

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	Tijmen Smith 22/01/2023
Student number	

Studio	
Name / Theme	Architectural Engineering
Main mentor	Olga Loannou Roel van de Pas Building Technology, research mentor Architecture (Explore lab), Design mentor
Second mentor	Ger Warriess Building Technology mentor
Argumentation of choice of the studio	Decision for aE studio is due to the particular interest in technology driven research and design. The studio covers a wide scope of topics including technical, sustainable, societal and ecological challenges. In this studio you are given the freedom and encouragement to pursue your own fascination. This gave me the drive to experiment and to dream about my interests and develop a challenging research. This close relationship of the interconnection of research and design makes this studio of great value.

Graduation project	
Title of the graduation project	The evolution of the notion of modularity since the 1960's and its current relevance for circularity; for the design of a Modular stadium as a true benefit in the afterlife of a major temporary sports event
Goal	
Location:	Merwevierhaven Rotterdam, Makersdistrict
The posed problem,	Stadiums built for major temporary sports events and their poor legacy/ afterlife. In the context of a major temporary sports event: <ol style="list-style-type: none"> 1. Abandoned stadiums 2. Huge urban and social impacts, often no purpose for local community 3. Stadiums are not adaptable/multifunctional 4. FIFA is increasing format of World Cup, resulting in the need for more stadiums <p>In the context of stadiums for permanent use:</p> <ol style="list-style-type: none"> 1. Stadium is built for 50 years and only in full-use for 18

	<p>months total resulting in low use of its huge embodied energy 2. Huge amount of energy to demolish it, far more than typical office building. 3. The private and empty space in the urban fabric</p> <p>Stadiums got to adapt from a temporary use for sport to a permanent use for the local community and city after such a tournament. Therefore the research into the evolution of modularity could give answers to how such problems were dealt with in the past and why it is still relevant today?</p>
<p>research questions and</p>	<p>Main research question: <i>How has the notion of modularity evolved since the 1960's?</i></p> <p>Sub-questions: <i>How did modularity inform architectural production of that time?</i> <i>What were the shifting points and what influenced those shifts?</i> <i>Why did these ideas not become mainstream and prevented it from being built?</i> <i>What makes modularity relevant now?</i></p>
<p>design assignment in which these result.</p>	<p>Modular and adaptable multifunctional stadium</p>
<p>How research relates to design:</p> <p>The objective is to research modularity to find design principles for the design of a more multifunctional and adaptable stadium. Modularity can contribute to the circular economy through the use of a modular design and optimization of modules, generating benefits that can contribute to the implementation of strategies for the circular economy in order to maximize the lifecycle of a product. It is a way of giving order and solution to complex problems of achieving adaptability. Such strategies will be researched for a new stadium typology. Which accommodate for the afterlife use of a stadium for a major temporary sports event. That could benefit the city and its community on a long term. The context in which this will be designed is, the what-if scenario, of The Netherlands one day hosting the FIFA world cup or the Olympics.</p>	
<p>Process</p>	
<p>Method description</p> <p>By exploring 4 varying projects of different instances and locations in this radical era, this research monitors how modularity in architecture has evolved. The four projects which will be discussed to answer the main research question and its sub-questions are: Buckminster Fuller's, Dymaxion House; The Fun Palace by Cedric Price; Archigram's member Peter Cook and his design of the Plug-in City and the Metabolism Movement member Kisho Kurokawa and his design of The Nakagin Capsule Tower.</p>	

These case studies will be discussed and analyzed in such a way to compare its iterations, what techniques and materials they used, the intention of the architect and why most never become mainstream and stayed concepts.

Data is retrieved from websites, research papers, but mainly books specifically on the certain case studies.

Literature and general practical preference

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Machado, N., & Morioka, S. N. (2021). Contributions of modularity to the circular economy: A systematic review of literature. *Journal of Building Engineering*, 44, 103322.

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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)?
 - Exploring Modularity, open building techniques which relate to the AE studio
 - Historical analysis of evolution of modularity, new building techniques
 - Futureproofing temporary Stadium design
 - Building with more sustainable materials
 - Better integration of stadium in urban fabric

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

- Over the many decades we have seen that hosting a FIFA World Cup or the Olympics has caused increasingly greater environmental, urban, social and economic impacts on the hosting country and city. This is mostly due to the building of new sports infrastructures such as stadiums. They are neglected or not suited for permanent use in certain areas. Therefore a solution must be thought of by changing the way we design stadiums for these events. One that is adaptable.
- Research into the evolution of modularity could give past views on methods for reconfigurable buildings. During the 1960's big scale buildings were thought to be designed modular as solutions for problems, such as a rapid population growth, the need for mass housing and obsolescence. The accommodation for change was built in, whether this was the spatial, functional or contextual. These problems connect to the given problem and by learning from the past we can achieve guiding principles for the future.
- How modularity is still relevant now for the circular economy. Modularity is a means for change and a means to achieving a more circular and futureproof building.