Graduation plan: All tracks

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

Personal information
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Studio
Name\Theme: ExploreLab
Design mentor: Robert Nottrot
Research mentor: Saskia de Wit
Building Technology mentor: Ype Cuperus
External committee member: Daan Vitner

Argumentation of choice of the studio: My interest lies with creating a greater degree of integration between nature and architecture. A subject that cannot be researched in its full extend at a different studio

Graduation project
Title of the graduation project: Back to Nature

Goal
Location: Rotterdam, Wilhelminapier

The concept of healing through nature is both ancient and modern. As a species we have lived the majority of our evolutionary history in a natural world. During this time our minds and bodies came of age and as such we depend on nature for our physical and psychological well-being. Since the earliest construction of dwellings healing places were always found in local natural environments. Among the oldest of these healing places were, springs, groves, caves or just simply a rock with special meaning. Long after the first dwellings were constructed, places of healing began to change. In the western civilisation stands of groves, caves, and healing springs were turned into the predecessors of hospitals and infirmaries in the form of temples. (Healing gardens, 1999; ecopsychology, 2012; Sternberg, 2009)

Yet as society flourished we have largely forgotten the effect that nature has on our physical and psychological wellbeing. Our attitudes changed from healing, to diagnosing and treating (Sternberg, p.4). Using high-rise buildings to provide space for dwellings and offices further removes people from the beneficial influence of nature. In order to prevent cities and mega cities from becoming cesspools of psychological problems restorative environments need to be integrated in high-rise buildings to reconnect people with the beneficial aspects of nature.

The main research question this project will address and aim to answer is:

How to integrate nature in the form of restorative environments with the architecture of interior and exterior spaces in buildings with high stress environments in order to harness the positive effects on the human psyche?
This question highlights three different focal points; firstly, the theory behind nature and its effects on the psychological wellbeing of humans. Secondly, the elements of restorative environments that need to be integrated into buildings to reproduce the beneficial effects of these environments. Thirdly, the technological means to actually integrate plants and natural elements with architecture.

The three sub-questions that follow from this research are tied to the three main focuses of the research question mentioned above.

**How can nature affect the human psyche?**

**What elements and spatial characteristics do restorative environments contain?**

**What technological adaptations need to be included in buildings to accommodate restorative environments in interior and exterior spaces?**

One of the major products of this research is a toolbox of natural elements, spatial characteristics and concepts that when combined will allow architects and designers to integrated restorative environments into buildings. The toolbox that is at first primarily a product of the research will be tested by creating a design in which restorative environments are integrated with the architecture of interior and exterior spaces. The process of designing will then provide additional information and refinement for the toolbox. The product of the design proposal is therefore not just the design itself but also a refined and illustrated toolbox.

In order to have the largest impact with the integrating of nature within buildings, the location had to be one of the larger cities of the Netherlands. Rotterdam qualified since there is very little actual nature in the city. Also locations within the Randstad are far removed from natural environments where people can go to seek the restorative effects of nature.

Another reason for choosing Rotterdam is the presence of high-rise buildings. High-rise buildings are, by their very essence, disconnected from nature due to their height. Especially the current redevelopments in the harbour districts of Rotterdam provide ample opportunity. The Wilhelminapier contains little to no publicly accessible natural spaces and is therefore the perfect location for designing a high-rise building in which restorative environments are integrated.

The building in which the toolbox will be tested and implemented will be a hybrid. This hybrid will combines offices, apartments and restorative environments. The location for the design is along the waterfront on the southern edge of the pier.

The brief that will be used for the design is based on the actual plan for the pier. The site demands a high-rise building containing 50,000 m² of program. A mix of offices, apartments, and studios that can be both dwellings and offices. Intermixed with the offices and dwellings are recreational spaces. The parking for both dwellers and office workers is to be realised underground.

In addition to the brief extra space will be needed to accommodate the restorative environments. The recreational part of the original brief will be used for this as well as any extra space that is needed for the technological adaptations.
A combination of methodologies will be used: top-down in the form of literature studies and bottom-up in the form of case studies and the odd interview. The top-down research will link the existing knowledge to the formation of a toolbox and subsequently the design. The bottom-up research will ensure that the project including the research will respond to real life situations and day-to-day use of the building.

Both the top-down and bottom-up research will be used to create a toolbox in which the theories and examples of restorative environments are broken down into natural elements, spatial elements and concepts. These will be combined into tools for the toolbox.

**How to integrate nature in the form of restorative environments with the architecture of interior and exterior spaces in buildings with high stress environments in order to harness the positive effects on the human psyche?**

The project will start by conducting theoretical research, investigating the broader scope of the research question. As such it will deal with psychological stress, physical stress, nature, spatial characteristics and the relevance of this research on the field of architecture. This theoretical research is necessary to clarify the intricate relation between nature and people. Without this knowledge it will be impossible to create viable tools for the toolbox that will link theory to practice. Following this, more plant specific and spatial research will be conducted to address the actual integration of restorative environments into buildings. Drawing upon both the theoretical and practical research a toolbox will be developed that will integrate the natural elements and spatial characteristics with architectural tools. This toolbox will then be illustrated with a design for a hybrid building containing apartments, offices and spaces for leisure. The design will follow a research by design approach in which reflections on the research-driven and design-driven aspects are central.

By using the conclusions of the subquestion the main question will be answered. These conclusions will be combined into the toolbox that will be one of the products of this research. Besides the toolbox the research will explore a new model for integrating restorative environments in buildings providing a perspective on environmental issues. The third product will be a design to illustrate and the both the model and the toolbox.

Finally the project will be concluded with a reflection of the entire process and the products. Although the project is thought of as a research driven, built on the conclusions of the three subquestions. However, it is impossible to design a building without decisions based on the designers point of view. In the reflections the distinction between research and input of the designer will be discussed.

**How can nature affect the human psyche?**

This question will focus on the link between nature and human psyche. First it is relevant to review the literature on restorative environments in more detail as well as the scope of restorative environments. Secondly a broader insight of the cause of psychological problems and its effects on the human physiology must be created to combine the different theories. Following this the effect of nature on the sensory systems will be explored to understand how perception affects the psychological and physiological states. These will than be combined in order to determine if there are spacial implications that facilitate the positive effects of restorative environments on people.
Methods

Literature studies
This question is answered with multiple literature studies. The aim of these literature studies is to create a link between the different aspects of the human psyche and nature. The first study will focus on the attention restoration theory and stress restoration theory explore the different restorative environments and the causes of stress and attentional fatigue. The second study will focus on stress and how it affects the body and psyche. The third study will explore the sensory systems and how restorative environments, stress and senses interact.

Products

What elements and spatial characteristics do restorative environments contain?
The conclusions of the first subquestion will be explored further in this question to identify the spatial implications and natural elements that make up restorative environments. This understanding is necessary in order to know how restorative environments are created and by what means they can be integrated into buildings.

Method

Literature study | Case studies
This question will be answered by first exploring the theory of restorative environments and later exploring literature on gardens, parks and other environments that are recognized as restorative environments. The case studies will be used to find additional spatial layouts and natural elements that are present in such environments.

Products

What technological adaptations need to be included in buildings to accommodate restorative environments in interior and exterior spaces?
The natural elements and spatial constructs will be explored further in this sub question. Specifically the needs of the flora that is to be included within the building; aspects like, soil, water, sunlight and maintenance and the overall requirements of restorative environments will be examined. Understanding the limits of the integration of plants in buildings is an important aspect of this question.

Method

Literature study | Interviews | Case studies
This question or actually set of questions will be answered by a literature study and interviews with experts on integration of nature in buildings. The case studies will provide valuable insights on the practical aspect of the integration of nature.

Products

The first conclusion of this question will be compiled into a database of flora with their needs and statistics. The second conclusion will deal with the technological adaptations that need to be made to actually integrate and maintain nature in an indoor environment both from the point of view of the flora and the users. These conclusions will provide the first set of parameters for the design.
Literature and general practical preference


Reflection

Relevance

Scientific relevance
At its core this project aims to build bridges between environmental psychology and architecture. Environmental psychology is an interdisciplinary field that focuses on the interaction between individuals and their surroundings. The field defines environments very broadly, it encompasses natural environments, social settings, the build environments and learning environments.

The aim of this project is to research the possibility of integrating nature into buildings. It is of particular interest to this project to build a bridge between the theories of restorative environments and architecture by the continuation of the existing research that looks at the effects of restorative environments on humans. This project will consider a toolbox in which the theories of restorative environments are broken down to natural elements, spatial constructs and concepts which are than integrated in architectural tools. This toolbox will strengthen the relationship between design and environmental psychology.

Societal relevance
It is the opportunities that cities provide for people that outweigh the advantages of living in more rural areas. This should, however, not mean that society has to accept the lack of nature and the negative effects that come with it. The biggest possibility for the society is to bring nature to the city and integrate it with architecture for everyone to enjoy. Thereby reducing depression, sickness, improving attentional capacity and the amount of stress one can handle.