

# 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](mailto: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	Myrthe den Heeten
Student number	4724240

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Roel van de Pas	Architecture mentor
Second mentor	Pieter Stoutjesdijk Engbert van der Zaag	Research mentor Building Technology mentor
Argumentation of choice of the studio	<p>The field of Architectural Engineering combines architectural design with innovative engineering. Many challenges cannot be addressed by either architecture or engineering. This combination interests me the most as I believe the best solutions to today's challenges, like 1 Million Homes, follow from thorough study of both fields.</p> <p>My personal fascination lies with architecture and health. Being an athlete I have always valued living healthy, but I realize that this is not a simple choice for everyone. Health strongly differs among different societal groups, which shows that environmental factors play a big role.</p> <p>I am interested in designing an environment that supports healthy living and a building that has an actual positive effect on health. I believe the Architectural Engineering studio is the perfect place to do so. Researching different user groups, aspect affecting health, spatiality and materiality are things I want to research.</p>	

Graduation project	
Title of the graduation project	Aging Evolution
Goal	
Location:	Amsterdam, Overtoom 283
The posed problem,	The healthcare system of the Netherlands is at a turning point. Data shows that more than a quarter of the overall burden of disease in the Netherlands in 2015 is linked to behavioural risk factors – including smoking, poor diet, low physical activity, and

alcohol use. Behavioural risk factors tend to be more common among people at a disadvantage because of a lesser education or lower income (OECD & European Observatory on Health Systems and Policies, 2017). Health also tends to be worse in the city, as there is a higher density of the previously mentioned groups, as well as lower mental health due to higher costs of living (CBS, 2006 & 2020).

In addition, the population is getting older. Where in 2017 one in five people will have an age above 65, this will be as much as one in four in the year 2030. This 'grey pressure' is part of the reason healthcare costs are rising steady, as well as the demand for healthcare workers. (Compendium voor de Leefomgeving, 2014; Vektis, 2018). High overall spending is mainly due to comparatively large long-term care expenditure. The system remains expensive, prompting worries over future growth and sustainability (OECD et. al., 2017). It is thus important to bring down healthcare costs.

Transition to '*healthy architecture*' however is slow. Healthy architecture is defined as: '*architecture that contributes to a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*' (Rice, 2019). Currently, the focus in the building industry mostly lays on sustainable architecture. Frameworks like *cradle to cradle*, *bio based economy* and *circular economy* have developed philosophies on materiality use and production. While the field of sustainable architecture is developing an added light needs to be shed on the users of the buildings themselves. As the impact of the built environment on health is becoming more evident architects hold a responsibility to not only design healthy for the environment but also for the people. People spent twenty hours per day indoors, which makes the relation between health and the built environment worthwhile to investigate (Bos, 2019). Healthy architecture is complex as the field is still developing. Research not only focusses on mitigating the negative effects a building can have on health, but also on actually having a positive effect with research into areas like stress reduction, climate and daylight.

However, health can not only be influenced by the environment, but also by behaviour. Several studies show that architecture can influence behaviour, and behaviour can influence health. This means that the concept of a healthy building can be taken to the next level. This research aims to provide insight in how architecture can influence behaviour that positively affects health.

	<p>The increase of behavioural risk factors that account for more than a quarter of the overall burden of disease can be addressed by using the concept of nudging. Recently, nudging is becoming a more widely used tactic to influence this unhealthy behaviour of the public. Nudging means presenting choices to decision makers in a different way. Current studies mostly focus on government policy (like the covid pandemic measures, or the default option for organ donation). This research aims to discover the role nudging can play in affecting healthy behaviour of users within the built environment.</p>
<p>research questions and</p>	<p>This research aims to answer the question: <i>‘How can modern architectural nudge techniques be applied to improve overall health in the built environment?’</i>. Its final aim is to provide a framework with guidelines and design elements that can positively influence health which architects can implement in their design. This is done in several steps:</p> <ol style="list-style-type: none"> <li>1. <i>In what ways can the built environment influence behaviour to affect health?</i></li> <li>2. <i>What preconditions are there to conduct nudging tactics in an ethical correct manner, and which of these tactics achieve the best results?</i></li> <li>3. <i>What type of framework lowers the threshold for architects to implement design elements within their designs that influence behaviour that positively affect health?</i></li> <li>4. <i>How is nudging applied to improve health within the built environment?</i></li> </ol>
<p>design assignment in which these result.</p>	<p>How to design a building in high density living environments in Amsterdam that can positively influence the health of its users?</p>

**Process**

**Method description**

The first step to answer subquestion 1 is to established that the built environment can affect health both negatively and positively. This will be done by analysing academic literature researching first the sick building syndrome as this is a term used to describe the collection of negative impacts a building can have on health, followed by academic literature research into the blue zone which, through empirical evidence, describes the positive effects the built environment can have on health. For the second part of the question (linking the built environment to behaviour) health is linked to current design trends that influence behaviour that positively impact each health type; mental, physical and social. The design trends are (1) biophilic design for mental health using academic literature and research into commercial quantification methods, (2) active design guideline using a case study by analysing effectiveness of New York government policy and lastly (3) co-operative design for social health using academic literature. By determining the influence of the built environment on

behaviour, the relevance of aiming to change behaviour through the built environment is justified.

Question two will focus on existing knowledge of nudging. First a set of basic principles by Thaler & Sunstein will be described as they are considered as the founders of the term. This will be followed by ways a nudge can be conducted in a correct manner, i.e. when the ethics of nudging, the social construct and prerequisites are all taken into account. The second paragraph of this analysis will focus on different nudging techniques. Here a framework of nudging will be explained that is supported by several academic studies from different fields, which builds on knowledge from Thaler & Sunstein. As each technique influence behaviour in a different way a detailed description is given on how to conduct them in a correct manner as described in the first paragraph. The overall aim is to determine a set of preconditions in what ways a nudge can be conducted in an ethically correct manner (libertarian paternalism), and which of those tactics work best. With this information one could set up their own ethically correct and working nudges.

The final layout of the framework will be mainly dictated by findings from chapter 2 and literature studies on a usable guidance tool. A database of existing design elements will provide the content of the framework. These design elements are found in literature studies, existing case studies, findings from existing design trends described in chapter 2 and from existing nudging techniques outside of architecture described in chapter 3. The final goal is to set up a framework by which architects can be stimulated to implement nudging techniques that improve health.

### **Literature and general practical preference**

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#### Case study analysis

1. Qville by B-architecten  
[https://www.archdaily.com/963316/qville-ecological-co-housing-b-architecten?ad\\_source=search&ad\\_medium=projects\\_tab](https://www.archdaily.com/963316/qville-ecological-co-housing-b-architecten?ad_source=search&ad_medium=projects_tab)
2. Community Centre by BSKS Architects  
<https://www.archdaily.com/84992/sephardic-community-center-bksk>
3. Zwei+plus by trans\_city TC  
[https://www.archdaily.com/940835/sta-zwei-plus-plus-intergenerational-housing-trans-city-tc?ad\\_source=search&ad\\_medium=projects\\_tab](https://www.archdaily.com/940835/sta-zwei-plus-plus-intergenerational-housing-trans-city-tc?ad_source=search&ad_medium=projects_tab)

## 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)?

One of the goals within the Architectural Engineering studio is to seek inspiring architectural solutions for both environmental and societal issues. By thinking differently about our current building culture engineering can provide affordable



housing solutions for denser cities. This connects to several topics of the master of Architecture as well. The 1 million homes, climate neutral by 2050 and renovation challenges all require an integrated approach. This graduation projects connects well to these points. Nudging, a relatively unknown subject within the built environment, can provide additional information on the relation between health and the built environment. The concept of nudging can help tackle a societal issue (health decline) with architectural solutions.

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

Nudging is a relatively new concept within the built environment. There has been research within the fields of computer science and marketing but using nudging with design elements is something that can be developed a lot. This research focuses on that. Actually using nudging towards a good purpose while being ethically and morally justifiable makes for a very interesting topic in my opinion. In addition the developed framework is that of an open source format, which means it can be used and complemented by other architects and urban designers. Professionals can not only add their findings, but also be inspired by seeing many different design elements that positively influence health, which will hopefully lead to a better understanding of the importance of integrating health within a design.