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	Przemysław Chmielarski
Student number	5150361

Studio		
Name / Theme	Architectural engineering studio/Open Building	
Main mentor	Roel van de Pas	Architecture
Second mentor	Pierre Jennen	Architectural Technology
Argumentation of choice of the studio	I appreciate the freedom of research and design of Architectural Engineering which was essential for my choice. Since the building industry is slowly shifting towards its sustainable future therefore it is crucial for me to learn about a relatively new branch of architecture which is large-scale timber-based structures.	

Graduation project	
Title of the graduation project	Spatial adaptability in the context of multifunctional timber high-rise building
Goal	
Location:	TU Delft Campus
The posed problem,	Housing crisis, low integration of students, predominant spatial and functional rigidness of buildings, high demand for sustainable building materials
research questions and	What combination of timber-based prefabricated modules would optimize the spatial adaptability of multipurpose high-rise building?
design assignment in which these result.	Overall Design Question: How can we design a mix-used community center integrated with affordable student housing that would utilize prefabricated timber-based modules to ensure the spatial flexibility and a long-term

	adaptability in face of the land scarcity of the TU Delft Campus?

The objective of this project is to design a multifunctional building that accommodates mainly student housing and a student community center. The goal is to create an architectural framework that would accommodate multiple functions through spatial flexibility that would use the wood's unique properties like lightness, durability, greater capacity for prefabrication, easy mountability and dismountability. The project should showcase the possibilities of adaptive timber-based architecture and present different scenarios for the building and show how it could be transformed throughout the years.

Process

Method description

The research was conducted on two parallel fronts; the analysis of the current strategies enabling the adaptability of the building while defining the spatial adaptability and checking how to evaluate it. The second one is to evaluate existing timber based structures through spatial adaptability criteria and check which combination of timber based modules can potentially improve the spatial adaptability.

The evaluation framework was mainly based on the work of R.Schmidt III and S.Austin(2016) and their book *Adaptable Architecture, theory and practice*, where they propose a system of dependencies based on the DSM (Design Structure Matrix) which can deliver quantitative results.

The design phase will include further research and design both of which are listed below:

- a case study of timber based modules and joinery
- reference analysis of multifunctional university buildings and community centers
- site analysis
- design through experimentation (scripting, packing problem, optimization tools)
- sketching, diagrams, 3D modeling
- mapping the programme
- implementation of research paper conclusion
- developing a time-based multi-scenario for the project

Literature and general practical preference

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

Key words: Open building, adaptable architecture, timber high-rise construction, multi-scenario building.

Literature examples used for the research part*:

Askar R, Bragança L, Gervásio H., 2021, Adaptability of Buildings: A Critical Review on the Concept Evolution. Applied Sciences.

Schmidt III R, Austin S, 2016, Adaptable architecture : theory and practice, New York : Routledge, ISBN 9781315722931

Habraken N.J. , 2008, Design for Flexibility: Building Resarch and Information. ISSN 0961 3218

Kaufmann H, Krotsch S, Winter S, 2018, Manual of Multi-Storey Timber Construction,Detail Business Information Gmbh Munich, ISBN: 978-3-95553-394-6

Staib G, Dörrhöfer A and Rosenthal M, 2008. Components and Systems: Modular Construction–Design, Structure, New Technologies, Walter de Gruyter. ISBN 9783034615662

*The full list of literature is provided within the research paper: "Spatial adaptability in the context of multifunctional timber high-rise building"

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)?

   The project subject is focused on the practical means to create an adaptable building that would utilize sustainable structural materials. The theory is based on the Open Building concept and it aspires to be a part of "1 milion homes" studio topic as well since it adds on the Campus housing capabilities.

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

   The final design project can potentially become a pilot project for other Campus related buildings regarding timber-based structures and their incremented spatial flexibility. The emphasis on adaptability can be a vital point of discussion about the Campus's future and its limited land available for new construction. The use of a timber-based structure can influence the future strategies for the sustainable future of TU Delft.