

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	
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Studio		
Name / Theme	Design of the Urban Fabric	
Main mentor	Machiel van Dorst	Urban Design
Second mentor	Heleen Janssen	Urban Studies
Argumentation of choice of the studio	<p>Urban fabrics is about the multiscale interrelation between the built environment and the systems that create the dynamics in an urban environment. These systems are either tangible or intangible, in any case these systems are connected. The intangible systems – the way people use the city and interact with each other, is stimulated and facilitated in the way the urban fabric is organized and designed. The increasing density of the urban environment has an influence on these systems, as they put more pressure on urban structures and how public space is being used. This is dealt with when designing these places, the right behavior of the individual or a group should be stimulated by both the social structure and the physical urban form. Socio-spatial processes, the relation between social systems and the physical urban form, are therefore important in order to move towards a social sustainable society.</p> <p>The studio's approach is urban design, which puts forward the importance of understanding how to develop a sustainable, attractive and vital urban space. Designing is an iterative process that reveals new challenges throughout. The design in this way is the method to get a deeper understanding of the area, both socially and spatially.</p>	

Graduation project	
Title of the graduation project	<p>Unsafey Stimulating the perceived safety in Rotterdam-Zuid through spatial design</p>
Goal	
Location:	Rotterdam-Zuid, neighborhoods Bloemhof (as case study during the spatial analysis) and Pendrecht (as design location)
The posed problem,	<p>In 2007 the Dutch government formulated a list of 40 problem neighborhoods in the Netherlands. Out of the 40 neighborhood, three neighborhoods are located in Rotterdam-Zuid. In these problem neighborhoods, social housing associations often dominate the market share. This creates concentrations of groups of people with low education, low income, and high percentages of non-western poorly skilled immigrants. The social exclusion of these neighborhoods is often caused by negative media attention, which results in a stigmatization of the neighborhood. Residents, who have the option, leave the neighborhood, and the concentration of low educated, low</p>

	<p>income, non-western immigrants increases. This way the negative trend continues.</p> <p>In order to act upon this negative status of the neighborhoods in Rotterdam-Zuid, the National Program Rotterdam-Zuid (NPRZ) is initiated. The focus of the program is to improve the level of education, labor participation and housing quality by 2030 (Nationaal Programma Rotterdam Zuid, n.d.). Besides the program, the municipality has also set goals to improve the safety. Their ambition is to maintain the safety level and strengthen it where needed. The results from a neighborhood performance assessment the difference in performance between the measured objective safety (registered crimes) and subjective safety (perceived safety) is significant. This research done by the municipality showed a lower score on the subjective safety than objective safety in, among others, the neighborhoods Bloemhof and Pendrecht. This means that the residents of these neighborhoods experience the safety worse than it is according to the registered data.</p> <p>The municipality does not focus enough on physical changes and adaptations in the urban fabric, despite the fact that research shows the importance of the physical environment for perceived safety. Therefore this research aims to improve perceived safety by changing the physical environment.</p> <p><u>Problem statement</u> The relation between safety and design is studied in its own research field (Crime Prevention Through Environmental Design, CPTED), but integral implementation of safety goals in urban transformation design is nearly never successfully applied. The literature on the relationship between safety and design shows the lack of empirical research with the aim to measure the effect of physical and social environment changes.</p>
<p>research questions and</p>	<p>How can perceived safety be improved through neighborhood transformation in Bloemhof and Pendrecht?</p> <p>What are the conditions that lead to an unsafe public space? How can (perceived) safety be improved through spatial design? How does human behavior relate to public space? What are the spatial and socio-economic conditions in the area? What is the history of the area? What design principles have been applied in the past in relation to socio-spatial processes? Which patterns can be recognized in the behavior of people in the public space in Bloemhof and Pendrecht? How are targeted spatial changes experienced by people with the conditions to improve perceived safety?</p>
<p>design assignment in which these result.</p>	<p>Perceived safety is depending on the social environment and the physical environment. The municipality of Rotterdam and the NPRZ focus on improving the social environment. Their objectives to improve the safety in Rotterdam-Zuid are mainly focused on changing socio-economic processes that contribute to the safety in the area. Physical changes in the neighborhoods must be implemented to improve the perceived safety.</p> <p>Researchers state that there is a lack of empirical research with the aim of measuring the individual physical and social environment and</p>

	<p>targeted changes to evaluate their effectiveness. This causes a lack of scientific evidence of the effectiveness of designing for safety. Looking at this lack of scientific evidence from designer perspective provides a chance to design for the perception of the environment. Therefore the design asks for a multiscale approach varying between eye level, street level, and neighborhood level.</p> <p><u>Design principles</u> Solutions for this context specific problems will be designed in a set of design principles with the aim to improve the perceived safety. The design principles will be combined and applied in a 3D model on street level and tested in a VR experiment. The results of this experiment will validate the effectiveness of the design principles.</p> <p><u>Neighborhood transformation design</u> The validated design principles will be integrated in a neighborhood transformation design. The intention of the neighborhood transformation design is to improve the overall perceived safety in the neighborhood and put a special focus on the most unsafe area in the neighborhood.</p>
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Process

Method description

The methods selected for this project are:

1. Literature study
2. Documentary research
3. Socio-economic analysis
4. Spatial Analysis
5. Field work
 - i. Interviews/surveys
 - ii. Observing public life
 - iii. Mapping public life
6. VR experiment

1. Literature study

The literature study is intended to gain a body of knowledge of theories revolving around perceived safety and certain methods used in the research. This includes theories on human behavior, environmental psychology, social safe design, and CPTED. As well as literature about the methods used for this project. This includes literature about observing and mapping public life and conducting a VR experiment and how to structure a narrative and questions for the experiment.

2. Documentary research

The documentary research includes inquiry of both qualitative and quantitative data from documents published by governmental institutions and local initiatives. This method is applied in order to obtain the vision and goals from the municipality and government related to safety and densification. The municipality has set goals in order to improve the safety of the living environment, by collecting this data the project has a clear guideline on what the municipality wants to achieve in terms of safety. Furthermore, a densification vision has been published by the municipality, which in this project is related to the final outcome, a neighborhood transformation design.

3. Socio-economic analysis

The socio-economic analysis is used in order to get insights in the current socio-economic status of the area. Research has shown that the socio-economic status of an area can have an influence on the safety performance of the area, therefore it is important to determine the socio-economic characteristics of the project area. A descriptive analysis is used to introduce, organize and summarize

the statistical data collected on the socio-economic characteristics. The outcome are sets of quantitative data that will be presented in visualizations and maps that related the data to their localities.

4. Spatial analysis

The spatial analysis is intended to give insight into the relation between space and human behavior. The techniques of mapping and observing public life will be applied to gather the required data. The intention is to use the software GIS and Space Syntax to identify relations between spatial characteristics and behavioral and social aspects. By using GIS and Space Syntax the interrelation between buildings and streets can be identified. Furthermore, multiscalar mapping will be used to gain a spatial understanding on the following scales: city scale, neighborhood scale, and street level. In order to gain a behavioral and social understanding observation will be done, which will be visualized and mapped.

5. Fieldwork

Fieldwork will be conducted in order to gain first-hand information on the qualities and potentials of the project area. The data collected with this method is expected to differentiate from the data collected in the documentary research and socio-economic analysis, it is expected that by using this method the data will be experience-based and perception-based instead of statistical data. The fieldwork includes different techniques: surveys, observing public life, and safety mapping. These techniques are intended to collect quantitative and qualitative data on a local level and aim to answer the questions "how many", "who", "where", "what" and "how long" (Gehl & Svarre, 2013). The survey will be focusing on the perceived neighborhood safety by the residents. The questions on the survey will be carefully formulated in order to not influence peoples answers. The survey will be handed out via mail to the residents of the neighborhood in order to decrease the chance of gathering data from people who are not regular users of the public space in the neighborhood. The outcome of the survey is to determine (un)safe places in the neighborhood. Participants will be asked to rate levels of safety, satisfaction and other topics based on the Likert scale (strongly disagree – disagree – neutral – agree – strongly agree).

Observing the public life in the neighborhood will identify people flows and how people use public spaces. This technique will, furthermore, be used to measure the frequency and dynamic of the public space. This help identify where the popular public spaces in the neighborhood are. The usage of the public space will be mapped to be able to relate the behavior to space.

The technique of safety mapping will be based on physical traces that indicate a possibly unsafe environment, for example litter, graffiti, deterioration, and streetlights. The outcomes will be mapped and compared and merged with the outcomes of the surveys to eventually get a comprehensive insight into the potential (un) safe spaces in the neighborhood.

6. VR experiment

The main method that leads the project to its final outcome is the VR experiment. The VR experiment will be use in order to validate the effectiveness of the design principles with the condition to improve perceived safety. Research shows that visualized ideas helps participants in VR experiments to assess and reflect deeper on the spatial properties and qualities and it positively contributes to the engagement of the participants (Van Leeuwen, Hermans, Jylhä, Quanjer, & Nijman, 2018).

There are different ways in which VR can be used to do research. Firstly, a decision needs to be made regarding whether or not the participants are selected from the actual location of the VR environment or to select random participants who are not from the project area. When deciding between these two option it should be taken into consideration that the perception of a safe environment tends to be perceived the same way for most people, except that it can depend on their demographic. However, residents of the project area are already familiarized with the context and are aware of different social and physical factors present in the area, which might corrupt the desired results.

One option is to use the stated choice experiment, in which the participant is given two or more options in VR of which one is stable and the other ones differ per question. This, however, can create a level of familiarity for the option that remains the same, which could affect the decision making of the participant. The participant is asked to choose one of the given options based on a narrative. This

narrative sketches a situation to which the participant can relate (Van Dongen & Timmermans, 2019). The environment in which the participant is located within the VR environment contains changing attributes. The presence or absence of the attributes is used to assess the experienced environment of the participant. "Stated choice methodology assumes that when people have a choice between different alternatives, they will choose the alternative with the highest utility, which is defined as 'the level of happiness that an alternative yields to an individual'" (Van Dongen & Timmermans, 2019, p. 5).

A second option for using VR is by using static one perspective rendering. The participant is able to navigate between multiple static renderings similar to Google Street View. Based on research, on the difference between static renderings on a computer and experiencing the environment with a VR headset, it showed that the variables 'immersion', 'translocation', and 'concentration' were significantly performing better when using a VR headset (Van Leeuwen et al., 2018). Nevertheless, using static renderings on a computer does have an advantage regarding time efficiency, reaching participants and duration. Modeling static renderings takes less time than modeling an interactive VR environment. Reaching participant can be done by sending a questionnaire via email and often the duration of a VR experiment is often overestimated.

Method and techniques	What?	Aim	Outcome/Data
Literature study <i>Theoretical review</i> <i>Context study</i>	<i>Perceived safety</i> <i>Social safe design(CPTED)</i> <i>Human behavior</i> <i>Environmental psychology</i> <i>History</i>	In order to understand the theories of perceived safety, social safe design (CPTED), human behavior, and environmental psychology In order to get context and knowledge on the history of the place	<i>Theoretical paper</i> <i>Body of knowledge</i> <i>Mappings</i> <i>Body of knowledge</i>
Documentary research <i>Vision + ambitions</i>	<i>Safety</i> <i>Densification</i>	In order to obtain the goals of the municipality	<i>Qualitative data</i> <i>Quantitative data</i>
Socio-economic analysis <i>Descriptive analysis</i>	<i>Socio-economic characteristics and interrelations</i>	In order to obtain data on the socio-economic status of the project location	<i>Quantitative data</i> <i>Data visualizations</i> <i>Mappings</i>
Spatial analysis <i>Mapping</i> <i>Observing public life</i>	<i>GIS</i> <i>Space Syntax</i> <i>Socio-spatial dynamics</i>	In order to obtain data on the interconnection between physical environment and behavioral and social constructs In order to understand the relation between people and the use of public space	<i>Data visualizations</i> <i>Mappings</i>
Fieldwork <i>Surveys</i> <i>Observing public life</i> <i>Safety mapping</i>	<i>Questionnaire on neighborhood safety</i> <i>Identify people flows</i> <i>Potential signs of (un)safe locations</i>	In order to obtain statistical data on perceived safety by the residents of the neighborhood In order to understand the dynamics of the neighborhood and the use of the public space In order to identify potential (un)safe locations and areas in the neighborhoods	<i>Quantitative data</i> <i>Qualitative data</i> <i>Data visualizations</i> <i>Mappings</i> <i>Photos</i>
VR experiment <i>Modeling</i> <i>Narrative development</i> <i>Choice experiment</i>	<i>Design principles</i> <i>Compile a narrative</i> <i>Experience-based questionnaire</i>	Generate VR models that are used for the VR experiment and simulate scenarios of (un)safe environments In order to obtain relevant information from the participants a structured and concise narrative needs to be told In order to validate preferences between different scenarios with regard to perceived safety	<i>VR model</i> <i>Narrative</i> <i>Questions</i> <i>Qualitative data</i> <i>Quantitative data</i>

Literature and general practical preference

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Reflection

Relation with other studios and Msc Program

This thesis touches upon different relevant topics within the urbanism research program. Dealing with the global issues of rapid urbanization, densification and intensification, this project looks at these issues in the Dutch context. Perceived safety relates to the social well-being and health of cities' residents and aims to improve overall safety. Sustainability is a broad subject in the research field of urbanism in which social sustainability is only one of the several aspects. It focuses on the social dynamic and social resilience of an area. Sense of belonging to a community and social interaction and cohesion play a big part in this. The final outcome, a neighborhood transformation design, will implement sustainability in the broader sense. The spatial implementation of design principles with the aim to improve safety bridges the gap between theory and design.

Scientific relevance

This research add to the body of knowledge on social safe design, perceived safety and the use of VR technology in empirical research. According to Romice et al. (2016) there is a lack of effective synthesis of the theory on connecting the form of cities with the social processes and implementation in mainstream practice. Despite the extensive knowledge on links between urban form and socio-economic processes, this is not sufficiently applied in practice. Furthermore, there is a lack of empirical research with the aim to measure the targeted changes in the individual physical and social environment (Bloeme, 2013).

The development of research on designing for people has caused an over-professionalized form of urban place-making, which makes people believe that everything related to shape and management of environmental form is a professional problem (Romice et al., 2016). This thesis will explore methods where the design outcome is tailored to the experience of the user. The results therefore will be determined by users of the public space, which is testing during the research by a VR experiment.

Societal relevance

Safety is one of the human needs and is included as second most important need in the pyramid of Maslow. This means people will seek to find safety before meeting their social needs, esteem needs, and self actualization. Safety, therefore, is a basic need in life. The social and physical environment are equally important to establish a safe environment. However, in cities, where the building density and population density is high, creating a safe environment has become more and more complex. The well-being of people is depending on feeling safe in the direct living environment. However, the safety performance of the neighborhoods that are being research in this project; Bloemhof and Pendrecht are considered a safe environment. The government has a budget of 130 million euros to increase the safety in Rotterdam-Zuid. The money must be invested in housing, education, work, safety, and culture. The neighborhoods also gained special attention in the safety vision of the municipality of Rotterdam. Their goal is to minimize the risks and tackle the challenges they foresee in regards to perceived safety in the neighborhood. When the safety in the neighborhood increases the quality of the living environment will also increase. This largely benefits the residents of the neighborhood and might take away the bad image the area has for a long time.