Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Sijbren Binne (Bernd) de Groot
Student number	5452929

Studio		
Name / Theme	Heritage and Architecture Adapting 20C Heritage: Resourceful Housing	
Main mentors	Prof.dr. A.R. Pereira Roders Dr.ir. L.G.K. Spoormans	Heritage and Values Heritage and Architecture
Second mentor	Ir.Arch. E. Karanastasi	Building Technology
Argumentation of choice of the studio	The studio matches my ambition as a future architect to make a valuable contribution to the transition into a circular building economy and sustainable future. Furthermore, the studio matches my passion for existing (heritage) architecture and the many design opportunities that arise after extensive design and research on what is already there.	

Graduation project	
Title of the graduation project	Towards Adaptable Post-War Housing: An architecture that uses change for greater significance.
Goal	
Location:	Burgemeester Hogguerstraat, Slotermeer, Amsterdam Nieuw-West.
The posed problem,	Problem Statement
research questions and	Research Question
design assignment in which these result	Design Assignment
[Problem Statement]	

Modernism's commitment to abstract symbolism gave rise to the concept of "pure form" and the tenet "form follows function." This allowed the architect to easily define the form of a building based on its use or 'what the building wants to be' (Jencks, 1973). Modernist architecture, and therefore post-war housing, is characterized positively by simple cubic form, industrialized, modular construction, and functional separation. But also, negatively through mono-functional spaces, neglect of context, style over substance (performance), and the objectification of users (Rabeneck & Sheppard, 1973) (Habraken & Teicher, 1998) (Hertzberger, 2005) (Schneider & Till, 2007). Many of the negative characteristics identified here continue to be prevailing viewpoints today, indicating a lack of evolution towards situating architecture in its true context (Schmidt III and Austin, 2016).
Furthermore, these negative attributes have an impact on getting a building listed today. According to Hasche (2016), the main challenges in the listing of post-war housing estates as cultural heritage are the fact that potential obsolescence, changed demographics, and rapidly growing demands for energy efficiency, as well as new living standards, all threaten these buildings with demolition or modification before their historic or artistic values can even be recognized. Although parts of the urban design of Amsterdam Nieuw-West have received recognition of significance (protected cityscape), unfortunately, this is not the case for all the architecture of the buildings, of which many have been demolished or transformed without consideration of their potential cultural significance (Havinga et al., 2020). Research on heritage attributes of post-war housing in Amsterdam by Havinga et al. (2020) reveals that ten out of seventeen publications address the threat of demolition, either as a current threat or as a threat from the past, due to the state of disrepair and lack of recognition.
Lastly, the EU is developing extensive refurbishment plans to create a built environment that is carbon neutral by 2050, which will require significant changes to the stock of post-war and modernist buildings in order to respond to the global urgency to be more efficient with resources and the sequestration of carbon, which will require more adaptable buildings. Adaptability can be considered a way to reduce the amount of new construction, (re)activate underutilized building stock, and improve component disassembly and deconstruction, thereby extending the useful life of buildings (Schmidt III and Austin, 2016).

[Research Question]

How can post-war housing be redesigned to be more adaptable by using its defining attributes and values to address the changing needs of society?

Sub-question 1:
How can adaptability be spatially defined at the building level?

Sub-question 2:
How adaptable is post-war housing spatially on the building level?

Sub-question 3:

What are the heritage attributes of post-war housing and the values embedded in them?

[Design Assignment]

Redesigning the three flats at the Burgemeester Hogguerstraat, Slotermeer, Amsterdam Nieuw-West to be more adaptable while at the same time considering the various defining attributes to create a further developed architecture that uses change to achieve greater significance.

Design-question 1:
How can the adaptability of post-war housing be improved, and how does this affect its attributes and values?

Design-question 2:
How can the current needs of society be addressed in the redesign?

Process

Method description

[Methodology]

To answer the first sub-question, literature research and a theory review are used to identify the definition of adaptability, attributes, and values on the building scale. This results in the theoretical framework mentioned before in Chapter 3.

Answering the second sub-question is done through analysis of the selected case based on the Building Layer Model by Schmitt III and Austin (2016). The data necessary for the analysis consists of historical and contemporary photographs and architectural drawings of the original and current states. The data can be accessed through archives, municipal documents, architects' archives, site visits, and relevant websites (Funda). After acquiring the primary data, it is to be reproduced using 2D drawing, 3D modelling (BIM), and personal writing. The data is then classified and interpreted using a dependency structure matrix.

The third sub-question is answered through historical and contextual analysis of the selected case based on the Building Layer Model by Schmitt III and Austin (2016). The data necessary for the analysis consists of historical and contemporary photographs and architectural drawings of the original and current states. The data can be accessed through archives, municipal documents, architects' archives, heritage status, site visits, and relevant websites (Funda). After acquiring the primary and secondary data, it is to be reproduced using 2D drawing, 3D modelling (BIM), and personal writing. The data is then classified and interpreted using Veldpaus (2015) tangible and intangible matrix and Tarrafa and Pereira Roders' (2011) heritage values taxonomy.

Literature and general practical references

The framework used in this research is divided into two distinct parts. Firstly, the classification of building layers and elements; subsequent internal and external connections and attributes; and secondly, the interpretation of all the in a dependency structure matrix, revealing relationships, areas of synergy, and associated values. This two-part process can be repeated after the redesign to reveal the impact of interventions.

Classification

The basis for classification is seeing a building as a series of layers whose interactions define its resistance to change. Brand (1997) defines a building as a series of 'shearing layers' that change at different rates (Figure 3). The more layers are connected, the more difficult and expensive it becomes to adapt a building.

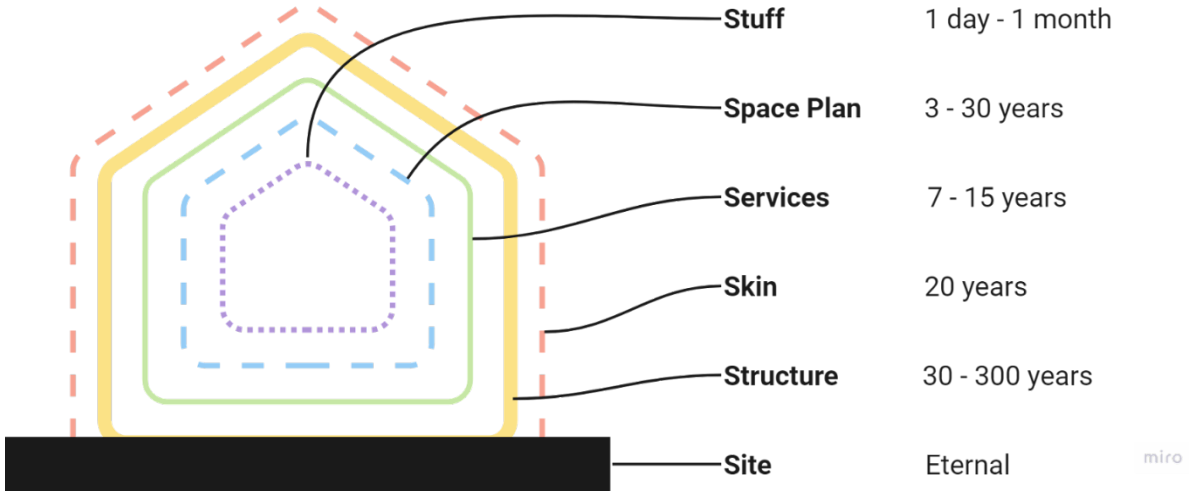

Figure 3: A building as a series of layers according to Brand. (Author)

Schmitt III and Austin (2016) have further modified and expanded Brands' theory. First of all, they refrained from explicitly stating the lifespan of each layer since this relies on the elements selected for a specific typology and its context. Instead, the model indicates the relative rates of change for each layer based on the proximity of dots; as a result, the dotted line in the space plan layer is considerably closer together (faster) than those in the structure layer (Figure 4). Secondly, they have added two layers (surroundings and social) (Figure 4) to provide a more comprehensive interpretation of the layer concept. These additions are crucial when considering the value of a building throughout its life because contemporary architecture needs to have the capacity to effectively accommodate the evolving demands of its context (Schmidt III and Austin, 2016). These two additions demonstrate that buildings and their parts cannot be considered in isolation from their context. Users and their social perceptions also shear against the building layers. The social layer is excluded from this part of the research; instead, it will be researched during the subsequent design process.

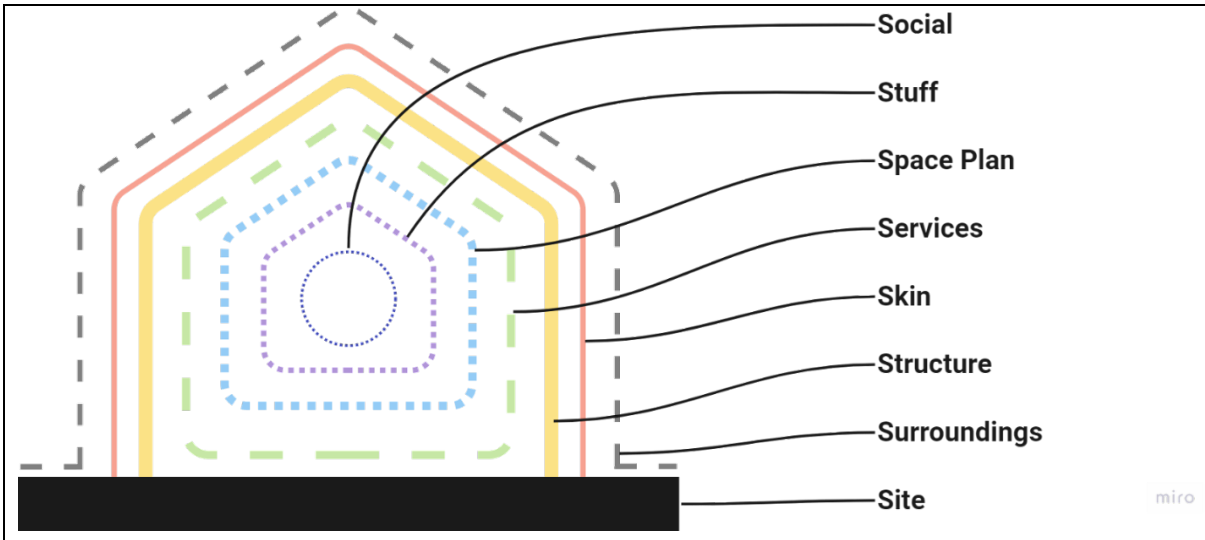

Figure 4: A building as a series of layers, according to Schmitt III and Austin (Author).

The case study will be analyzed according to the adapted version of the Building Layers Model by Schmitt III and Austin (2016). The model contains the following eight layers:

(Surroundings): The larger context that surrounds a building, encompassing both natural and man-made elements, and extends beyond the boundaries of the building's specific site.

Site: The legal boundary in which the building is situated.

Structure: Elements or Attributes that provide horizontal bracing and primary vertical load transfer.

Skin: Elements or Attributes that separate the interior spaces from the exterior spaces, physically and visibly.

Services: Elements or Attributes that supply and move physical flows, such as water, electricity, communications, and elevators.

Space Plan: Elements or Attributes that enclose the spaces that users occupy.

Stuff: Elements or Attributes that exist within the space users occupy.

Social: Humans in and around the building who interact with and play a role in the building's life.

To further clarify the types of connections, a series of three connection types is used based on the findings revealed by Durmisevic (2006). The dissertation states that there are two primary design requirements for decomposable connections: 1. components and elements must be maintained apart to prevent infiltration into other systems or components; and 2. Chemical techniques (mortar or glue) should be replaced with dry-jointing techniques (screws or bolts). This is visualized (Figure 5) using three different characters (X, \, O).
According to Durmisevic (2006), every layer of a building should be subject to these requirements. This makes every construction system demountable, every part and constituent interchangeable, and every material recyclable.
Furthermore, the identified elements will be, if applicable, classified as attributes using Veldpaus's (2014) tangible and intangible matrix (Appendix 1).

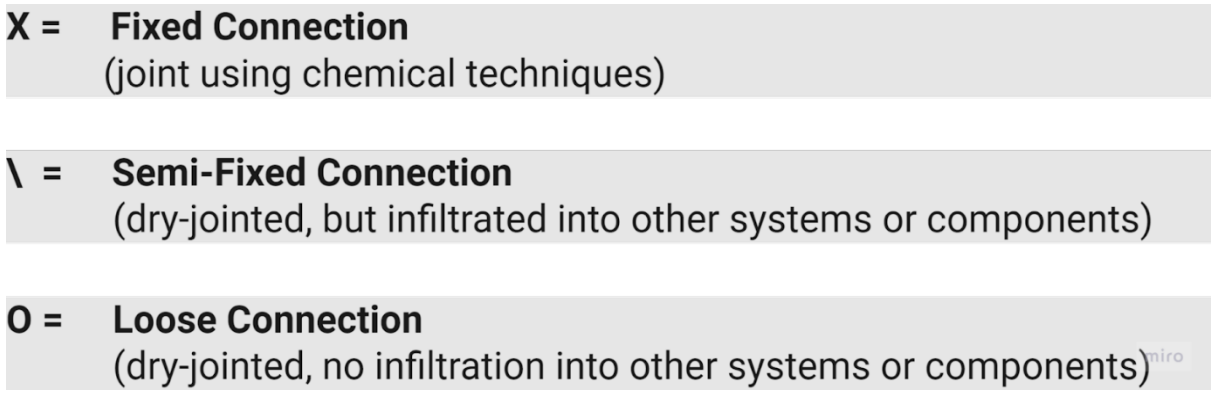

Figure 5: Three different classifications of connections. (Author)

Interpretation

The classified elements and attributes will be interpreted by placing them in a dependency structure matrix (DSM). A DSM reveals complex interdependencies between the different building systems. According to Schmitt III & Austin (2016), this is crucial for further improvement of a building's adaptability. A DSM is an NxN square cell matrix (Figure 6a) that maps the relationships between elements in a single domain. This research will use a static DSM, analyzing the case study at a fixed moment in time.

Most DSMs are binary, meaning that a dependency can either be present or absent. However, other DSMs employ color, numerical values, or other symbols to represent additional system features, such as the strength or type of connection (Schmidt III and Austin, 2016). This is visualized (Figure 6b) using the three different characters (X, \, O) as shown in (Figure 5).
Furthermore, the historical values associated with the chosen elements and attributes will be revealed using Pereira Roders (2007) heritage values taxonomy (Appendix 2).

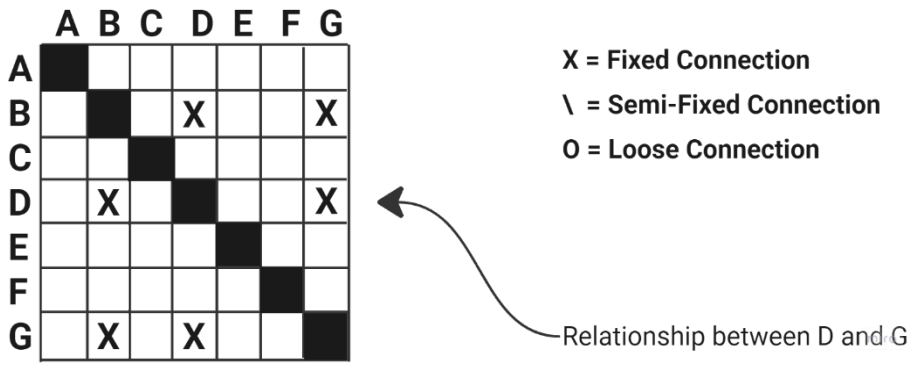

Figure 6a: A DSM composed of seven elements. (Schmidt III and Austin, 2016)

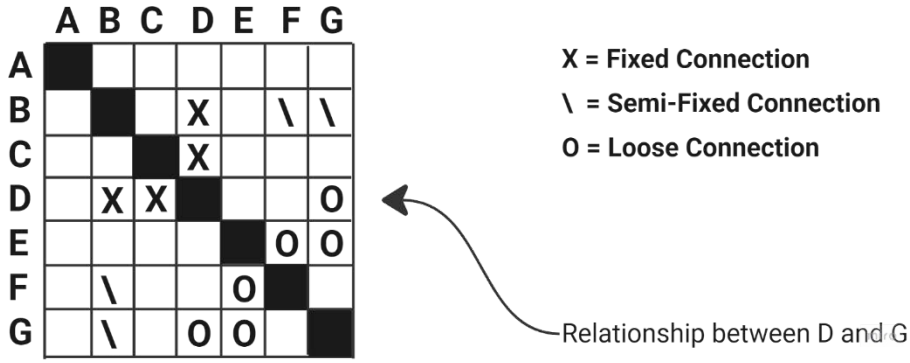

Figure 6b: A DSM composed of elements representing system features. (Author)

[General Practical References]

Prior personal experience would include earlier design studios I passed that were exploring themes like: modular building methods, zero-energy design, and heritage transformations of industrial and religious heritage.

Architectural precedents would include the work of Lacaton & Vassal, Herzog & de Meuron, Korteknie Stuhlmacher, and Hans van Heeswijk Architecten.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A, U, BT, LA, MBE), and your master programme (MSc AUBS)?

My graduation project is about the adaptability of post-war housing. The capacity of these buildings to effectively accommodate the evolving demands of their context, thus maximising their value through life (Schmidt III and Austin, 2016). On the other hand, there is the concept of cultural significance, which addresses the range of values ascribed to a cultural heritage asset and justifies its designated status (Avrami et al., 2000). Therefore, this graduation project focuses on the development of post-war architecture towards an architecture that uses adaptability for greater significance.

This ties in with the studio: Adapting 20C Heritage: Resourceful Housing. The studio faces two main challenges: the housing crisis and the circular economy. Heritage provides the connection. To solve social issues like energy inequality and climate change, my graduation project utilises the synergy between adaptability and significance. Redesigning the physical environment is essential if our cities are to have a sustainable future. Furthermore, the redesign of adaptable post-war housing can contribute to the development of additional housing, better energy efficiency, and a wider variety of typologies.

This is relevant to my master's programme since it focuses on investigating innovative methods that promote more sustainable development and to develop an independent, academic attitude that supports architectural design and research in relation to social and technological challenges.

2. What is the relevance of your graduation work in the larger social, professional, and scientific framework?

First, my thesis research may offer a scientific framework that seeks to broaden ideas and highlight contrasting aspects of the importance of post-war housing blocks (values and features) by connecting them to adaptability.

Second, this framework can be a useful tool for industry professionals who want to help transition existing post-war housing projects into more adaptable ones without sacrificing heritage significance. This will help pave the way for a sustainable future and circular building economy.

Finally, valuable dwelling redesigns might be accomplished with the use of this tool and its scientific foundation. Redesigns that concentrate on the advancement of post-war architecture towards an architecture that uses change for greater significance, considering the many unique attributes and the fact that the needs of society are continually changing.