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	Anwar Lemnawar
Student number	4727576

Studio		
Name / Theme	Advanced Housing Design/ mixing production with living	
Main mentor	Olv Klijn	Architecture
Second mentor	Anne Kockelkorn, Ferry Adema	Research Theory, Building Technology
Argumentation of choice of the studio	Thesis about the design subject and an architectural design	

Graduation project	
Title of the graduation project	House in a day
Goal	
Location:	Keileweg Rotterdam
The posed problem,	**Studio Problem Statement** Pushing production out of the city takes too much space. **Personal Problem Statement** The housing market is under pressure as it has become unable for the majority of starters and single-person households to acquire a home.
research questions and	
design assignment in which these results.	House in a Day
Research questions: - What are the factors that play a role in the Dutch housing crisis? Political? Financial? Physical? - What are modular homes and what types are there? What are the pros? What are the cons? - How do you design a modular home to be affordable, sustainable, and scalable? - How can we mix living and working? - How can modular homes be used to fulfil living demands for starters, the elderly, and makers?	

Design:
The design assignment will result in a design for Keileweg which shows how production and living can be mixed and create a flexible building in a modular way. This design will be designed for Starters and Students/Elderly.

The Design Ambitions that this design will use are:

- Mixing production with Living
- Creating affordable housing
- Create it in a sustainable way -> Environmentally sustainable and sustainability in the future (adaptability)

Process

The research and design will be completed by conducting a literature review and case studies of projects that try to answer the question of modularity, standardization and flexibility. The research has 5 Chapters which will focus on the 2 questions 1. How do we mix production with living? And 2. How can we aid in the housing shortage with modular architecture.

Literature and general practical preference

Case Studies:

- Habitat 67
- Nagakin Capsule Towers
- Keetwonen Amsterdam
- Raines Court
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Literature

Modularity

Marquit, A. (2013, December). December 2013 From Sears & Roebuck to Skyscrapers: A History of Prefabricated and Modular Housing. NYC Buildings.

Luther, M. B. (2009). TOWARDS PREFABRICATED SUSTAINABLE HOUSING – AN INTRODUCTION. Environment Design Guide, 1–11. http://www.jstor.org/stable/26151879

Phillips, D., Guaralda, M., & Sawang, S. (2016). INNOVATIVE HOUSING ADOPTION: MODULAR HOUSING FOR THE AUSTRALIAN GROWING FAMILY. Journal of Green Building, 11(2), 147–170. https://doi.org/10.3992/jgb.11.2.147.1

Wu, Z., & Sober, R. (2020). Design of Modular Housing Suitable for the Elderly. International Research Journal of Engineering and Technology, 7(12), 1800-1808.

Ganiron, T. U. J., & Almarwae, M. (2014). Prefabricated Technology in a Modular House. International Journal of Advanced Science and Technology, 73, 51–74. https://doi.org/10.14257/ijast.2014.73.04

Faludi, J., Lepech, M. D., & Loisos, G. (2012). USING LIFE CYCLE ASSESSMENT METHODS TO GUIDE ARCHITECTURAL DECISION-MAKING FOR SUSTAINABLE PREFABRICATED MODULAR BUILDINGS. Journal of Green Building, 7(3), 151–170. https://doi.org/10.3992/jgb.7.3.151

Radwan, A. H. (2015). Containers Architecture Reusing Shipping Containers in making creative Architectural Spaces. International Journal of Scientific and Engineering Research, 6(11), 1562–1577. https://doi.org/10.14299/ijser.2015.11.012

Dutch Housing Crisis/Shortage

Hoppesteyn, M. (2012, October). Bevolkingsprognose Rotterdam 2013-2030. Centrum voor Onderzoek en Statistiek (COS). Retrieved from https://onderzoek010.nl/handlers/ballroom.ashx?function=download&id=38

Vermeulen, W., & Rouwendal, J. (2007). Housing Supply and Land Use Regulation in the Netherlands. (Discussion paper TI; No. 07-058/3). Tinbergen Instituut.

van der Heijden, H., & Boelhouwer, P. (2018). Wat is er aan de hand met de woningmarkt? Vastgoedrecht (Zutphen), 2018(6), 125-131.

Rabobank, & Lennartz, C. (2018, June). De omvang en prognoses van 'het' woningtekort. https://www.retailinsiders.nl/docs/05f29555-9547-4b4e-8d92-5ec4a5d22156.pdf. Retrieved from https://www.retailinsiders.nl/docs/05f29555-9547-4b4e-8d92-5ec4a5d22156.pdf

van der Heijden, H. (2022a). De woningcrisis in Nederland vanuit een bestuurlijk perspectief: achtergronden en oplossingen. Bestuurskunde, 31(1), 19–33. https://doi.org/10.5553/bk/092733872022031001002

Kuenzli, Peter, Arie Lengkeek. operatie wooncoöperatie. Amsterdam: trancity*valiz, 2022.

Sustainability

O'Grady, T., Morrison, G. M., & Gruner, R. L. (2020). Exploring environmental benefits of reuse and recycle practices: A circular economy case study of a modular building. Resources, Conservation and Recycling, 160, 104855. https://doi.org/10.1016/j.resconrec.2020.104855

Boafo, F., Kim, J.-H., & Kim, J.-T. (2016). Performance of Modular Prefabricated Architecture: Case Study-Based Review and Future Pathways. Sustainability, 8(6), 558. https://doi.org/10.3390/su8060558

Watson, B., & Prasad, D. (2017). Performance and Perception in Prefab Housing: An Exploratory Industry Survey on Sustainability and Affordability. Procedia Engineering, 180, 676–686. https://doi.org/10.1016/j.proeng.2017.04.227

Raworth, K. (2018). Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist (Illustrated). Chelsea Green Publishing.

Affordability

van der Heijden, H., & Elsinga, M. (2022). Sustainable business model of affordable zero energy houses: Upscaling potentials. Journal of Cleaner Production, 344, 130956. https://doi.org/10.1016/j.jclepro.2022.130956

Kuenzli, Peter, Arie Lengkeek. operatie wooncoöperatie. Amsterdam: trancity*valiz, 2022.

Schrenkeisen, M., Dresel, N., & Cook, C. (n.d.). Thinking Inside the Box Affordable Student Container Housing: A Feasibility Study (Report). Western Washington University.

Watson, B., & Prasad, D. (2017). Performance and Perception in Prefab Housing: An Exploratory Industry Survey on Sustainability and Affordability. Procedia Engineering, 180, 676–686. https://doi.org/10.1016/j.proeng.2017.04.227

Raworth, K. (2018). Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist (Illustrated). Chelsea Green Publishing.

Mazzucato, M. (2019). The Value of Everything : Making and Taking in the Global Economy: Making and Taking in the Global Economy (1st ed.). Amsterdam, Nederland: Adfo Books.

Living needs

Atkins, L. C. (2022). Palaces for the people: How social infrastructure can help fight inequality, polarization, and the decline of civic life. Community Development, 53(4), 516–517. https://doi.org/10.1080/15575330.2022.2118937

Ahmed, V., & Ijasan, K. (2016). Studentification and the housing needs of international students in Johannesburg: An embedded mixed methods approach. in Ahmed, V., Opoku, A., & Aziz, Z. (2016). Research Methodology in the Built Environment: A Selection of Case Studies. Amsterdam, Nederland: Amsterdam University Press.

Kruythoff, H. (1994). Starters in the housing market in an urban region: The case of the Randstad Holland, a diversified housing-shortage area. Housing Studies, 9(2), 219–244. https://

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)?

We are looking at how we can mix production and living on an architectural level, so how can we design spaces that they can mix more easily? And the second is the personal problem statement which in my case is about the housing crisis and I try to analyse how can we use the tools of an architect/developer to help solve this problem. So both these problems have a direct relation with the master track architecture as we are looking how we can solve this problem with the architectural tools that we are given.

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

It is immediately clear in this research that modular architecture obviously has economic benefit/value, but there is much more to it than only having an economic value. If used correctly and on a larger scale it can have an environmental value as well as using modularity reduces waste and creates a certain circularity in the building process.

This research also focuses on how a designer can think about creating spaces where students, elderly, starters and makers can work/live together. This research can have a societal impact or contribution.

Raworth (2018) brings an important point forward as she states that for a large period in time industry is focused on generative design. This means resources from earth are used to produce something and at the end we throw it away. But this system has a negative effect on the earth as it is finite. There needs to be a change in our industrial system to a regenerative design. This means you have a system that is circular where once waste is the others resource.

This topic and research can contribute to this point, as there are modular ways of building that enforce this regenerative design but also from a programmatic standpoint where production and living can be programmed in a way that it is functioning as a circulative economy.