Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences
# Graduation Plan: All tracks

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The graduation plan consists of at least the following data/segments:

## Personal information

<table>
<thead>
<tr>
<th><strong>Name</strong></th>
<th>Jet ten Voorde</th>
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<tbody>
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</tr>
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## Studio

<table>
<thead>
<tr>
<th><strong>Name / Theme</strong></th>
<th>Urban Fabric</th>
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<tbody>
<tr>
<td><strong>Teachers / tutors</strong></td>
<td>Birgit Hausleitner¹ and Taneha K. Bacchin ²</td>
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<tr>
<td></td>
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## Argumentation of choice of the studio

One aspect that makes the Randstad so vulnerable being under main sea level, is the high-density aspect of the area. The water issue is often approached from a full engineering perspective, where the more spatial and social factors are being underexposed. Therefore the choice of the Urban fabric research group is logical, approaching the water problem from a different angle and look for example for adaptive capacities within the fabric of the city and system. The Delta Intervention research group as a second mentor helps to bridge between this urban context connection to the threat of water in the Delta zone.

## Graduation project

<table>
<thead>
<tr>
<th><strong>Title of the graduation project</strong></th>
<th>Planning for Extremes: The task of spatial planning and urban design in the context of extreme flood risk scenarios in the Netherlands</th>
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<td><strong>Goal</strong></td>
<td><strong>Location:</strong> Randstad area Netherlands, and on the smaller neighbourhood scale the area of Blijdorp, Schiebroek, Schiemond and Oud Charlois in Rotterdam.</td>
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<td><strong>The posed problem:</strong> The Randstad is the economic and social center of the Netherlands, where up to</td>
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seventy percent of the gross national product is produced and where more than seven million people live. Compared to other Delta countries the location of this socio-economic center below sea level is remarkable. The Dutch approach of drain, dredge and reclaim that has shaped the Netherlands throughout history, is mainly focused on fighting water. This human intervention led to a cycle of heightening dikes and pumping out the water and brought the country to the situation we are in today: its national center is located in an area that is highly exposed to flood risk being located in areas that are below sea level. As the current notion of risk used in the Netherlands has a strong focus on reducing the probability that a flood will occur, it leaves little attention for reducing exposure and vulnerability, as the other components when defining risk. Socio-economic trends show that the area below sea level will be only more inhabited with people and economic growth. This along the predicted sea level rise and greater fluctuations in river discharge compel research on spatial planning and urban design to look far into the future, to widen their scope and to anticipate developments further ahead.

<table>
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<tr>
<th>research questions and design assignment in which these result.</th>
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<tr>
<td>How can the spatial structure of the Randstad be transformed in order to prepare for extreme sea-level rise?</td>
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<tr>
<td>This thesis focuses on the possibilities of restructuring the Randstad region throughout the scales (in space and time), assigning densification zones and areas of relocation towards reduction flood risk exposure under climate extremes. These zones have to be designed in a way that there is a reduction of the vulnerability of the highly-urbanized delta region Randstad, resulting in a decrease of risk. The zones are distinguished at the Randstad scale, creating a large scale framework</td>
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The project aims at transformation of the current way the Netherlands deal with the increasing treat of water, proposing to create more adaptive capacity of the spatial structure in order to deal with future uncertainties in the context of extreme climate change scenarios. A reduction of the vulnerability of the highly-urbanized delta region Randstad results in a decrease of risk. This is where the field of spatial planning and urban design could contribute largely. This thesis focuses on the possibilities of restructuring the Randstad region throughout the scales (in space and time), assigning densification zones and areas of relocation towards reduction flood risk exposure under climate extremes. The Randstad region is chosen as it is the economic and social center of the Netherlands and therefore very vulnerable in terms of flood risk.

**Process**

**Method description**

The techniques of getting knowledge vary per sub question as some are more scientifically based in opposite to the design based questions. The framework that will be used to structure the process towards the design is Geodesign. This method of Steinitz integrates context analysis, design and evaluation phases into a set advanced design solutions (Lee, Dias and Scholten, 2014). The framework of Steinitz also splits the steps from a current situation to a new situation in ‘The world what it is’ and ‘The world as it could be’, similarly as the division of research sub questions.

The world as it is:
- Data inventory: How can the geography of the Randstad be described?
- Process models: How does the Risk Management system currently work?
- Capability/sustainable models: Is the current system working well?

The world as it could be:
- Design and sketch: What alternatives of the structure are there?
- Evaluation and analysis: What are the consequences of this change?
- Decisions: How should the spatial structure be changed?

The six sub questions can be divided in three groups depending on in what way the core of the answer can be provided: by literature(1), by data and analysis(2) and by design(3). The method that will be used to answer each of the sub questions will be described below.

1. What are the uncertainties in the Randstad?
As the project aims on deep uncertainty, a common way to deal with this is using scenarios. To make the scenario assumptions are made based on trends or previous experiences. As the Netherlands have several experts concerning the trends that have to do with water, the flood defense systems are prepared to a certain extend of change in the future. By reading and exploring literature, the global and national
trends will be put into a scenario. When this scenario is set, the requirements of the spatial structure can be determined.

2. What measures diminish the risk of flooding?
Another sub question that should be answered by exploring literature is about measures that reduce risk of flooding. First more general ways of adaptation will be explained. Also the approach towards the notion of risk will be highlighted. Lin literature several ways of defining risk are described, the approach of the Netherlands will be zoomed in at. Then measurements that are currently used in the Netherlands will be grouped into these ways, resulting in possible improvement per field.

3a. What features are exposed to floods?
Applying spatial analysis and modelling, the entire Randstad region is analyzed based on a set substratum conditions, such as height or type of soil, and urban densification resulting in areas that are highly exposed and areas that are more suitable for further development. The suitability method of Ian McHarg combines different layers containing information geographically. The layers can express whether that certain feature is suitable or not for a certain type of use or development. In Design with Nature Mc Harg explains that by using the layers social and environmental information can be used together. In a suitability map is reversed, it shows the areas where a certain type of land use is not favorable. If the areas with poor substratum conditions are put over the demographic layer, the output shows how many people are exposed more to risk. This could be done for economies, people and for example cultural heritage.

3b. What areas have potential for resettlement?
Current critical infrastructure and functions play a major role in the possibility of densification. Since the suitability for functions based on the substratum is determined in question 3, the features exposed to extreme risk need to be relocated. The design principles are influenced by geospatial knowledge, and therefore Geo and Design come together: GeoDesign. This method of Steinitz integrates context analysis, design and evaluation phases into a set advanced design solutions (Lee, Dias and Scholten, 2014).

4. How can spatial planning help in dealing with uncertainty?
As the far future is very uncertain, the need to find ways to adapt the structures in such a way that they can be positive for several futures. A theoretical framework is used to explain the notion of adaptive capacity and its contribution to dealing with uncertainty. How should a structure adapt to what could be there? By analyzing the way urban areas were built up or transformed in the Netherlands, Using this definition, the

5. What spatial measures can be taken in order to increase the adaptive capacity?
In order to increase the adaptive capacity an exploration of other projects is helpful to list optional interventions. The method of making a catalogue of other projects that had to deal with great uncertainties is created.
On a specific location the temporal layer becomes also important. By using the scenario of question 1, requirements for the new structure can be defined towards what extent the system should remain adaptive.

**Literature and general practical preference**
The two main books are Geodesign of Carl Steinitz and Design with nature of Ian Mc Harg.


FLOODsite (2009) *Flood risk assessment and flood risk management; An introduction and guidance based on experiences and findings of FLOODsite (an EU-funded Integrated project).* the Netherlands.


Reflection

Relevance

The Netherlands are leaders the water management world, guiding other Delta areas to new flood protection systems. The Dutch apply their knowledge gained since the beginning of the country to protect other regions in the world in similar conditions regarding water challenges. Applying techniques like dikes and dams in other deltas, the rising sea level will slowly turn this areas into bathtubs as well: a highly vulnerable area next to a rising see. A new approach that really stops fighting the water, can be a next step in the Dutch approach. Room for the river is a first step acknowledging the room water needs in order to keep the country safe. The Netherlands is a very extreme situation where the most vulnerable area is as well seen as the heart of the nation. By exploring the options of resettling urban areas to create space for the water, the Randstad project could be a next step in the Dutch approach.

As green-blue networks have become a crucial component in the organization of metropolitan growth, this large-scale project can show how resettlement and green blue structures can be combined. The systematic approach of assigning certain clusters to densification and others to relocation can contribute to the theory of increasing the adaptive capacity of a large-scale system, taking large uncertainty due to the time span into account.

When performing this project, the method of creating suitability maps to find the matching land use for a certain area can be tested on this large scale. It proposes a classification based on suitability maps, without losing the notion that all interventions should respond to the local conditions.
The ethical dimension of this thesis has two main sides; on the one hand our right to well-being and safety and on the other hand the responsibility towards our ecosystem.

Both are rather obvious an ethical question as the decisions made around this topic concern a lot since they are affecting a large amount of people and a large ecological system. The government among other parties has the task to keep its citizens safe, but as the future is uncertain this is rather difficult. Since there are a lot of timeframes to think within, it is logical for politics to look within a scope of maximum 20 years, since that is more clear and certain. However by doing this, the changes that are made stay within the same system, within the same paradigm.

As a spatial planner and urban designer, I feel the urge to address the vulnerability of the society in the current system. Not only do we put the lives of almost 1.5 million people in danger, but also, we have pushed the ecosystem into the structure that we needed to create this unsustainable solution.

How we came in this situation is clear, but continuing within this system of manipulation of the water (and placing lives and ecology in stake) while knowing current information and models is another step. The problem that is stated in this thesis is already pressing, but with the trends of climate change and urbanization is it rising every day.

**Time planning (next page)**