buildings in a continued pattern and the idea of a living building that was shaped by its users. The structure meant more to the individual architects than merely a a gridded means of construction. However, while these aspects can be recognised in the work of these architects, to everyone it supported different ideals and possibilities, resulting in a great variety of material execution, though always maintaining the social aspect as the ultimate motive for designs. In the end this diversity results in buildings expressing very much the individual characteristics of the different architects, though all sorted in the same style through their shared structural grid and humane focus.

Blaakse Bos - Piet Blom

Structuralism in the work of Piet Blom is visible through three main aspects:
1. System
   Multiple units contribute to one entity. Each unit or house is autonomous, in this he differs from other structuralist architects. This autonomy facilitated the multiplication of elements. Removing or adding one unit does not interfere with the design. The supercubes are exceptions, while still following this system.
2. Social
   Most importantly, the cube houses act as a framework in which social interaction can take place. Blom uses sightlines from the houses to street level, raised communal spaces and sequencing of open and narrow spaces to encourage people to interact and to occupy the spaces to make them their own.
3. Human Scale
   Bloms vision of ‘The city can be lived as a village’ is materialised by the smaller spaces and multiplication of elements. Thereby creating a livable space in contrast to the post-war redevelopment.

Huis Ter Aar - Joop van Stigt

The structuralism of Ter Aar is defined in the form language, basic scheme, repeated overlapping squares, using the grid, visual load bearing limestone walls and timber roof construction, visual social interaction between spaces and also the connection with nature. The entrance of the building used to be on the front centre position. This was the place where the inhabitants and employees would interact together. The extension to the building was done by the original architect and he tried to use the same ideas. The basic scheme, overlapping squares and the form language are still the same. There is a visible load bearing structure but he applied other methods with smaller dimension such as concrete columns, frameworks and brick interior walls. The ground floor of the new building is a level lower than the ground floor of the existing building and the connection to the landscape is also successful in the new building. The sight lines from the atrium to the different levels is also kept in the new atrium but interaction between spaces is less pronounced due to the addition of partition walls. The new entrance is moved to another location and is no longer representative as a part of structuralism.

Structuralism in the transformed building:

The building still has a social meeting function but it has been excutied slightly differently and in a less extreme manner. The meeting places in the living room areas between the classrooms allow for social interaction. Flexible walls allowing for multiple interpretations of the space. Successful reuse of the existing structure is an interpretation of the flexible structure.

Vredenburg - Herman Hertzberger

Vredenburg is shaped around the geometrically centred concert hall that sets the symmetry for the surrounding column structure. Designed from this central point outward the spaces and structural elements form a gradient that adheres to strict geometric repetition to environment-abiding lobbed facade compositions.

Structural Gradient

As a function-specific building Vredenburg is shaped around the geometrically centred concert hall that sets the symmetry for the surrounding column structure. Designed from this central point outward the spaces and structural elements form a gradient that adheres to strict geometric repetition to environment-abiding lobbed facade compositions.

Transformation Disconnection

With a new structure only connected by passageways in former outer facades and standing as a contrasting modern neolith beside the small-scaled old building the new addition of the transformation is in style, structure and intervention completely disconnected from the existing concert hall, visibly showing the difference between old and new.

't Karregat - Frank van Klingeran

The essence of ‘t Karregat consists of a repetition of umbrella-like steel columns. Repetitive system: The umbrella-like steel column and roof construction is made in modular components. The architect envisioned that this structure could later be expanded throughout the neighbourhood. Social interaction: The ideas of decloting and hinder to create a better community. The users own interpretation of the space: The fact that all the installations were placed in the roof zone meant that the floor space plan was flexible for change. Transition between inside and outside spaces: multiple entrances were created from different sides and the use of a glass facade. Experimental design solution: how to create a portion of the Dutch city.

Burgerweeshuis - Aldo van Eijck

The structure of the Burgerweeshuis is defined by a system of living units that are structured in a diagonal, non-hierarchical way. The living units can function autonomously, but are connected by an ‘inner street’ and courtyards to create a whole. This allows for contact between the users and relations between the units. The repetitive use of smaller construction elements such as the columns, architraves and cupola’s gives the building uniformity and clarity as it creates a sense of human scale.

The main aim of the transformation was to revitalise the building. Subtle interventions are used to transform the building to modern standards while keeping the building’s original principles intact. The former living units are now used as office departments that are able to function autonomously, but are connected to the ‘inner street’ where the different employees are able to meet in an unforced manner.

Technical interventions are hidden away in the cover on the cupula’s, also improving the acoustics of the building. The green facade color is removed to show the original material, creating uniformity.
1. Blaakse bos (Cube houses) (1978)

Architect: Piet Blom
Location: Overblaak 70, Rotterdam
Group members: Joris Hartmans, Jelle Hettema, Lydia de Vries
Piet Blom was a Dutch architect, known for a number of notable projects, mostly built between the 1970's till 1990's. One of his most famous projects is the dwelling complex Blaakse Bos in Rotterdam, due to the extraordinary cube houses. Piet Blom was generally listed as one of the structuralist architects, together with Aldo van Eyck and Herman Hertzberger. His work has a strong focus on the social consequences of architecture, and is recognizable by the small elements contributing to a larger whole. However, the spatial expression of his work was in his words not important. He believed in the social effect that architecture can have on society, leading to his stubborn attitude. Due to his stubbornness not many of his projects are actually realized.

1934: Birth Piet Blom
Blom was born in the Amsterdam neighbourhood de Jordaan, at the time a dense and lively district. This atmosphere inspired his housing design during his career.

1939: Graduation project under supervision of Aldo van Eyck: “Cities will be lived like villages.” This project aims to create a complex and compact form of urban architecture, comparable to his hometown Amsterdam and North African kasbahs. Intertwined functionality should give the neighbourhood a social and vibrant living conditions. Aldo van Eyck is impressed and uses this project at a CIAM congress as an answer to his own architectural questions.

1973: Realisation Kasbah in Hengelo
This dwelling project is the first physical expression of Bloms’ vision. Elevated houses make room for traffic and urban life including shops and playing areas underneath. It consists of 4 different types of dwelling, combining in a neighbourhood of 184 houses. However, this project is built on the outskirts of Hengelo, not in an urban setting. Therefore the neighbourhood does not create the livelyhood that was planned.

1999: Death of Piet Blom
while on holiday in Denmark.

1984: Realisation of the Blaakse Bos in Rotterdam
For this project 78 cube houses were planned, but due to an economic crisis only 38 houses are realised together with two super cubes containing social functions. To finance the cube houses two apartment buildings are constructed, namely the Blaaktoren and Spaanse Kade. The cube houses spanning the Blaak are based on the cube houses in Helmond and are the culmination of Bloms’ idea which he called: living on the cities roof. Right in the centre of Rotterdam these cubes should resemble an urban forest. Between the ‘trunks’ are shops and other social functions. Furthermore the Spaanse Kade brings back the livelyhood on the Oude Haven, combining dwelling and small-scale cafes.

By studying the Blaakse Bos dwelling project, we are researching the social and spatial characteristics of structuralism. Furthermore, this research aims to extract the values of structuralist design, and how they can be used to accommodate contemporary needs.

How is structuralism represented in Bloms’ design for the Blaakse Bos, and how does the recent transformations by Personal Architecture take into account the design decisions of Blom?
Process

‘The promenade of Rotterdam only makes sense if it really becomes fairy-tale like and you can not stay away from it’ is a statement Piet Blom made. In a first draft the cube houses were spherical. Blom made 4 models (’77-’78) for the passageway from Blaak to the Oude Haven, including a submerged underpass (model 2) and a bridge enclosed by shops and dwelling (model 3). The fourth model is more like a fabric within the urban environment. This proved to be most sufficient to the situation, combining dwelling, commercial space and an overpass over the busy road.

On 10 Jan. ’78 Blom also proposed a different location for his cube houses, next to the Oude Haven. This in combination with the aforementioned underpass.

The first ‘final’ design (15 jun. ’78) had cube houses along the Gelderse Kade, and featured a more gradual ascent via multiple staircases. In the end this design was changed due to exceeding costs. Therefore the number of cubic houses was reduced and the Blaaktoren and Zuidflat were added to provide sufficient dwelling.

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Public

Semi public

Private

The plan is characterized by the lifted level that was meant as a bridge between the Oude Haven to the Blaak. This new level is the place for social interaction and commercial activities. Just above this level you will find collective space for the owners and up there the private homes as if you would live in the foliage.
While the cube houses appear to have a separate construction they are connected on the second floor through the construction. This floorslab is concrete 'in situ' giving the ensemble stability and rigidity.

Transformation

1998: Replacement of Asphalt roofing in favour of Zinc plating
2009: Stay Okay Hostel located in one of the supercubes.

The Hostel is located in 2 supercubes and 6 regular cubes. From the exterior you won’t distinguish the hostel from the Masterplan. When you enter, you’ll experience a big and open space. You won’t experience the Cubes inside the hostel, an extra “fake” cube is therefore added.

2013: Transformation of one of the Super cubes by the office Personal Architecture.

Again the exterior is unharmed and stays equal to the houses. One Supercube is used as the center of the foundation and deployed for vertical movement. Spatiality and daylight is strengthened by a void through the core of this cube. Around this core the rooms of the ex-prisoners are situated. Colours and material are very neutral to create a clean and bright space.

2015: Renovation by J.P. van Eesteren. New painting of the well known yellow is applied, the gable roofs are cleaned and the glass is replaced.
Standing in front of the project you notice the variety of architecture. Many tourists are interested in the cube houses and climb up the stairs to the "kijkkubus" and Hostel. The inhabitants of the city prefer to cross the road instead of using the overpass due to the bad entrance, the stairs are experienced as a threshold. Once arrived in the public space of the "Blaakse Bos" you feel as if you are in a different world. A smaller scale and the feeling of social control is very strong. In this space there are multiple elements placed to stimulate the social interaction, for example the plants and the game of chess on the floor.

On the east side of the Blaak you will find the vibrant Spaanse Kade. The atmosphere has much character because of the old boats, the water and "het witte huis". Many bars and restaurants are located in this Oude Haven and created a busy city life.

The cube itself has a narrow entrance, but an open living space with a lot of light and view on the public space. The sleeping level is darker and the walls are moving towards you. In the top it is very light again and you will have a view on the roofs and skyline of Rotterdam.

Many colors are used besides the grey colors of stone and concrete. These colors are used to bring back the happiness into the project.

Although it wasn’t Blom’s plan, the cube houses became an icon of the Blaak area. Together with other icons, Blaak is a very attractive area for tourists. Blom wanted to create a lively area inside the city of Rotterdam; a town inside a city. The Spaanse kade is part of the design with this lively atmosphere.

- The structure is flexible during the design process, were it is possible to add or delete certain elements/cubes to the design. After the realization it is more difficult to change the structure since the floors, on one level, form a plane. The framework itself doesn’t leave much room for new interpretation by the people, unless the object or the frame is upscaled, like in the supercubes.
- The plan was to construct a connection between the market side and the harbour side with a bridge design. The design forms no ‘good’ urban connection in the context since it is faster to cross the road on the ground floor.

+/- Through the tilted planes with windows the inhabitants of the cube houses have a view on the public areas in between. When you access these public areas you experience little privacy because of this ‘social control’ of the inhabitants.

In the Blaakse Bos structuralism is visible through three aspects: System, Social and Human scale. In combination with our own experience of the Blaakse Bos we can draw a conclusion with positive and negative points of Piet Blom’s design.
2. Raadhuis Ter Aar (1970)

Architect: Joop van Stigt
Location: Aardamseweg 4, Ter Aar
Group members: Marjan Sadeghi
Structuralism

Dutch Structuralism, as an architectural movement, was founded by the so-called FORUM-group. According to the FORUM-group, modern architecture resulted in too uniform, too large-scaled and anonymous buildings that are unable to react on future developments. They believed Modernism killed creativity and forgot the humanity. So they were seeking for a design with larger social impact.

According to Van Heuvel there are several characteristics of Structuralism. Firstly, the construction structures space and creates flexibility. It allows growth and cohesion and is part of the architecture in both the interior and exterior. Secondly, the human being and its relations was the starting point for every design. The buildings were designed in order for people to meet and interact. Thirdly, the building can be seen as a configuration that consists of smaller units that are subject to individual interpretation but still form a coherent whole in which collectivity can enter. Finally, instead of dividing the different monovalent functions, Structuralism strives for a mixture of functions and spaces that can be used in multiple ways.

Dutch Structuralism represents one of the most important moments in the development of twentieth century architecture in the Netherlands, and left rich architectural and cultural values. This booklet mainly focus on the analysis of five iconic projects of Dutch Structuralism. By analyzing these projects and their architects, we could have a better understanding on the development of Dutch Structuralism.

Fig 1: Joop Van Stigt, 1965-1970/1990-1992

Fig 2: Site plan of church and old raadhuis

Fig 3: Raadhuis, 1970 with church on the left


Joop van Stigt was the architect of Raadhuis Ter Aar. His motivation to become an architect was rather unusual. He was born in Amsterdam in a large family of fourteen children. His older brother would become a missionary and Joop van Stigt decided that if his brother became a priest then he would need to build churches. His brother didn't become a missionary but he did become an architect. In the ten years which it took for him to complete his study, he worked full time at a construction company (GevelRaad, 1999). As a result he understood the fundamentals of construction well. Later he gained practical experience working at Bodon, Van der Linden, Aldo van Eyck and Boon and finally started his own practice.

What makes Raadhuis Ter Aar a structuralist building and what values does this offer?

The municipality wanted a building which would be situated in the polder landscape of Ter Aar and to make the interaction between the geographic place, the historical context, between the municipal workers and the local citizens (Steenhuis, 2014). The vision of the client together with the methodology used by the architect a unique structuralist building was created in on the outskirts of Ter Aar.

Certain characteristics appear more frequently in the buildings’ design from a structuralist mentality. These characteristic are to be highlighted in the next few pages. The findings from the analysis highlight the values that this structuralist building provides.

Configurative design using a modular unit

The module of 11m x 11m is arranged in an interlocking pattern in plan to create the following form. The plan of Raadhuis Ter Aar by Joop van Stigt has a strong geometrical character. It's centralized and symmetrical composition with grand steps shows clear relation to the work of Renaissance architect Palladio (Villa Rotonda). At the same time, the geometrical shape (use of squares) and the division between the “serving” and “served” space using structural vacant columns was clearly influenced by the works of Louis Kahn (Tremble Bath House). As one of the best students of Aldo van Eyck, Joop also redeveloped the social and spatial ideas of van Eyck.

By creating the public atrium and the open office space using what can be call configuration design (interlocking squares), Joop meant to stimulate social interaction between the public and the civil servants in the town hall.

References which could have had an influence on Joop van Stigt design process
1. 1571 Palladio Villa Rotonda.
2. 1955 Louis Kahn Bath House.
3. 1060 Aldo van Eyck Amsterdam Orphange.

Fig 4: Abstraction plan of the building, scanned from Het Nieuwe Instituut archive, 1965

Fig 5: References

Fig 6: Concept diagram on right and 1992 addition on left
Program analysis

The roof is extended 2.5m out of the façade in order to express the structure of the roof to the viewer on the ground. The cross structure of the roof is dominant in determining the hierarchy of public and private space in the interior. The edges are more private and the centre walkways are more public.

Spatial connections.
The atrium is the interlocking space and it was conceived as the most public space in the town hall. The three zones of the atrium are the darker crypt-like area, the public platform and the lifted roof with windows bring light into the atrium and onto the structure. Open plan offices look onto the atrium from four sides. The double-height hall is 1.5m higher than the ground level of the polder landscape and it forms a connection with the service/help desk spaces on the ground floor and the managers on the first floor. The crypt like space below the double-height hall is supported by a central column with exposed concrete aggregate concrete finishes. This space then leads to the door of the archive store.

Observation

Interlocking space

Due to largely updated facility systems, change of building regulations and increased sustainability requirements during the past 50 years. Large amount of equipment, ducts and pipes were placed on top of the rooftop, through the slabs and along side the timber beams. They appear to be located in an unorganized way and are unavoidably interrupting the original spatial experiences and taking up space inefficiently.

Materiality
Apart from the aging of lime stone both in interior space and on facade, most of the materials and details are conserved as their initial design. The combination of stone, red wood, bronze frames and washed concrete are not in good quality both technologically and aesthetically. They still shape a welcome atmosphere of the atrium as it was in 1960s.
The form language that is associated with structuralism was not to have a certain purpose. The craftsmanship in the building structure was more important than the envelope for van Stigt. At the same time what sets van Stigt apart from other structuralist architects is that for him the facade is inseparable from the building. He knew that the façade often receives the most attention when the building is rated and that the façade sells well. This is seen in his choice to use a more expensive material for the façade, limestone. “But architecture is 3D and for me the façade is a result of the construction. The façade is where the whole organisation behind the façade sits.”

Use of wood is dominantly present in the work of J van Stigt. Especially in the roof form but also in his furniture. Every square is closed with a cross roof. The beam construction of the redwood continues to 2.5m past the façade. The raw basement of washout out aggregate concrete, the façade of limestone the bronze window frames, exposed aggregate concrete floors in the interior; these are elements that give a welcoming atmosphere as a house for the citizen.
The complexities of current building can be regarded as a result of social, economical and functional changes through almost 50 years of time. In 1965, the whole planning appeared to be a huge “room” shared by both the municipal workers and visitors. With no solid separations or enclosed space which are usually considered as rooms, structures elements, spatial compositions and even furnitures were all designed in order to shape a plural, flexible and public space.

An extension was conducted with the same logic of interlock squares in planning in 1991 and offered more serving space for functional considerations.

Situations of the building by the time of our visit is a result of the renovation in 2006 when the building was transformed into an private office for a company. The formal entrance using big stairs was abandoned signifying the disappearance of publicity. With all the fundamental structural elements kept as initial, additional walls was added for separating private office areas and reorganizing the circulation. Two more toilet rooms was disturbingly placed in what used to be a bright corner with skylight in the original design. A glass elevator was added in the corner of the atrium for more friendly usage and all original furnitures which offered possibilities for flexibility were removed.

Even though to some extent, later occupations and separations did prove the potential for adaptability and exposed the functional problems during its usage, the renovations on site have largely damaged the original spatial order and the correspondence between spatial experience and functional, social ideas.

**Conclusions:**

The analysis of Joop van Stigt for Raadhuis Ter Aar from the drawing and documents in the archives, lecture from Francis Strauven, and tour of the site with the municipality’s maintenance manager has brought the following points to our attention:

1. **Flexibility.** Structure which can be rigid to hold a flexible and variety of activities. Express the structure as a building finish. Clear to see the logic of the structure
2. **Social interactions.** Rethinking how people meet and interact with one another as a result of the built form.
3. **Use of materials.** Most relevant technological systems eg. glass roof structures.
4. **Structurally sound.** Calculation of the structure all done by the architect himself. No need for a structural engineer.
5. **Connection to nature.** The design for the new town hall for Ter Aar is part of the evolution of our work environments and ways of working. The own plan town hall is situated out of the city centre and surrounded by grass and green. This is an indication of the decentralisation of the city’s public buildings as a result to be in connection to nature.
Reflection

The visible load bearing structure is the part of the structuralism and it has specific character. All facade stones are loadbearing and had to be outlined and executed. The visible load bearing structure is applied in the other methods with smaller dimension such as concrete columns framework and brick infill walls.

According to floor plans the building expansion in 1992 was to create a canteen space and storage space.

The sight lines from the atrium to the different levels is also kept in the new atrium but interaction between spaces is less due to adding the partition walls.

Later in 2006 the major change in the spatial layout indicates that the use of the building has changed but still the structure has allowed for flexible use of space.

Entrance is moved to other place and is no longer representative as a part of structuralism.

Other major changes to the building as a result of mechanical ventilation, toilets and other services show a challenges for the building to accommodate all these less attractive services around the exposed and bare structure. Here the building is not responding well to certain changes. Technological advancements and changes in ways that humans communicate means that the certain spaces no longer have the same relevance or do not allow enough space.

The building has achieved the goal to connect to the landscape and the original design was successful. The ground floor of the new building is a level lower than the ground floor of the existing building and the connection to the landscape is also successful in the new building. Fig 19

Fig 24: Existing entrance

Fig 25: load bearing column

Fig 2: Roof
3. Amsterdam Burgerweeshuis (1960)

Architect: Aldo van Eyck
Location: IJsbaanpad 3, Amsterdam
Group members: Jelmer Dankers, Valery Eshuis, Jonathan Verhoef
Aldo van Eyck, born in 1918 in Driebergen, the Netherlands, was a Dutch architect. He grew up in London and graduated in Zürich. After being a member of CIAM, Aldo van Eyck was in 1956 one of the founding members of Team 10, a group of young architects that discuss and critique architecture and each other's work. One of their collective ideas was found in criticism on post-war modernism, mainly for a lack of human element.

The first building of this new generation of architects that was realized was the Burgerweeshuis, a building that was a first step towards architecture that would later be defined as structuralism.

Before building his first building, Van Eyck designed hundreds of playgrounds for the city of Amsterdam. These playgrounds can be seen as exercises in relativity and non-hierarchical compositions, as the mutual relationship of elements was essential and they are all equal. The modularity of the playgrounds was also essential for the designs, as in different cases the same playing elements were used, yet arranged differently to fit the specific surroundings.

The principles used for designing the playgrounds can later be found in the architecture of Aldo van Eyck.

The reason the former director of the Amsterdam Orphanage, Frans van Meurs, chose for Van Eyck as the architect for the new Orphanage was because of the way Van Eyck's ideas matched the desires that Van Meurs had for his orphans. He wanted to create a friendly building and an orphanage that would really be a home for the children. He wanted to create a place where children of all age groups had to grow up with a certain level of independence, but would be in contact with one another in an unforced manner.

The Orphanage was built on the periphery of the city of Amsterdam. It was located on the edge of the city close to the Olympic stadium and surrounded by polders. It was built there because Frans van Meurs had a “desire to move his orphans away from the bustle of the inner city to a small, ideal world bathed in healthy air, sunshine and greenery.”

Later though the surroundings of the Orphanage got built and it was no longer located in green surroundings. In the early 90’s the Tripolis towers were built (to a design of Van Eyck and his wife) right next to the site, but the Burgerweeshuis was at the time no longer in use as an orphanage.

In 2016 Wessel de Jonge got assigned as the architect to transform the Burgerweeshuis to make it more functional as office space and make it more efficient and sustainable by creating a modern-day level of thermal and acoustic performance inside. The approach to this design by Wessel de Jonge was to revitalise the building and use the principles and ideas implemented by Aldo van Eyck, rather than making big interventions.

The building as it was designed has the qualities to function as an office space. The building units can function as autonomous elements allowing them to house different departments. The inner street connects the units and allows for unforced interaction, creating a workspace that is informal and gives the employees a feeling of freedom. The places where children used to play football and run around playing are now places where employees of different departments meet, which improves the company as an organisation.

The biggest interventions made during the transformation are on a technical level, where for example the installations and wiring have been hidden in the new ceiling covering. In 2018 BPD moved into the building as their head- and regional office. Next to office they also offer a public exposition in the building to expose their private collection of art. The interior for BPD has been designed by Odette Ex of Ex Interiors.
Coherence through interstitial spaces

In between the elements is interstitial space that functions as a connection that creates coherence and connection between them. This is space where the users of the autonomous units meet in an unforced manner.

This has been implemented in the building in multiple ways. The interior connection between the elements is created by a diagonal ‘inner street’ that creates a non-hierarchical connection. Also a big courtyard is created in the middle of the building that allows for the user to enter the building through multiple entries. The space created in the courtyard has been defined in multiple sizes by using architectural elements. The connection between the living units is created through physically shared outside space and visual connections.

Genericity

The axonometric drawing shows the repetitive elements of the building that make up the primary structure. The building is made from prefab columns, architraves, and domes. However some parts, like the floors, are cast concrete. From above the structure looks very ordered and generic.

Repeating elements:
1. Roof domes: 2 types, big and small. And some have rooflights and others don’t.
2. Beam details.
3. Architraves with window frame.
Specificity

Contrasting the repetitive application of the structural elements, the interior spaces are much more specifically designed. This can be seen in the original setup of the building units. These units were meant to be dwellings for specific groups of age and gender. And even the objects designed inside the dwelling were accustomed to the specific needs of the expected users (Fig. 20).

The differences in height of the floors between different parts of the building is done deliberately to accommodate the older and younger children of the orphanage.

These height differences are seen in the hallway and the dwellings of the younger children.

1. grid (pro)

The buildings strictly follows a 3,36 x 3,36 m grid structure for the load bearing elements (columns and walls).

2. structural elements (pro)

The columns, architraves and domes are repeated single elements that together construct the building and create a uniform character throughout the building.

3. hallway and entrance square (pro)

The hallway serves as a place where people moving from unit to unit can meet in an unforced manner. The hallway and entrance square have a rather egalitarian character.

4. variety in layout (con)

Some spaces were designed to accommodate specific groups. The changes in exterior walls show these distinctions in otherwise identical units.

5. floor height (con)

Changes in floor height indicate the physical height of the child/user for whom the space was designed.

6. specific objects (con)

Certain objects in the building were originally designed to accommodate a certain activity. To what extend they are prone to re-interpretation is debatable.

Conclusion

In structuralism the use of spaces and objects is left to be determined by the user. But in the orphanage the meaning seems to be embedded in the design. And this particular notion would oppose the claim that the building is indeed a structuralist building, seeing that objects/spaces are not ‘multi-interpretable’ or flexibly usable. Still, the adherence to the grid, repetition of elements and influence of units to the connecting fabric and vice versa explains why a lot of features from this building inspired the structuralism movement. Or would lead people to identify this building as being an example of the structuralists movement.
Transformation and personal findings from the excursion

The transformation by Wessel de Jonge and Ex Interiors of the Burgerweeshuis resulted in a minimalist approach. The building qualities were mostly respected and restored. The green paint on the exterior walls was removed. Additional wiring was implemented underneath a paper glued layer on top of the concrete domes on the inside of the building. This helped the acoustics as well. The interior was mostly done by Ex-Interiors. She used color to create a very warm atmosphere and to specify the different rooms. Lighting in the building also accentuates the dwelling spaces and the aesthetics of the building structure.

The hall causes initial disorientation because everything looks alike. The same elements are used everywhere throughout the building (columns, domes, architraves). Often it was uncertain in which area of the building we were.

The offices are stuffed with extra office furniture resulting in less openness. The view on the garden is obstructed by the elements used to define the office areas.

The play areas that Aldo van Eyck had designed stayed exactly as they were. They are concrete molded to the floor. And thus hard to remove. There is no blockage to protect the play grounds, so it is possible to interact with them. The aim for the transformation architect was to use minimal intervention in the building in order to protect Aldo van Eyck’s intended design. Furniture is used to enhance the spaces. Wall panels, art and a lot of statues are used to differentiate the office areas. This also helps with the wayfinding throughout the building.
4. ‘t Karregat (1973)

Architect: Frank van Klingeren
Location: Urkhovenseweg 16, Eindhoven
Group members: Michelle Bettman, Anne Ebbenhorst, Morsal Habib
The architect
Frank van Klingeren was born on February 4th 1919. He studied civil engineering and architecture, but never finished the latter one. After working for several companies as a civil engineer, he started his own studio for building engineering in 1948. Later he started doing more architectural projects, of which the Meerpaal in Dronten, the Agora Lelystad and 't Karregat in Eindhoven are his most well known works. These projects also express some of Van Klingeren’s central themes:

Declotting
In reaction to the modernists tendency to separate functions, a central theme in Van Klingeren’s work was ‘ontklootening’ (declotting). By combining functions and removing boundaries new possibilities for meeting and public life arise.

Nuisance
Another theme in Van Klingeren’s work is ‘hinder’ (nuisance). Declotting causes nuisance. This is usually considered as negative, but he turns it into something positive. Nuisance is contact and contact can lead to friendship or enmity or anything in between.

More with less and imperfection
More with less is not just about material in Van Klingeren’s work. It is also about the program. By being less specific, more is possible. His engineering background was always subordinate to the architecture and social intentions. He also believed in imperfection and the unfinished. Comparable to the ‘more with less’, leaving things imperfect and unfinished creates possibilities for unexpected things to happen.

Art
Van Klingeren often collaborated with artist Pierre van Soest. Of all projects realised after 1953, Van Soest was involved with two-thirds of them. The art gave the buildings a human touch, created more expressive buildings and was accessible to a large public.

Context
The neighbourhood Herzenbroeken was built in the beginning of the 1970’s in Eindhoven. The municipality wanted to create an alternative to the large-scale developments of the post war era. The new neighborhood should be experimental with new ideas about living and working with a strong social cohesion.

Herzenbroeken was situated in isolation from the center of Eindhoven and lies in between two railroads and a road. To accommodate the neighborhood, the municipality proposed a shopping center. Soon the idea arose to combine commercial and social functions in one building and in 1970 Frank van Klingeren was commissioned to make a design. The program of the building was extended to also include schools and a neighborhood center, but the budget was slim. Van Klingeren was the perfect person for the commission to design and build the building for this unique challenge and with his strong will the ‘t Karregat became a reality.

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**Design Process**

The project is commissioned by the municipality of Eindhoven and project development agency AMRO-Westland Utrecht. The design started in 1970 and construction was finished in 1973.

When making the design of 't Karregat he got inspired by the painting of Paul Klee. He made almost an exact copy of this painting with his scale model which is depicted in the picture on the right. With this model in mind, he created the floor plan and added the functions.

The building takes its name from the area and its location. A 'wtkar' was used for the groceries. Due to the height differences in the building, the car would go to the lowest level. The children were to push the empty car back to the shop. This would also create social interaction between the different age groups. Because of this idea, the building is called 't Karregat.

### Starting points

His main starting point of this experimental project was to focus on 'ontklontering' (delumping or declotting of functions to create social interactions between people who would otherwise never interact with each other).

Originally, the school wasn’t in the program requirements but after adding this to the program of the building, Frank van Klingeren came up with the idea to accommodate education, culture and trade in one building. With this last addition the building started to function as the living room of the neighborhood.

Frank van Klingeren wanted to avoid having walls which separate the different functions. He wanted the maximum openness of the space. This could lead to a clash or confrontation.

Only the toilet units had their own enclosure.

A glass facade made a connection between inside and outside.

### The transformation

The building is not a monument but is considered valuable by the municipality. This is partly due to the unique design by van Klingeren that responded to the demand for an experimental neighborhood center. It is considered as a design with an unique reflection of his time.

Diederendirrix Architecten (restoration background) and Architecten en-en (school background) were the chosen architects to focus on this project. The first conclusion of their research was that the open space never worked and the needs of the school were to have individual classrooms. Therefor dividing walls were added even though the original design was not to separate different functions from eachother.

For the transformation they chose to restore the floor, roof and construction and make it sustainable. They brought back the original colour gradient of the columns which was designed by Pierre van Soest. The new construction ensures decent spaces, corridors, transparency and still retains its spaciousness. By making the inner walls movable, the flexibility of the building is preserved, partly through the integration of sliding doors.
Steel frame construction of umbrella-like columns and steel joists in between. Structure is secured on concrete pad foundations and timber joists carry the wooden waterproofed boarding for the roof. The infrastructure of the roof was seen as separate to the ground floor which is organic in form.

Services

The lightweight infrastructure of the roof houses all the services of the building which leaves the ground floor to have a max flexibility for layout changes.
REFLECTION What was the translation of the original design into the transformation?

Original building
What aspects were successful:
1. large spans and high ceiling
2. daylight from above
3. the multifunctional building as living room of the new neighborhood created a strong sense of community
4. the use of art made the building more playful and it made the art available to a large public
5. good quality materials were used which have aged well

What aspects were problematic:
1. lack of climate control: ventilation, heating and cooling, dust
2. too open and not enough privacy for areas which need quiet, focused environments to function.
3. no acoustic insulation between different functional spaces for specific activities

Transformed building
What aspects were successful:
1. use of a mezzanine level in certain classrooms to create more floor space
2. the amount of daylight contributes to the users appreciation of the interior space
3. the living rooms in between the classrooms are a place for children, teachers and parents to meet
4. the original column color scheme was reintroduced
5. the “kuil” is well used by the school for celebrations

What aspects are not successful:
1. the relationship between inside and outside spaces is less emphasized
2. the “kuil” is no longer reachable by members in the neighborhood
3. limited budget so cheaper materials were used which need to be replaced regularly
5. Muziekcentrum Vredenburg (1978)

Architect: Herman Hertzberger
Location: Utrecht
Group members: Jeroen Bogaard, Jeroen Moerman, Josephine Uitrenbogert
In Hertzberger’s early years, after also attending lectures from Aldo van Eyck at the TU Delft, Van Eyck and grand contemporary architects of the time like Le Corbusier formed a major inspiration for Hertzberger’s first designs. He clearly uses the principles and building methods of the modern architecture movement, already aiming for a more idealistic approach to architecture. In the age of congresses like CIAM Hertzberger was invited by Van Eyck to join magazine Forum less than a year after his studies, writing on his ideals and principles which he would later describe as the foundation for Structuralism as an architectural movement. Hertzberger sees himself as an important instigator for this movement, being a driving force behind the social aspect of architecture. For Hertzberger this meant a focus on architecture designed from the interior, deprivoritizing outer beauty of buildings, but also adapting to the contemporary thoughts and critiques on architecture. This change is important to him as later in his career he breaks with his old inspirators and tries to aim for an independent own architecture bound to a more modern timeframe. In this he also criticizes his former professor Van Eyck when they jointly work on the transformation of his Burgerweeshuis and Eyck appears to be a stubborn conservative.

Timeline Herman Hertzberger

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>Born</td>
</tr>
<tr>
<td>1958</td>
<td>Winning design for the student residence Weesperstraat.</td>
</tr>
<tr>
<td>1961</td>
<td>Graduated from TU Delft</td>
</tr>
<tr>
<td>1962</td>
<td>Teacher TU Delft</td>
</tr>
<tr>
<td>1963</td>
<td>Architecture in Delft</td>
</tr>
<tr>
<td>1964</td>
<td>Own architectural firm</td>
</tr>
<tr>
<td>1969</td>
<td>Music centre Vredenburg</td>
</tr>
<tr>
<td>1970</td>
<td>Music center is completed</td>
</tr>
<tr>
<td>1973</td>
<td>Teacher TU Delft</td>
</tr>
<tr>
<td>1979</td>
<td>Ministry of social affairs</td>
</tr>
<tr>
<td>1992</td>
<td>Chaise theater Breda. After Vredenburg Hertzberger started to design more theaters.</td>
</tr>
<tr>
<td>1996</td>
<td>Write the books: Lessons in architecture about space</td>
</tr>
<tr>
<td>2003</td>
<td>First plan of Herman for transformation Vredenburg</td>
</tr>
<tr>
<td>2005</td>
<td>First plan of the shopping mall Hoog Catharijne</td>
</tr>
<tr>
<td>2008</td>
<td>Final design of Tu Delft Vredenburg</td>
</tr>
<tr>
<td>2010</td>
<td>Final plan of Herman for transformation Vredenburg</td>
</tr>
<tr>
<td>2020</td>
<td>Masterplan for the station area for 2030. The concept is to connect the old city to the jaarbeurs.</td>
</tr>
<tr>
<td>2022</td>
<td>Decane of berlage institut</td>
</tr>
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<td>2022</td>
<td>Write the books: Lessons in architecture about space</td>
</tr>
</tbody>
</table>

Timeline development location and city

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1106</td>
<td>Castle Vredenburg is built in the 11th century.</td>
</tr>
<tr>
<td>1528</td>
<td>The castle was built under Spanish rule as an oppression tool, but demolished quickly after independance.</td>
</tr>
<tr>
<td>1577</td>
<td>The city of Vredenburg is founded</td>
</tr>
<tr>
<td>1651</td>
<td>The first city hall is built in Vredenburg</td>
</tr>
<tr>
<td>1721</td>
<td>The theater is erected</td>
</tr>
<tr>
<td>1769</td>
<td>Model study for a new horizontal theater</td>
</tr>
<tr>
<td>1894</td>
<td>Vredenburg gets a trade function with the arrival of the Koninklijke en de Fruidal</td>
</tr>
<tr>
<td>1919</td>
<td>Vredenburg is made into a place of the singel</td>
</tr>
<tr>
<td>1923</td>
<td>Model study for a transition phase from the shopping mall Hoog Catharijne</td>
</tr>
<tr>
<td>1969</td>
<td>First plan of the shopping mall Hoog Catharijne</td>
</tr>
<tr>
<td>1974</td>
<td>The final design of the music center Vredenburg</td>
</tr>
<tr>
<td>1979</td>
<td>Final plan of Herman for transformation Vredenburg</td>
</tr>
<tr>
<td>2002</td>
<td>Masterplan for the station area for 2030. The concept is to connect the old city to the Jaarbeurs.</td>
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<td>First plan of Vredenburg for a new horizontal theater</td>
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Apart from the characteristic facade the concept and layout of the building are not immediately apparent to be structuralistic. Yet a concert hall is a quite specific building type. The plan-libre type construction of grid elements is an essential part of the building as well as the humble materials used. Apart from curtains, acoustic wooden panels and the necessary wooden finish in the hall itself, the building is entirely made up of insitu concrete, concrete blocks and simple wooden and steel furniture. This was in line with the social equality so important in the structuralism movement. This equality plays a major role in the approach to the building’s layout. The symmetry and equality in spaces in Vredenburg facilitate a strong sense of togetherness in a hall where everybody has seats of the same quality and with the same view on the stage. Most important though is the sense of human scale Hertzberger shows. The building is a composition of small scale spaces and cozy nooks and corners, allowing for a grand array of intimate atmospheres, focused strongly on bringing people together. This is also achieved by the use of a publicly accessible street with shops through the building and the possibility of opening the hall and entire building from all sides, creating a completely open space. This openness is in turn a connector of the city, blurring the transition between inside and outside space, also integrating the composition of the square into building and urban fabric. Hertzberger ultimately sees this square as a permanently changing place that adapts in use and composition to a changing city and users.

Sight lines are an important aspect in the design of the old Vredenburg theater. They are used as part of the social interaction, and the connection between different spaces. This aspect has been implemented throughout the building, often creating connections between vertical spaces. Examples of these are the upper and lower floor of the passageway, and the openings in the staircases within the foyer. The need for a good view of the performance area was a key point in Hertzberger’s design of the theater hall. Being of the notion that a good view is complementary to the auditory experience. For this reason Hertzberger designed the seating areas in such a way that everyone would have an unobstructed view of the performance area.

Central in the old floor plan of Vredenburg lies the eight-sided theater hall. The foyer that surrounds it is an array of small and each very different spaces, ranging from highly introvert and drawn back to areas with large amounts of overview and opportunities for social interaction. This is complemented by over 25 entrances to the theater hall and 8 staircases that allow for a well-organized flow of visitors and balanced dispersion of the audience. All functions of the building are accessed through many entrances to the central ‘street’ which connects with outside and Hoog Catharijne, with the key points in the design being the vertical aspect with the light from above, and street-like materials (mainly concrete).
An important part of the atmosphere and structure in the building is created by the distinctive round columns with broad square heads. Hertzberger explains their use for guiding people around and using the heads for a large variety in structural uses, also allowing for a larger span of floors with more space in between the individual columns, largely in contrast to the beam-supporting square columns of earlier designs. They create a square grid with wide flexibility. There is a careful exploration of the different connecting points between the columns and differing wall-, ceiling-, and window sill compositions, as well as a variation of three different ceiling heights giving spaces different atmospheres and transitions. By knitting the outer facade around the columns in different ways and placing the column grid in line of entrances and hallways the repeated columns form a (dis)placement that - compared to conservative designs - does create strange occurrences in the middle of entrances and hallways and form an almost disastrous penalty to insulation and climatization. With the new construction of the transformation (3) being a contrasting modern way of building and parts of the old castle (1) still present underneath and old Vredenburgs characteristic column structure (2) in between, the whole can be seen as a timeline between different ways of construction to achieve different goals. All in the columns form an intrinsic part of the structuralism in the building, showing the wide range of characteristic possibilities with repeated standard elements and a strong representer of it’s contemporary architecture.

The transformation of the building took place for several reasons. The old Vredenburg had its problems - empty shops, abandoned and dangerous inside/outside street in the building, climate problems, and a non-working concept of openness - but the main reason was the renewal of the central station urban area to modernize the city, which included a centralization of the music centres in the city. For the transformation, 4 different parties, including Hertzberger for the old hall, worked together, soon creating the concept of a building as a city wherein every hall had its own design, materialization and identity and was built as an individual block within a simple joined construction. After different design ideas for the whole the new part has nothing to do with the structuralism of the old building and is in large sense more a reflection of the architectural cooperation and identity than a homogeneous representation of ideals. It stands almost disconnectedly away from the old part, only connected through the ground floor lobbies. Although the interior spaces still own a cozy atmosphere and leveling characteristic to Hertzbereger’s designs it has completely broken with almost every original structuralistic concept of the old Vredenburg.
The visit to TivoliVredenburg gave us new insights in the way the building works. The architects of Tivoli attempted to make a connection with the rest of the city but this connection is very one-sided. Where the old Vredenburg attempted to connect with all of its surroundings, Tivoli does not. The old Vredenburg, the part that still remains, is even closed off. The entrances are no longer in use, making the building lose its most important connection to the Vredenburg square. The new Tivoli has a public lobby that is freely accessible, and has multiple entrances. Together with the glass façade, it creates a strong connection with its surroundings on the north side of the building.

One of the most prominent aspects taken from the old Vredenburg design are the many different spaces, each with their own spatial quality. A clear example is the old Vredenburg passageway that creates a difference in space using variation in height divided by a row of columns. This aspect was taken and placed in the Tivoli lobby. The difference in height between areas, and the creation of unique places throughout the collective space of the theater is a returning aspect of both the old and new design.

Reflection

fig 14: Street in the foyer of TivoliVredenburg.

fig 13: Differences in outline and entrances in the old and new building.

fig 15: Passage of Vredenburg with the different spaces of the street.

fig 16: Open foyer of TivoliVredenburg with all logistics closed off.
Tivoli Vredenburg


Figure list:

Timeline Herman Hertzberger (L-R):
- Ministry of social affairs: http://www.architectureweek.com/newsletters/notes/data/564.dat

Timeline development locationa and city (L-R):
- Castle Vredenburg:
- Model study for expection: Rotterdam, Het Nieuwe Instituut, HERT.
- First plan transformation: Rotterdam, Het Nieuwe Instituut, HERT.

fig 8: Own drawing, based on: http://www.bouwpututrecht.nl/2016/11/25/kasteelhistorie-verbeeld/
fig 16: Own drawing, modified form google streetview, photo made by Verhorst, D. (2014).