An evaluation framework for AI powered generative concept design in the real estate site planning process

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Executive summary

Introduction

Introduction
Due to the stricter sustainability requirements and associated governmental regulations, the real estate development process in the Netherlands is becoming increasingly complex, narrowing the real estate developer's opportunity space and increasing the uncertainty regarding the feasibility of the real estate development project.

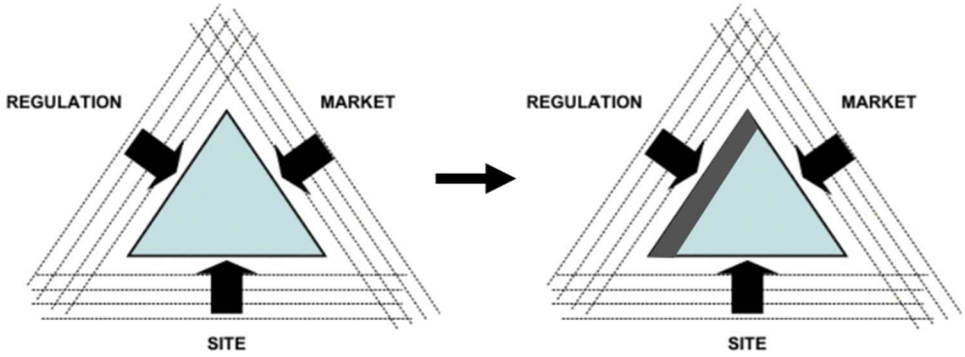

Figure 1: Increasing complexity real estate development process due to stricter rules and regulations. (Source: adapted from Carmona, Heath & Tiesdell, 2010, p.290)

In the current concept design process, a lot of decisions are made based on educated guesses instead of objective knowledge. In case these estimations turn out to be wrong later on in the development process, this could lead to rework, thereby jeopardize the feasibility of the project. By increasing the amount of objective knowledge during the early stages of the real estate development process (during the concept design process), the developer could potentially decrease the uncertainty with regards to the feasibility of the project.

Problem statement
Recently developed AI powered generative design tooling could potentially be used to decrease this uncertainty during the concept design process. However, there is currently no scientific method that helps the (concept) developer evaluate the concept design with the use of this AI powered generative design tooling and make decisions based on more objective design criteria. Furthermore, as stated in the introduction, the current concept design evaluation and decision-making process is already characterized by its (relatively) unstructured process, also increasing the uncertainty within the real estate development process according to the literature.

Research objective
Based on the introduction and problem statement, the goal of this research is to develop an evaluation framework for the concept design process that can be used by real estate development professionals in the Netherlands, during the concept design stage of inner-city apartment buildings, to make more informed choices (based on additional objective information) earlier on in the design process to decrease the uncertainty with regards to the feasibility of the real estate development project. The framework will be developed considering the current visualisation and simulation abilities of AI powered generative design tooling. The following main development statement has been formulated:

"The lack of objective knowledge during the often poorly structured concept design evaluation and decision-making process increases the uncertainty regarding the feasibility of the project"

Research design & methods

Research design
In order to develop a solution for the development statement, qualitative exploratory research will be performed as input for the Design Research methodology. In order to complete this study according to the Design Research principles, part of the Engineering Cycle will be used: the Design Cycle. The Design Cycle consists of the first three steps of the Engineering Cycle depicted in figure 1, including the following tasks (Wieringa, 2014):

- Problem investigation: What phenomena must be improved?
- Treatment design: Design an artifact that could treat the problem
- Treatment validation: Would this designed artifact treat the problem?

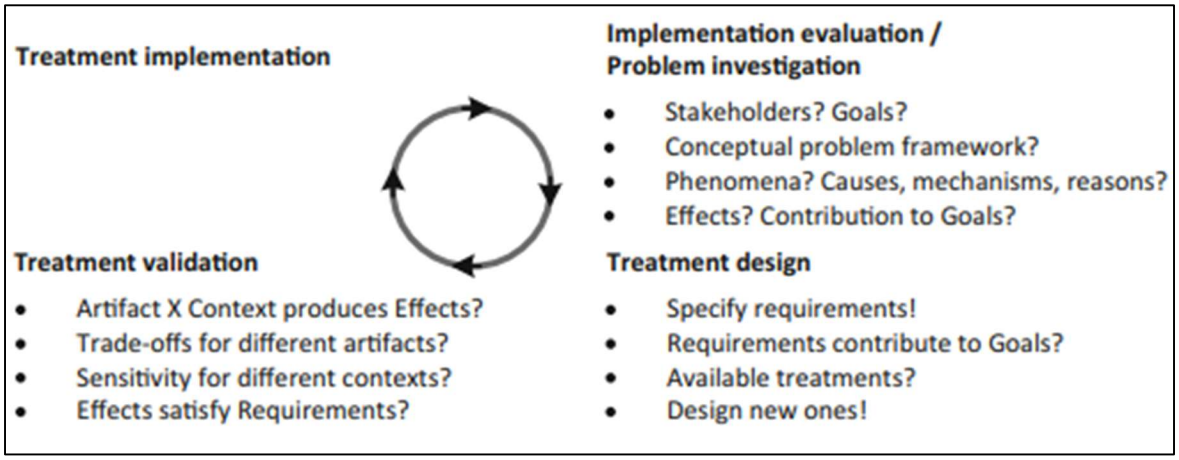

Figure 2: Engineering cycle (source: Wieringa, 2014, p. 28)

Research structure
In order to find a solution for the development statement, several supporting theoretical and exploratory sub-questions have been formulated and answered. SQ1, SQ2 and SQ3 serve as input for SQ4, in order to develop a solution for the development statement.

Problem investigation

- *SQ1: ''How is the current concept design stage of the real estate site planning process organised according to the literature, key-actors and case documentation?''*

- *SQ2: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature, key-actors and case documentation?''*

- *SQ3: ''What is the suggested influence of the use of AI powered generative design during the concept design phase on the real estate site planning process according to the literature?''*

Design solution & specification

- SQ4: *''How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?''*

Problem Investigation

Uncertainty due to a lack of knowledge during the decision-making process of the concept design stage plays a large role in the current real estate development process. This uncertainty needs to be considered in determining the value and therefore the feasibility of a project. A lot of decisions made during the concept design process are based on educated guesses, which if estimated wrong, could lead to consequences in the form of rework, additional design iterations and an increasing lead time that potentially could jeopardize the feasibility of the project by making the initial cost estimation less accurate. This lack of knowledge can be further specified as follows; mainly the environmental properties related to the environmental influence of the building on its surroundings and vice versa (such as noise pollution on the façade) are estimated during concept design process. According to the research, this currently often leads to rework, additional costs (making the initial cost estimation less accurate), and a longer lead-time.

The feasibility of the project is determined by calculating the expected residual (land) value / profit of the project. The profit is calculated by subtracting the expected total development costs from the expected capital value of the project. Unexpected additional costs caused by rework, higher loan-costs due to additional lead-time, or higher building expenses, make the original project feasibility estimation less reliable.

The literature states that structured evaluation and decision-making enable the developer to steer on uncertainty and risk minimization or mitigation. This could be used to decrease the uncertainty within the real estate development process. According to the key actors, the current concept design process overall is regarded as inefficient and unstructured. Half of the interviewees indicated that there is a need for optimizing the concept design evaluation process and expressed the need for a software application to assist them during these activities. However, there is some concern that the use of this type of software may have a negative impact on the manageability of the concept design evaluation and decision-making process.

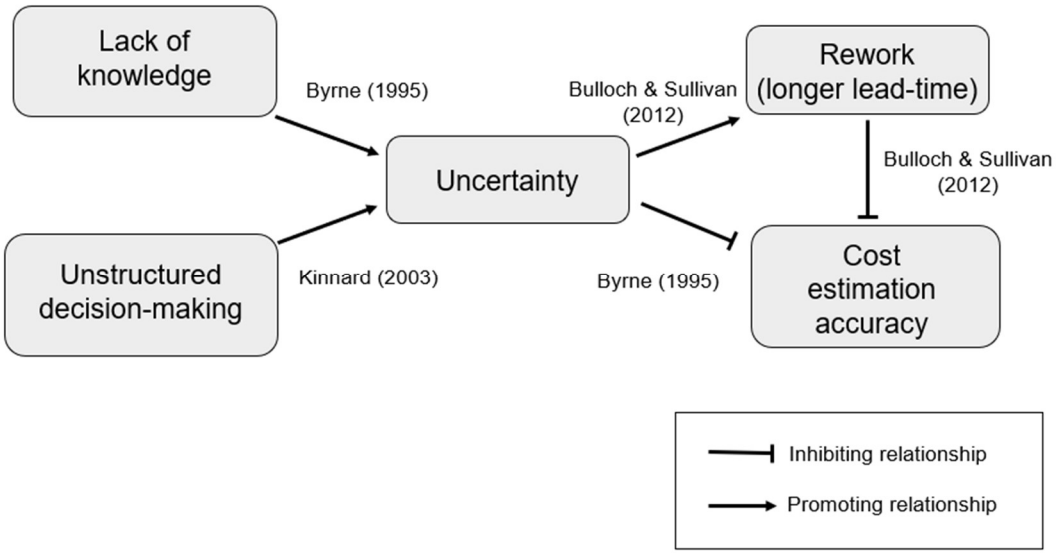

Figure 36: Causal network: current situation

In order to visualise the relation between the discussed problems, a causal model has been developed (figure 36) that fits within the scope of this research. The causal relations are based on the literature from the theoretical framework.

Design solution & specification

Development needs

In order to design an artifact that could potentially treat the identified problems, the development goals have been specified. Figure 37 below visualises the development needs of the artifact, in order to hypothetically solve the identified problem.

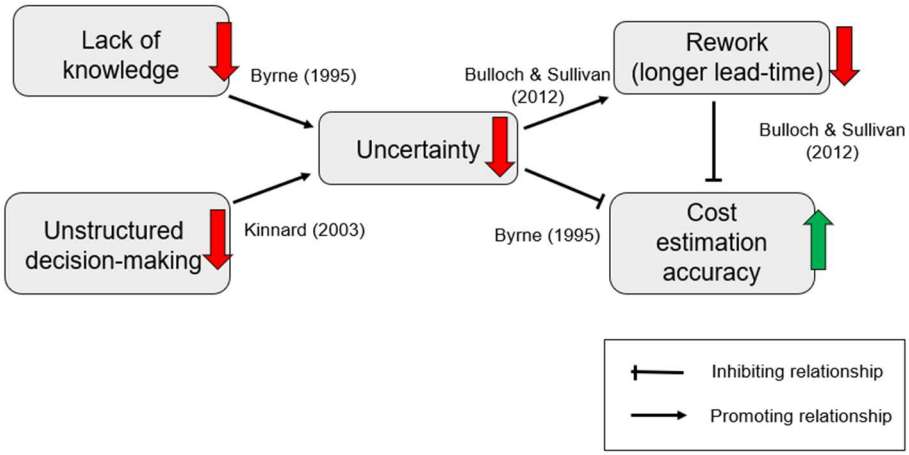

Figure 37: Development goals visualised in the causal network

Artifact development & validation

In order to meet the development needs, the researcher has developed an artifact which fulfils the relationship within the causal as shown in figure 39. As depicted in the figure, the artifact is divided into two parts: 1) AI powered generative design tooling, and 2) the concept design evaluation matrix. Part one of the artifact decreases the lack of knowledge within the current causal model, and part two decreases the unstructured character of the current evaluation and decision-making process within the concept development process. An expert group, consisting of real estate professionals has validated the artifact and the relationship depicted below.

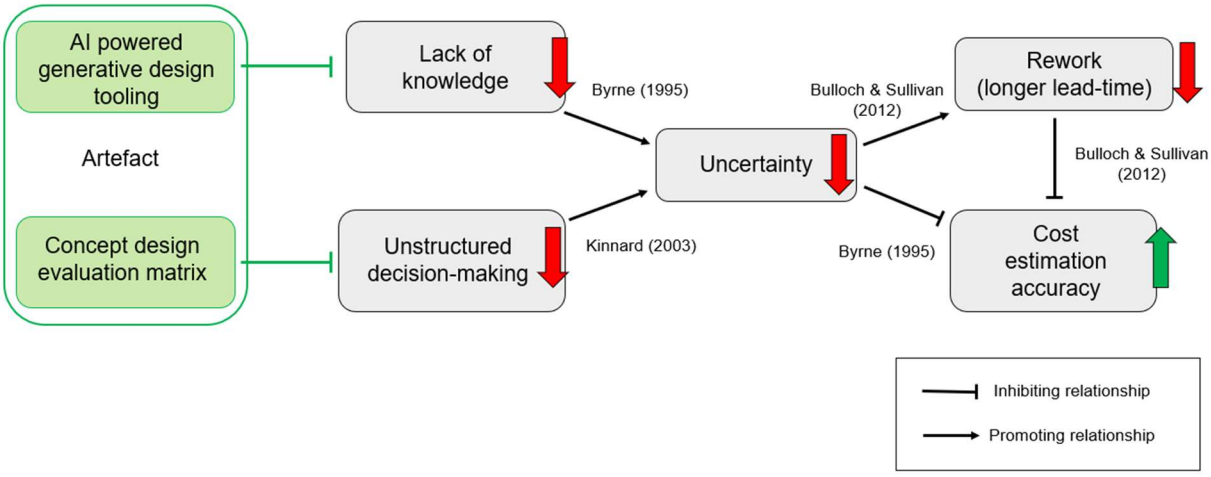

Figure 39: Hypothetical causal model: situation using the developed artifact.

As discussed earlier on in this research, Spacemaker is used as AI powered generative design tool for this research for the verification and validation of the artifact. According to the theoretical framework, the AI powered generative design tooling has the distinctive ability to

allow users to generate a wide variety of concept designs, increasing the quantity of design solutions. Given the scope of this research, this is not further investigated. Another feature of the tooling; the simulation and testing of the concept designs is, as stated in the theoretical framework, valuable for the efficiency increase and to give the developer a better understanding of the performance of the concept design and its relationship with its surroundings. Based on the theoretical framework and the practical data analysis, it can be concluded that especially the environmental parameters of the AI generative design tooling are of added value for the current real estate development process. As explained in subchapter 3.3.2.2, these parameters include: Noise, Daylight, Wind, Sunlight, View distance/View to area. Figure 42 shows an example of a noise pollution analysis using Spacemaker.

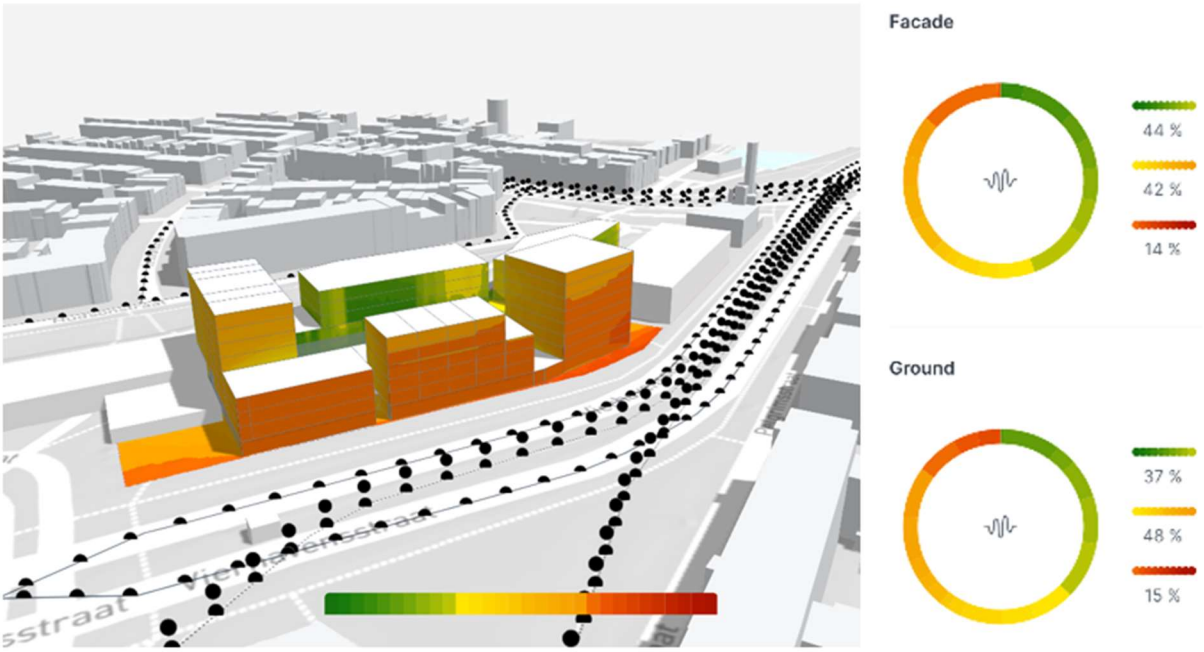

Figure 42: Example of noise pollution analysis using an AI powered generative design tool (part 1 of artifact)

By using the AI powered generative design tooling prior to the decision-making within the concept design process, as schematically depicted below (figure 38), the lack of knowledge and therefore the uncertainty with regards to the feasibility of the real estate development process can be decreased.

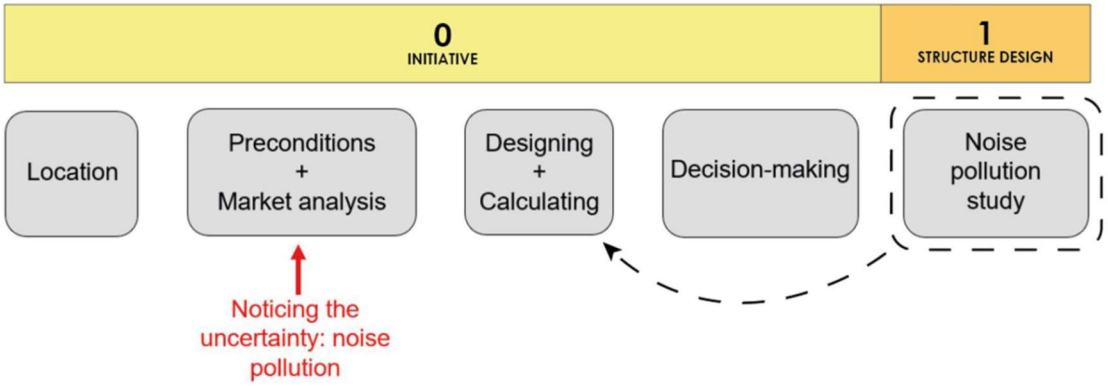

Figure 38: Example of a desired change to the current concept design process (simplified)

This led to the development of the concept design evaluation matrix depicted in figure 53 below (part two of the artifact). The design parameters included in the evaluation matrix are divided

into the following categories: Area, Programme, Building, Parking, and Environmental. The importance of the parameters for the feasibility of the concept development process has been verified by a group of real estate development professionals (n=35).

Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:						
	Built-up area (Dutch: BTO) [m2]:						
	Issuable land [m2]:						
Programme	Houses [n]:						
	Home types:						
	Purchase/rent ratio:	*Rent %*					
		Purchase%					
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*					
		Residential:					
		Parking + storage:					
	Useable area (Dutch: GO)	*Residential:*					
	Form factor (Useable area/GFA):						
	Facade surface [m2]:						
	Lettable floor area (Dutch: VVO) [m2]:						
	Max. Building height [m2]:						
Parking	Parking places [n]:						
	Parking spaces / Houses:						
Environmental	Noise pollution	**Facade**					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
	Wind analysis:	*[Assessment 3D model]*					
	Daylight on facade [VSC]:	*Less than 5 %*					
		Between 5 and 15 %					
		Between 15 and 27 %					
		More than 27 %					
	Sunshine duration on facade [hours]:	**Februari 19:**					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		June 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		October 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
	Viewing distance [m]:	*Less than 400 m [%]*					
		Between 400 and 700 m [%]					
		More than 700 m [%]					
	View to certain point [%]:						

Figure 53: Concept design evaluation framework

The evaluation matrix is based on the lexicographical principle (order the different design characteristics based on importance for the specific case). Using the concept design evaluation matrix, as shown schematically in figure 54, the real estate developer and other relevant stakeholders are encouraged to 1) carefully determine what they consider important for the specific real estate development project, taking into account the site-specific characteristics, prior to the evaluation and decision-making process. 2) By subsequently focusing on these priorities during the location/market investigation and concept design process (for example by focusing on identifying any uncertainties and/or risks related to environmental factors such as noise pollution), the expert panel expects that the developer 3) can better steer the process because the different interests are clear and the developer can better evaluate the results with stakeholders by using the analysis results and ranking scores of the different parameters in negotiations/discussions. The expectation is that this evaluation matrix will provide the developer with a handle to ultimately achieve an even better real estate development result.

Figure 54: Suggested concept design evaluation matrix process, focussed on minimizing uncertainty

The expert group validated the following hypothesis: In case the noise pollution report of the case project would have turned out to be negative during the concept development process (hypothetically) (depicted in figure 55), the labour cost increase due to rework and therefore additional lead-time would have led to an increased labour cost of 25% (as shown in figure 56) within the scope of the hypothesis. It should however be noted that a lot of assumptions have been made (as discussed in Appendix C-18). In addition, the expert group stated that the cost increase could be further specified by taking the additional advisory costs (both the architect and the noise advisor) into account.

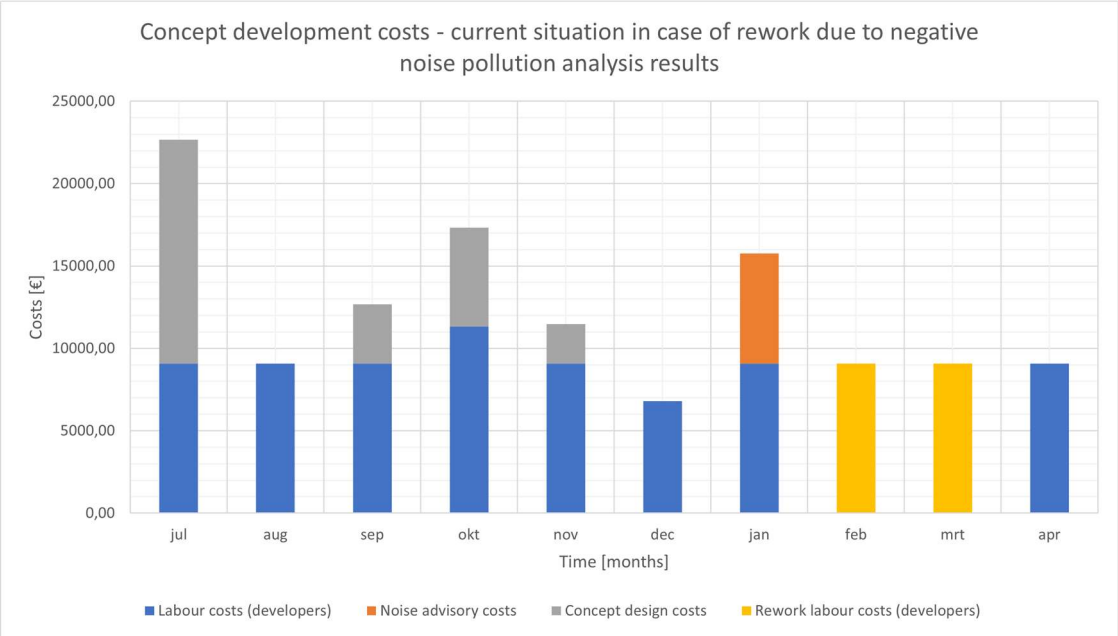

Figure 56: hypothetical labour cost increase due to rework

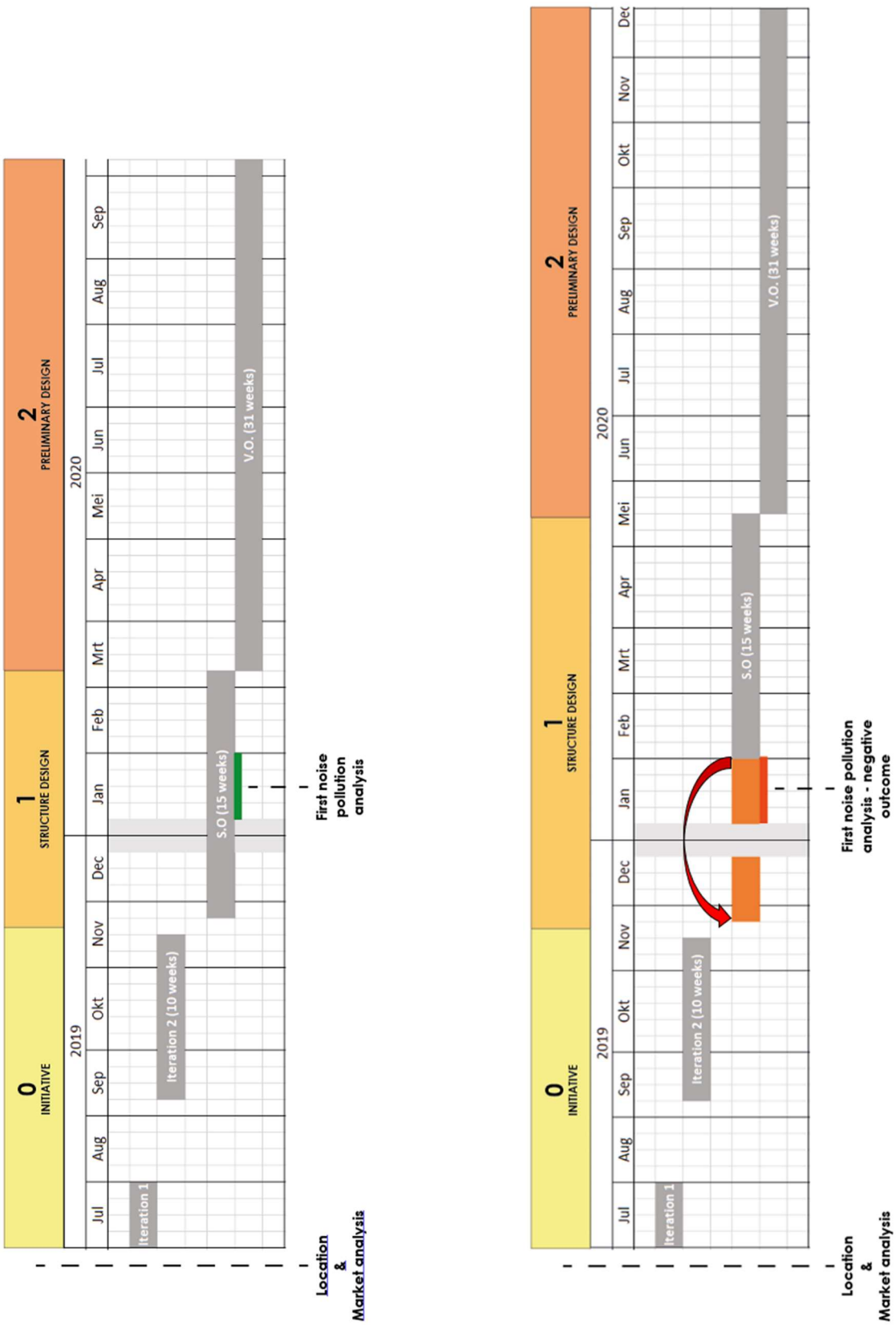

Figure 55: Hypothetical difference in lead-time between situation with sufficient noise pollution report (left) and a negative noise pollution report (right).

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Glossary

AEC: Architecture Engineering Construction

AI: Artificial intelligence

BENG (Bijna Energieneutrale Gebouwen): Since January 1, 2021, all new buildings (Residential or non-residential) in the Netherlands, must meet the BENG requirements (Nearly Zero Energy Buildings (NZEB)). These standards are the result of the European Energy Performance of Buildings Directive (EPBD) and the Energy Agreement for Sustainable Growth (Netherlands Enterprise Agency, 2017).

BEO (Budget exploitatieopzet): Budget exploitation plan

BVO (Bruto vloeroppervlakte): Gross Floor Area (GFA)

EPG (Energieprestatie Gebouwen): ‘‘Energy Performance of Buildings’’. The Energy Performance of Buildings system and the associated determination method drawn up by the NEN on behalf of the Ministry of the Interior and Kingdom Relations. The system’s goal is to provide a clear and transparent technique of determination that may be applied to the context of building regulations (NZEB requirements) (NEN, n.d.)

GO (Gebruiksoppervlakte): Useable Area

MPG (Milieu Prestatie Gebouwen): ‘‘Environmental Performance of Buildings’’. Every request for an environmental permit must include an application of the Environmental Performance of Buildings (MPG) report. The MPG indicates the environmental impact of the materials used in a building. This applies to newly constructed residences and office buildings (greater than 100 m^2) (Netherlands Enterprise Agency, 2017).

PAG (Programma Actualisering Geluidsmanagement Haven- en Industriecomplex): ‘‘Sound Management Actualization Program Port and Industrial Complex’’.

Spatial Planning Act (Wet Ruimetelijke Ordening (WRO)): Specifies how the state, provinces and municipalities’ spatial plans are to be implemented. A municipal land-use plan is an example of a spatial plan (Ministerie van Infrastructuur en Waterstaat, 2017).

1. Introduction

The housing shortage in the Netherlands is big. With a housing shortage of almost 279.000 (3,5% of the total housing stock), the pressure on the Dutch housing market is unprecedented (Capital Value & ABF research, 2022). The Dutch government is committed to reduce this deficit in the coming years. On 15 December 2021, the Dutch government stated in the 2021-2022 coalition agreement that it aims to accelerate the construction of additional homes to approximately 100.000 homes per year. It can be concluded that there is a need for fast real estate development and building procedures. However, the real estate development process in the Netherlands is becoming increasingly complex due to stricter sustainability requirements and associated government regulations, making it harder for the real estate developers to develop feasible real estate projects. This chance in the real estate developer's opportunity space is depicted in figure 1. For example, the environmental performance of building materials will become an increasingly important factor in the total environmental impact of a building. As of January 2021, the MPG, which is part of the Environmental Permit, has been tightened from 1.0 to 0.8. The goal is to have a maximum MPG score of 0,5 by 2030. The MPG is an important measure of the sustainability of a building. The lower the MPG, the more sustainable the use of materials. The MPG is an objective tool in the real estate design process, and it can be used in a Schedule of Requirements to record the outcome of a design process. The environmental impact of materials can be calculated using an MPG calculation (Rijksdienst voor Ondernemend Nederland, 2017).

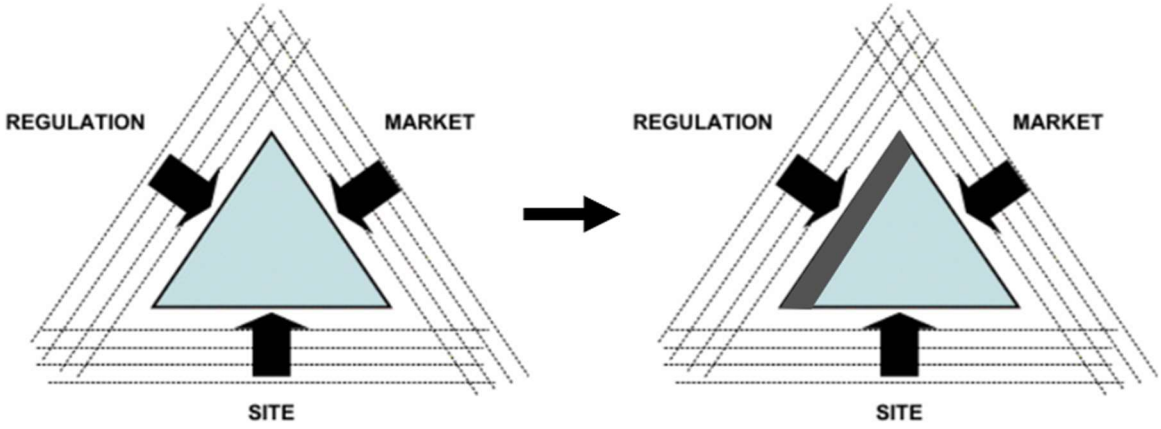


Figure 2: Increasing complexity real estate development process due to stricter rules and regulations. (Source: adapted from Carmona, Heath & Tiesdell, 2010, p.290)

Another important sustainability norm is the is the EPG, which as of January 2021 uses the BENG score as a sustainability measure. Currently, permit applications for all new construction projects must meet these new BENG regulations, including requirements for the maximum energy requirement, fossil energy consumption and the generation of renewable energy in buildings. (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020). Furthermore, since the Energy Performance Buildings norm is getting stricter, the MPG of a building is becoming increasingly important as a measure of sustainability. An important point of attention is the fact that favourable measures for the BENG score may be unfavourable for the MPG and vice versa. For example, thicker insulation or solar cells improve the BENG, but degrade the MPG (Rijksdienst voor Ondernemend Nederland, 2017). According to the Dutch Ministry of Interior and Kingdom Relations (2020), the decisions made in the urban development phase of the real estate development process will have an increasing influence on how easily these sustainability standards and requirement can be achieved.

However, according to Bulloch & Sullivan (2012), real estate developers currently make a lot of decisions in the early stage of the real estate development process based on educated guesses instead of objective information. Opera (2010) states that this uncertainty (lack of knowledge) is an integral component of the real estate development process that needs to be considered in determining the value and therefore the feasibility of a project. Currently, as more information is obtained later on in the process, it becomes clear whether these educated guesses were correct. In case the assumptions were correct, there are no negative consequences, and the development can continue as scheduled. However, this new information often conflicts with the initial assumptions, resulting in rework and additional design iterations, which is often very expensive and time consuming, and therefore increases both the lead time of the development and the total development costs of the project, jeopardizing the feasibility of the project (Bulloch & Sullivan, 2012). These consequences are certainly not desirable considering the current national housing shortage. Bulloch & Sullivan (2012) emphasize the importance of timely information provisioning to prevent those consequences from happening. This is certainly true now that the preconditional framework of the development is becoming stricter, leaving less room for development errors caused by decisions based on educated guesses.

1.1 Problem statement

The increasing complexity within the real estate development process due to additional sustainability requirements and associated government regulations leads to an increasing uncertainty with regards to the feasibility of the real estate development project. These stricter regulations add more components to the preconditional framework, leaving less development space and room for mistakes for the real estate developer. The importance of knowledge about the design task is therefore becoming increasingly important. However, uncertainty in the form of a lack of knowledge during decision making plays a large role in the current real estate development process. A lot of decisions made at an early stage are based on educated guesses, which if estimated wrong, could lead to consequences in the form of rework, additional design iterations and an increasing lead time that potentially could jeopardize the feasibility of the project. Given the current housing shortage in the Netherlands, this is certainly not desirable.

An increase in the amount of knowledge concerning the design task at an early stage of the real estate development process could potentially reduce the uncertainty with regards to the feasibility of the project. Recent developments in the field of generative design enables architects and real estate developers to use AI powered generative design tools during the concept design stage of the real estate site planning process. This enables them to increase the amount of knowledge of the specific design problem, on the one hand by quickly generating a wide variety of concept designs, while on the other hand better determine the characteristics of these concept designs and optimize them based on their relationship with their environment using simulation and visualisation techniques. The combination of AI and machine learning algorithms enables these tools to process more data resulting in more informed choices and develop faster design options than human design teams can do (Cousins, 2021). This corresponds to the research from Pahl & Beitz (1996), focused on the engineering domain, in which they state that especially the quantity of the design solutions at the beginning of the design process is important. A larger amount of concept designs increases the possibility of having a suitable design solution for the specific problem(s). There are a number of practical examples known from Spacemaker (one of the companies that offers an AI generative design tool for site planning) with a proof of concept. In 2020, the French architectural firm Valode et Pistre and Spacemaker signed a research and development collaboration for two projects. In one of the experiments, two teams of architects worked on the same design proposal. One team used AI software, the other team did not. This research concluded that the team using the AI tool finished its proposal earlier than the other team, decreasing lead-time (Kiel, 2021).

Although the use of AI powered generative design tooling during the concept design stage of the real estate development process could potentially be used to analyse and evaluate the impact of the design on its environment with quantitative characteristics and reduce the uncertainty with regards to feasibility of the project, there is currently no scientific method to help the designer evaluate the concept designs and enable them to make more grounded decisions based on these criteria. De Boer (1990) states that the evaluation of designs is often poorly structured and that decision-making often becomes a largely subjective activity, based on subjective beliefs rather than objective information. Despite the fact that the decisions made in this phase of the design process form the basis for the end product. It is suggested that decision makers should pay more attention to both the evaluation and decision making within the design process.

1.2 Research objective and scope

Despite the lack of proper evaluation and decision-making methods in the field of real estate development (more specifically during the concept design stage of real estate site planning) that enable the real estate developer to make decisions based on objective information rather than educated guesses, there are several evaluation and decision-making methods focused on concept design evaluation and decision-making in general product development or product development in the engineering field.

The goal of this research is to develop a concept design evaluation framework that can be used by the real estate developer, during the concept design stage of inner-city apartment buildings in the Netherlands. This framework should help the concept designer(s) to make more informed choices (based on additional objective information) earlier on in the design process to decrease the uncertainty with regards to the feasibility of the real estate development project. The framework will be developed considering the current visualisation and simulation abilities of AI powered generative design tooling.

1.3 Scientific relevance: development gap

A lot of research is done in the field of generative design and Building Information Modelling (BIM) integration for the design of single buildings or constructions. These studies mainly focus on exploring applications and investigating tools (Ma, Wang, Wang, Xiang & Sun, 2021). Another application for the generative design concept is the urban planning and area development field. Studies can be found that investigate different ways to overcome the difficulty of integrating urban analytics and generative design methods (Koenig, Miao, Aichinger, Knecht & Konieva, 2019). However, a recent development in the generative design field enables architects and designers to use AI powered generative design tools during the concept design stage of real estate site planning to optimize the automatically generated designs, based on their relationship with their environment. The combination of AI and machine learning algorithms enable these tools to process more data and develop faster design options than human design teams can do (Cousins, 2021). In order to optimize the use of these new generative design, visualisation, and simulation software during the concept design stage of real estate site planning and make this process less dependent on subjective judgement, while creating higher quality buildings, there is a need to reframe the evaluation and decision-making process of the concept design stage within real estate site planning.

As discussed in paragraph 1.2, there are several evaluation and decision-making methods focused on concept design evaluation and decision making in general product development or product development in the engineering field. By developing a concept design evaluation framework for the concept design stage of real estate site planning based on input from excising literature and key-actors in this field of practice, a scientific contribution can be

realised, filling the development gap. This study focusses on the real estate site planning process, according to the standards and legal requirements set in the city of Rotterdam, the Netherlands. Furthermore, as stated in paragraph 1.2, the framework will be developed considering the current visualisation and simulation abilities of AI powered generative design tooling.

1.4 Development statement & research questions

Based on the problem statement, the aim of the research and the development gap, the following main development statement can be formulated:

''The lack of objective knowledge during the often poorly structured concept design evaluation and decision-making process increases the uncertainty regarding the feasibility of the project''

Several supporting theoretical and exploratory sub-questions are formulated in order to find a solution for the development statement, by developing an evaluation and decision-making framework for the concept design stage within real estate site planning process, suited for the use of AI powered generative design tooling.

- *SQ1: ''How is the current concept design stage of the real estate site planning process organised according to the literature, key-actors and case documentation?''*

The first question focusses on the current real estate site planning process according to the literature, case documentation study and key-actor interviews, and serves as the basis of the theoretical framework. It positions the concept design stage of real estate site planning within the real estate development process. By answering this sub-question, a general overview of the different processes in real estate site planning is given, and it can be concluded whether the concept design process from the case documentation corresponds to the theory from the literature. This question will be subdivided into the theoretical part: SQ1-a and the practical part: SQ1-b, after which a comparison will be made, and the conclusion will be formulated in SQ1.

- *SQ2: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature, key-actors and case documentation?''*

Define uncertainty with regards to the feasibility of a real estate development project according to the literature, investigating evaluation and decision-making theories to find out how the evaluation and decision-making process is defined according to literature (both in real estate development and other product development fields), and determine which design parameters are important for the remainder of this research. Furthermore, using case documentation and data retrieved from interviewing key-actors involved in the concept design stage of the real estate site planning process to determine which problems generally influence the uncertainty with regards to the feasibility of the real estate project, and to determine which design parameters / categories are relevant for the concept design evaluation framework. This question will be subdivided into the theoretical part: SQ2-a and the practical part: SQ2-b, after which a comparison will be made, and the conclusion will be formulated in SQ2.

- *SQ3: ''What is the suggested influence of the use of AI powered generative design during the concept design phase on the real estate site planning process according to the literature?''*

In order to complete the theoretical framework, it is examined what generative design and other relevant concepts entail, and to what extent these concepts are applicable to the current

real estate site planning process according to the literature. Furthermore, the results from the literature study can possibly be used as input for the determination of the parameters used in the concept design evaluation framework.

- SQ4: *''How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?''*

SQ1, SQ2 and SQ3 serve as input for SQ4, in order to develop a solution for the development statement. Based on the findings from the literature study and practical data analysis, a concept design evaluation framework for the concept design stage within the real estate site planning process can be developed. This framework should help the concept designer(s) to make more informed choices (based on additional objective information) in a structured manner, earlier on in the design process to decrease the uncertainty with regards to the feasibility of the real estate development project. The framework will be developed considering the current visualisation and simulation abilities of AI powered generative design tooling.

2. Research design & methods

2.1 Research design

In order to develop a solution for the development statement: *"The lack of objective knowledge during the often poorly structured concept design evaluation and decision-making process increases the uncertainty regarding the feasibility of the project"*, qualitative exploratory research will be performed as input for the Design Research methodology, also known as Engineering Design or Design Science. According to Sreejesh, Mohapatra, & Anusree (2015), exploratory research aims at understanding the topic being researched, at the initial stages of the research process. The process of evaluating existing studies on related topics, discussing the problem with experts, and analysing the situation helps the researcher to define the identified problem. At the end of the exploratory part of the research, the researcher should know what type of information is necessary to develop a solution for the development statement. Dym, Little & Orwin (2014) state that Engineering Design can be seen as a systematic process in which engineers generate, evaluate, and specify solutions for devices, systems, and in this case a process that attain given objective while adhering to specified constraints. In this development process, the specific device, system of process is referred to as the artifact.

In order to complete this study according to the Design Research principles, part of the Engineering Cycle will be used: the Design Cycle. The Design Cycle consists of the first three steps of the Engineering Cycle represented in figure 2 and explained in bullets below. The Engineering Cycle is a rational problem-solving process and consists of the following tasks (Wieringa, 2014):

- Problem investigation: What phenomena must be improved? *(Design Cycle)*
- Treatment design: Design an artifact that could treat the problem *(Design Cycle)*
- Treatment validation: Would this designed artifact treat the problem? *(Design Cycle)*
- Treatment implementation: Treat the problem with the designed artifact
- Implementation evaluation: How successful has the treatment been?

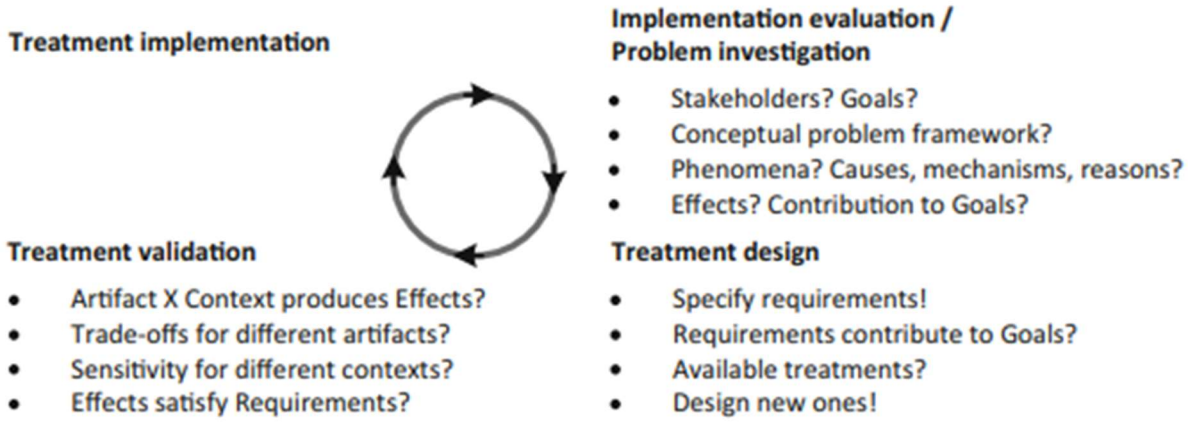


Figure 2: Engineering cycle (source: Wieringa, 2014, p. 28)

2.2 Research structure

In the paragraphs below, the chosen research methods for this qualitative research are discussed. Figure 3 represents the research approach for the different sub-questions.

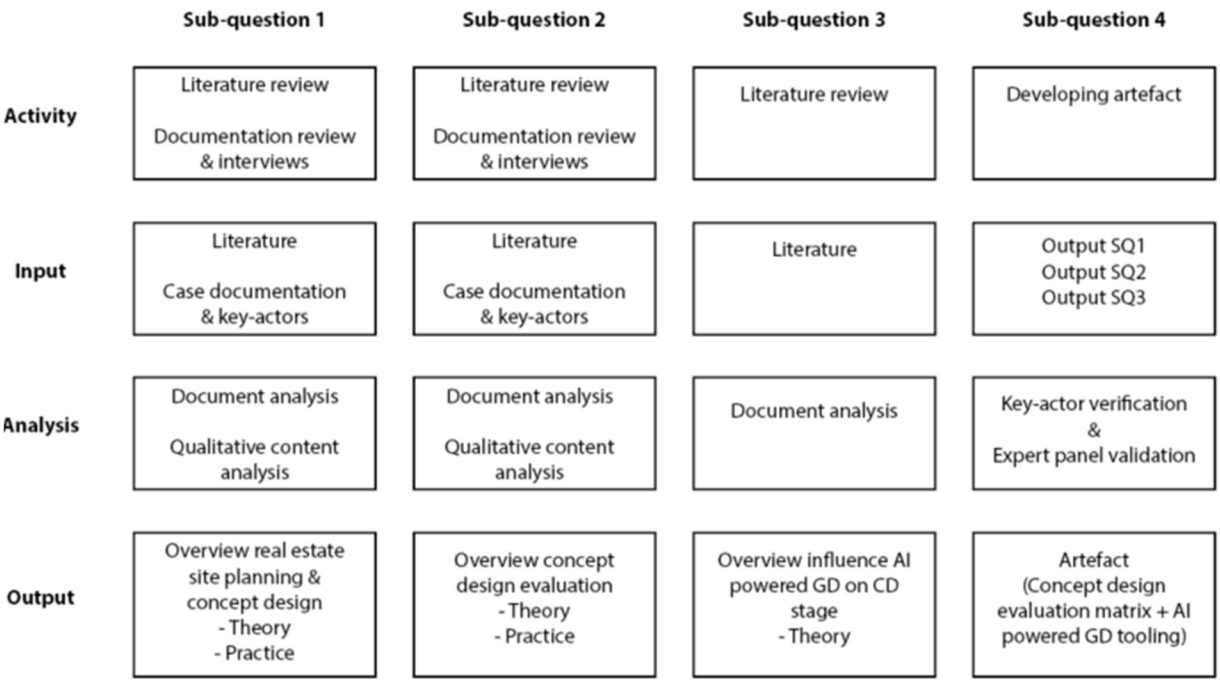


Figure 3: Research Approach

2.2.1 Problem investigation

The exploratory part of this research will form the basis and first step of the design cycle. The Theoretical framework and practical data collection in the Context chapter will be used to answer SQ1, SQ2 and SQ3 and aims at understanding the topic being researched, at the initial stages of the research process. Theory of related topics, discussing the problem with experts, and analysing the situation will help the researcher to better define the identified problem.

Theoretical framework – literature review

In order to draw up a strong theoretical framework, and to answer SQ1-a, SQ2-a and SQ3, literature review will be performed. The definition of basic concepts, such as real estate site planning, generative design, and concept design evaluation and decision-making including theories and methods will be explained. Literature review can be used early on in the development process to better understand the design problem and the protentional users. Excising solutions in different fields of expertise can be used to form a basis for the development of the artifact (Dym et al., 2014).

Context – interview & documentation study

The practical data collection in the context chapter will enable the researcher to define the current problems in the concept design stage within the real estate site planning process according to the key-actors and case documentation. Furthermore, the researcher can define the relevant parameters for the evaluation framework and answer SQ1-a and SQ2-a. Interviews, observations, and documentation study are the three main types of data collection for conducting qualitative research. The use of multiple data sources can increase the reliability of the research according to Yin (1984).

Problem specification
The information gathered in the Theoretical framework and the practical data from the Context chapter will be used to further specify the problem and answer SQ1 and SQ2. Furthermore, this contributes to the specification of the development needs of the artifact in chapter 6.

2.2.2 Design of solution & specification

The second step in the Engineering cycle is to develop the solution for the identified problem. First of all, based on the Problem Investigation, the development needs will be specified, after which the concept design evaluation matrix will be developed as part of the artifact, and finally the developed artifact will be validated. By validating the artifact, SQ4 will be answered. The design decisions are documented in a design specification.

Development needs
This chapter will specify the desires and goals of the artifact. How will the artifact solve the identified problem? In other words, what are the development goals? Furthermore, who are the stakeholders that might be interested in the use of the artifact, and will it contribute to their goals?

Concept design evaluation matrix development
With the excising evaluation and decision-making methods and theories from the theoretical framework as a basis, the input from key-actors in the concept design field within real estate site planning, and the results from the documentation study, an artifact in the form of a concept design evaluation framework will be designed that could potentially treat the identified problem. First of all, the design requirements will be specified, after which the design decisions are specified in the design specification, and finally this part of the research will be finished with the verification of the designed artifact.

Development validation
The third step of the Design Cycle is the validation of the designed artifact. According to the Design Research methodology, the artifact validation is done prior to the implementation and should justify whether the developed problem solution would contribute to the stakeholder's goals if implemented (Dym et al., 2014). In order to validate the problem solution, an expert panel consisting of three real estate development professionals will determine whether the designed artifact meets the development needs and would solve the identified problem.

2.3 Source material

Literature review will be used to form the theoretical framework of this qualitative exploratory Design Research. The definition of basic concepts, such as real estate site planning, generative design, and concept design evaluation and decision-making theories and methods will be explained. This knowledge can be found in various sources, but for this master thesis the focus will be on gathering information from books, scientific journals, and papers. As discussed earlier, the practical data collection in the Context chapter is divided into two parts. For the first part, the case documentation will be analysed to gather data for the problem definition and the design of the solution. Dura Vermeer will provide the necessary project information for the case documentation study. In order to verify if the developed artifact meets the design requirements, an AI powered generative design tool is needed. After a market analysis and reflection with Dura Vermeer it was decided to use the AI powered generative design tool Spacemaker for the case study part of this research. Dura Vermeer will provide the Spacemaker license.

For the semi-structured interviews, a format with predetermined, more generally formulated questions (based on scientific theory acquired in the literature study) will be used. However, the researcher may deviate from these predetermined questions in case more detailed information can be acquired. The interviews will be conducted within a research population of experts and stakeholders, also referred to as key-actors. Five interviews will be conducted to increase the validity of this research.

2.4 Justification of the research approach

As explained in subchapter 1.1 Problem statement, there is currently a problem within the real estate development process. There is a need for improvement due to changing circumstances. This research aims at solving this problem. According to Wieringa (2014), one of the main features of design science is to design something, referred to as an artifact, that improves something for stakeholders. Subsequently, the performance of the artifact is investigated in a specific context. During this process, the designer has to investigate the current situation, and identify the needs of the users, in this case the real estate development professionals (Dym, et al., 2014). By following the design research methodology, the researcher can create something (an artifact) to solve the initial identified problem and fill the research gap.

2.4.1 Validity

In research, validity refers to the truthfulness and accuracy of scientific findings, a study is valid if it demonstrates what actually exists. In qualitative research this does not refer to the quantity of the data but to the richness of the information (Le Comple & Goetz, 1982). According to Campbell & Stanley (1966) there are two major forms of validity that include a wide range of possible types of validity: internal and external validity. Internal validity refers to the degree to which study findings are a truthful reflection of reality instead of being the effect of external influences. This research will conduct semi-structured interviews instead of structured interviews, despite the fact that this has a negative influence on the internal validity of the research. In order to increase the internal validity (and the reliability) of the data collection, an interview protocol will be created and followed (Appendix B-1). The degree or extent to which the results can be applied across groups or other situations (generalized) is referred to as external validity. In order to address the external validity of this research, the design specifications of the concept design evaluation matrix have been elaborated on in chapter 7 and Appendix C.

2.4.2 Reliability

Reliability of research refers to the research method's ability to produce consistent results throughout several testing periods. In other words, another researcher who uses the same methodologies should obtain the same or comparable results. It also demands that the researcher is consistent during the research to minimize measurement errors (Brink, 1993). In order to increase the reliability of this research, an interview protocol will be formulated. This provides insight into the data collection process and enables other researchers to repeat the study (Yin, 1984). The interview protocol for this research can be found in Appendix B-1. Furthermore, the design decisions for the concept design evaluation framework will be documented in chapter 7. The (environmental) data used during the verification and validation of the artifact that had to be imported into Spacemaker, and the verification and validation process will be documented in the case verification specifications (Appendix C) and case validation specifications (Appendix D).

2.4.3 Generalisability

According to Yin (1984), generalisability is a significant concern in qualitative research. The concept design evaluation framework that will be developed in this research to decrease the uncertainty with regards to the feasibility of a real estate development project is based on existing theory and information gathered in the form of interviews and documentation study. The artifact, which consist out of the concept design evaluation framework and the AI powered generative design tooling, is designed according to the current capabilities of AI powered generative design tooling and is not limited to the use of Spacemaker.

I - Problem Investigation

3. Theoretical framework

The purpose of the theoretical framework is to improve the understanding of relevant basic concepts within this research such as real estate site planning, generative design, and concept design evaluation and decision-making including theories and methods. First of all, the real estate site planning process will be elaborated on in chapter 3.1, followed by chapter 3.2 Evaluation and decision making within the concept design process. Finally, the differences between the different generative design methods will be explained in chapter 3.3.

The information gathered in this is chapter contributes to answering the following sub-questions in chapter 3.4:

- *SQ1-a: ''How is the current concept design stage of the real estate site planning process organised according to the literature?''*
- *SQ2-a: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature?''*
- *SQ3: ''What is the suggested influence of the use of AI powered generative design during the concept design phase on the real estate site planning process according to the literature?''*

3.1 Real estate site planning

Lynch & Hack define site planning as follows: *''Site planning is the art of arranging structures on the land and shaping the spaces between, an art linked to architecture, engineering, landscape architecture, and city planning.*'' (Lynch & Hack, 1984, p.1). These site plans may concern a small community built, a small cluster of houses or even a single building. The real estate site planning process is part of the real estate development process (LaGro, 2007). Before the real estate site planning process can be discussed, an introduction of the real estate development process as a whole is necessary.

3.1.1 Real estate development

According to De Zeeuw (2018), real estate development (also known as project development) relates to the realization of a real estate object or a limited number of objects. It is often monofunctional and relates to a smaller area than area development. To most people, real estate means the physical houses they live in and the office buildings they work in. Real estate has however, a different meaning to different people according to Brown (2018). Architects for example see a real estate development project as an opportunity to design a building or multiple buildings, that will generate revenue, publicity, and a chance to express their creativity. For real estate investors, a real estate development project could be an investment opportunity, enabling them to earn a higher rate of return on their money than they would earn through savings interest. In this research, real estate will be address from the real estate developer's perspective which makes it, besides all of the things above, primarily a product. The real estate development is seen as the product development. This corresponds to the explanation of Tiesdell & Adams (2011), who state that the Real Estate site planning process is part of the real estate development process, a production process that creates the built environment.
Ambrose (1986) approaches the real estate development process as a transformation process, in which capital is converted into commodities such as raw materials and labour. These commodities are then converted into a saleable commodity in the form of a building, after which the building is converted back to capital by selling it as a commodity in the real estate

marketplace. The extra value that is created during this transformation process through the ‘production’ of the building, enables the real estate developer to sell the building for a profit. In order to be profitable and guarantee the continuity of the company, the amount of capital received from the sale of the building has to be greater than the production costs. The calculation of the expected profit and the risk associated to the realisation of that profit at forehand of the production process is therefore of great importance (Carmona, Heath, Oc & Tiesdell, 2010).
This is in line with the statement of Brown (2018), who states that real estate development is very risky since it requires a relatively large amount of upfront capital investment. Furthermore, every time a developer initiates a real estate project, he attempts something that is never been done before in the exact same way. Each real estate project namely represents a unique combination of location, product, price, and market timing.

The real estate development industry is both complex and diverse according to Ratcliffe, Stubbs & Keeping (2009). They state that the industry is complex in a sense that there are many public and private agencies, both large and small, that undertake the real estate development in a variety of organizational forms and legal entities. The industry is diverse because there are many different businesses across a wide range of sectors within the real estate development industry, which all have different objectives, aims and methods of operation. In order to understand the real estate development process, it is important to identify the key actors and their relationships with each other (Carmona, et al., 2010). As discussed earlier in this chapter, different actors have a different perspective and goal in the process. Figure 4 gives an overview of the different actors in the place-production process and their motivation, subdivided into cost and design-issue parameters. As shown in the table, a distinction is made between supply-side actors (those who produce development/places or contribute to their production), demand-side actors (those who consume development/places), and regulatory actors (those who regulate development/place-production process). The result is a wide variety of actors with different goals and perspectives, which corresponds to the different statements from literature covered in this report that implies that the real estate development industry is both complex and diverse.

	Factors of Motivation				
	Cost		Design Issues		
Development roles	*Time scale*	*Financial strategy*	*Functionality*	*External appearance*	*Relation to context*
Supply-Side Actors *– those who 'produce' development/places or contribute to their production*					
(Initial) Landowner	Transient	Profit maximisation	No	No	No
Land developer	Transient; to completion of project	Profit maximisation	Yes, but only to financial end	Yes, but only to financial end	Yes, to extent there are positive or negative externalities
Parcel/building developer	Transient; to completion of parcel	Profit maximisation	Yes, but only to financial end	Yes, but only to financial end	Yes, to extent there are positive or negative externalities
Development funders	Transient; to completion of project	Profit maximisation	No	No	No
Lenders of patient equity	Long-term	Profit-seeking	Yes	Yes	Yes
Builder	Transient	Profit maximisation	No	Yes	No
Designer	Transient	Profit maximisation/ seeking	Yes	Yes, to extent external appearance/design reflects on them and their future business	No
Demand-Side Actors *– those who 'consume' development/places*					
Investors (Investment funding)	Enduring	Profit maximisation	Yes, primarily as means to financial end	Yes, but primarily as means to financial end	Yes, to extent there are benefits to making positive connections
Occupiers	Enduring	Balance spaces cost against quality and contribution to business returns	Yes	Yes, to extent external appearance symbolises/ represents them	Yes, to extent there are benefits to making positive connections
Adjacent landowners	Enduring	Protect property values	No	Yes, to extent new development has positive or negative externalities	Yes, to extent new development has positive or negative externalities
(Local) Community	Enduring	Neutral in principle; practice may vary	Yes, to extent that buildings are used by general public	Yes, to extent it defines and forms part of public realm	Yes
Regulatory Actors *– those who 'regulate' development/place-production process*					
Public sector	Enduring	Neutral in principle; practice may vary	Yes	Yes, to extent it forms part of a greater whole	Yes, to extent it forms part of a greater whole

Figure 3: Motivation of development actors in the place-production process (Source: Carmona et al. 2010, p. 276)

Multiple models have been created over the years, each of them sees the real estate development process from a different perspective. The model of Miles, Netherton & Schmitz (2015) approaches the real estate development process from the project developer's perspective and divides the real estate (re)development process into eight stages (figure 5). The authors emphasise that the development process is not linear, but partly an iterative process full of renegotiations between the different stakeholders and strategic repositioning. Furthermore, at each stage of the real estate development process, the remaining process stages should be considered when making decisions. According to the model of Ball (1998), real estate development is a function of social relations specific to time and place, involving a

great variety of key-actors such as investors, landowners, developers, financiers, builders, consumers, politicians, etc. A very important and powerful actor in the real estate development process is the government (both local and national). The government sets the regulations and issues the permits required to start the construction works of the real estate project.

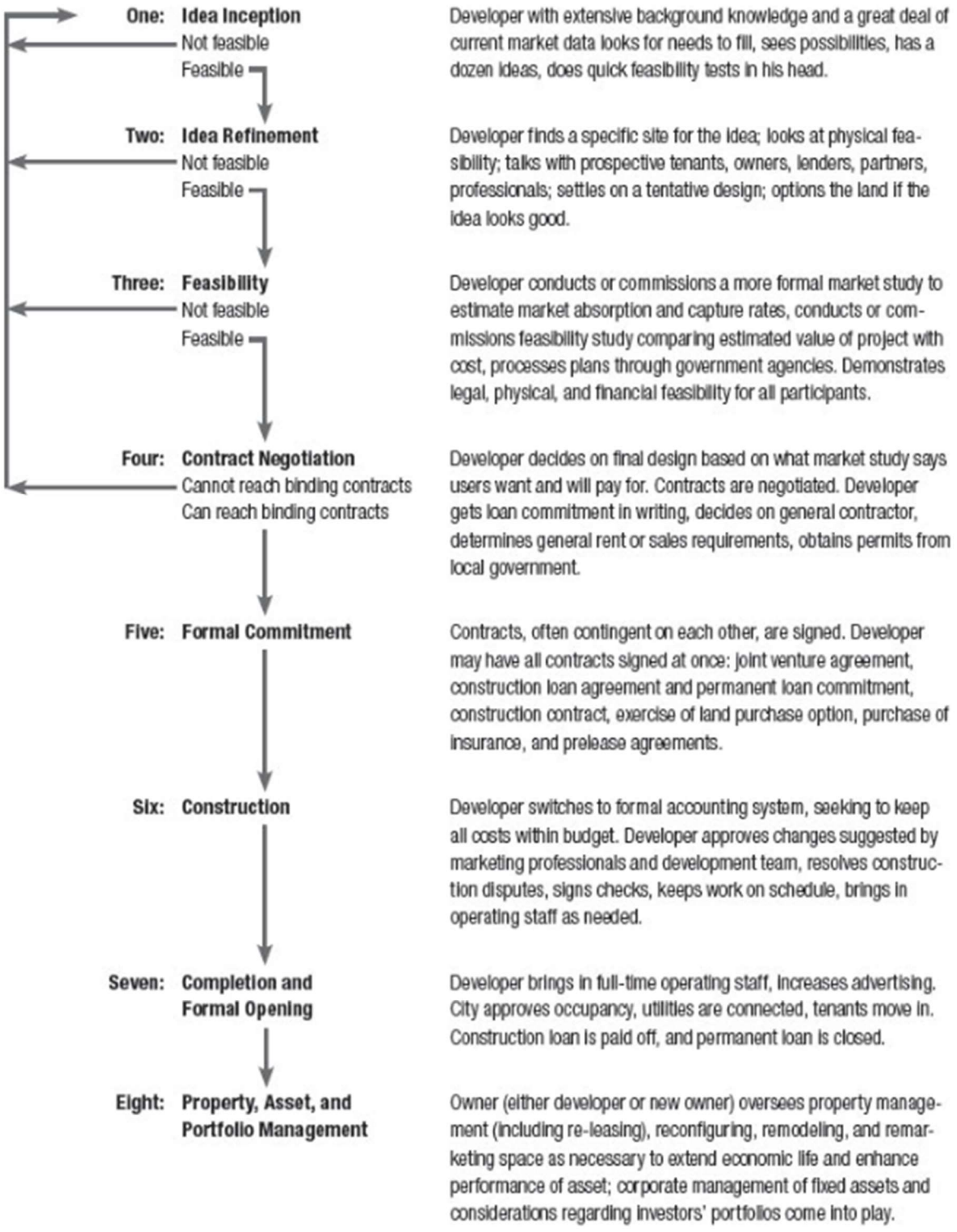


Figure 5: The Eight-Stage Model of Real Estate Development.
(source: Miles, et al., 2015, p. 42)

3.1.2 Governmental influence in real estate development

As discussed in the previous paragraph, the Dutch government is a very important and powerful actor in the real estate development process since it sets the regulations and hands out building permits. In this paragraph the role of the Dutch government in the real estate development process will be elaborated on.

Legislation and regulations in the field of spatial planning and urban development are complex, partly because European legislation is taking on an increasingly dominant position. In 2008, the Dutch government implemented the Spatial Planning Act (WRO). This law made the land-use plan and the spatial vision mandatory. The spatial vision replaces the spatial memorandums, the provincial regional plans, and the municipal spatial plans from the Spatial Planning Act of 1965. In the spatial vision, the national government, provinces, and municipalities have to describe their spatial planning vision and how they plan to implement these policies. The land-use plan is the legal guarantee of the policies described in the spatial vision (Hobma & Jong, 2016).
According to Hobma & Jong (2016), the land-use plan can limit the use of a property since it determines what can be built at the specific location and which regulations apply to it. The land-use plan focuses on the area level, while a spatial vision focuses on the scale levels of the city up to and including the national level. It was not only the plans themselves, but also the mandatory investigations that make spatial planning extremely complex and time-consuming. Such research is not required for a spatial vision, but for a land-use plan it concerns, among other things, research into the cultural-historical value and the archaeological value, often linked to spatial quality. In addition, on the basis of European directives, research must often be carried out into flora and fauna, as well as into a large number of environmental aspects such as noise, soil pollution and nuisance. Figure 7 gives an overview of relevant examples. Finally, the social and financial feasibility must also be demonstrated before the plan can be initiated. These findings are often published in a Memorandum of Principles before the land-use plan procedure is started. Based on the inventory carried out and retrospective assessment, the Memorandum of Principles discusses the findings in the plan area and proposes how to deal with them. Insight is also often provided into the planning and lead time of the land-use plan process. The Memorandum of Principles is prepared and adopted by the municipal executive and presented to the municipal council for discussion. The Memorandum of Principles sets the framework for the land-use plan (Gemeente Zandvoort, 2017).
In line with this spatial planning legislation, the Housing Act also plays a crucial role in area development, if only because an environmental permit is required in order to build. Not only the permit is regulated in the Housing Act, but the visual or architectural quality is also tested via the city's aesthetics policy (Meyer, Westrik & Hoekstra, 2014).

As stated in the previous section, before the construction works of a project can begin in the Netherlands, an environmental permit for building projects is almost always required. In 2010, the Dutch government implemented the environmental permit, thereby replacing a lot of individual permits that had to be granted before the construction works of a real estate project could be initiated. According to Hobma & Jong (2016), the environmental permit includes among others the following former permits: the environmental permit of the Environmental Management Act, the building permit, the construction permit, the monuments permit, and many more.

Categories	*Subcategories*	*Attributes*
Physical	Soils	Bearing capacity
		Porosity
		Stability
		Erodibility
		Fertility
		Acidity (pH)
	Topography	Elevation
		Slope
		Aspect
	Hydrology	Surface drainage
		Water chemistry (e.g., salinity nitrates or phosphates)
		Depth to seasonal water table
		Aquifer recharge areas
		Seeps and springs
	Geology	Landforms
		Seismic hazards
		Depth to bedrock
	Climate	Solar access
		Winds (i.e., prevailing or winter)
		Fog pockets
Biological	Vegetation	Plant communities
		Specimen trees
		Exotic invasive species
	Wildlife	Habitats for endangered or threatened species
Cultural	Land use	Prior land use
		Land use on adjoining properties
	Legal	Political boundaries
		Land ownership
		Land use regulations
		Easements and deed restrictions
	Utilities	Sanitary sewer
		Storm sewer
		Electric
		Gas
		Water
		Telecommunications
	Circulation	Street function (e.g., arterial or collector)
		Traffic volume
	Historic	Buildings and landmarks
		Archaeological sites
	Sensory	Visibility
		Visual quality
		Noise
		Odors

Figure 7: Examples of physical, biological, and cultural attributes that can be used to map site attributes. (source: LaGro, 2007, p.16)

Legislative planning changes are constantly taking place. Since 2012, the Dutch government has been striving for a strong simplification of legislation by integrating all laws with a spatial planning component into one Environment and Planning Act. Currently, the implementation of the Environmental and Planning Act is scheduled for January 1st, 2023 (Ministerie van Infrastructuur en Waterstaat, 2022) In this Environment and Planning Act, the land-use plans are replaced by one environmental plan for each municipality. The spatial vision from the Spatial Planning Act is included in an integral, strategic plan called the 'environmental vision', which also includes sectors such as water, environment, and traffic (Ministry of Infrastructure and Environment, 2014).

3.1.3 Risk and uncertainty in real estate development

The approach a developer uses to determine the cost or profit level at which a project in development would be financially feasible is known as a development appraisal, also known as residual value. The strategy is to determine the capital value of a projected future income (sell price of the realised development) and then subtract all the expected costs. In essence, it quantifies the development process in order to calculate the value of a set benchmark (Loizou & French, 2012).

Residual to Land Value

GDV Gross Development Value: Value of the completed development	-	**Total Costs** All construction costs. Interest on construction, professional fees & Developer's Profit	=	**Gross Residual** Maximum bid for site includes acquisition costs, professional fees & finance of land purchase.

Residual to Profit

GDV Gross Development Value: Value of the completed development	-	**Total Costs** All construction costs as above but including Land Value as a cost	=	**Developer's Profit**

Figure 8: Residual to land value & residual to profit (Source: Loizou & French, 2012, p.200)

Figure 8 shows the calculations of either the residual to land value or to profit. This indicates that the residual value can either represent the expected profit, or the residual land value in case the land value has been included in the costs of the development. The correctness of the input values is important for the reliability of the profit or residual land value estimation. It is challenging to account for all of the uncertainties involved in property development in a standard spreadsheet study. According to Loizou & French (2012), a more thorough analysis should focus on the uncertainties associated with each of the factors that influence the financial outcome of the project. MacFarlane (1995) states that real estate developers overall consistently underestimate the risk associated with real estate development. This results in the fact that for example the land value is overestimated or that the expected profit is too low to compensate for the risk level. Finance costs, construction costs, land costs, timing, sale/rental rate/price, procurement, and design are the main sources of uncertainty in the real estate development process according to Loizou & French (2012). Numerous other sources in different sub-processes and functions fall under these general themes according to the authors. A brief explanation of these factors is given below:

- **Financial risk:**
  In case the construction loan includes a variable interest rate, the real estate development party is at risk for interest rates that fluctuate or unaffordable interest payments due to delays in the building process. Increases in interest rates and time deplete the developer's resources, therefore reduce the profit margin of the development, which could lead to an unprofitable development.

- **Construction cost:**
  When developing any type of real estate project, construction costs is the developer's largest expenditure according to the authors. The physical characteristics of the land and the design of the building, building regulations and sustainability issues all affect the construction costs of the development. In addition, modifications to the construction schedule throughout the construction process might cause delays, potentially putting the developer at financial risk.

- **Land cost:**
  The suitability of a land plot for a certain purpose directly affects a locations land value or cost. It is important that the developer determines the restrictions on the specific land plot by contacting the local authorities and conducting preliminary research. This can be used in the calculations of the construction costs and in the estimations of the expected revenue / profit of the development project.

- **Timing:**
  According to the authors, delay can lead to conflicts between the different contractual parties and cause an unexpected increase in finance costs. It is therefore considered to be an important risk factor for the real estate development process.

- **Sale/rent:**
  The decision to move on with a real estate development project is often made by a developer based on the financial feasibility of a project; the difference between the estimated revenue and costs (as described in sub-chapter 3.1.3). Any changes to the sale/rent price of the properties can lead to unforeseen losses or higher profits.

- **Socioeconomic:**
  The risks and uncertainties described above are all internal development risks. In addition, the real estate development project may experience unanticipated consequences due to shifts in political confidence or adjustments to the economy on a regional or (inter)national level.

According to Byrne (1995), it is generally agreed that uncertainty in the real estate development process is a result of a lack of knowledge and inaccurate or incomplete information about the input parameters that are used in the analysis. The residual results of the analysis are unclear if the developer is unable to verify the accuracy of the input parameters.

3.1.4 Real estate site planning

Since a general overview of the real estate development process and the important role of the Dutch government is given, the real estate site planning process can be further explained. As discussed in chapter 3, the site planning process is part of the real estate development process. LaGro (2007) visualised the real estate site planning and design process (figure 9) and divided the process into 4 stages:

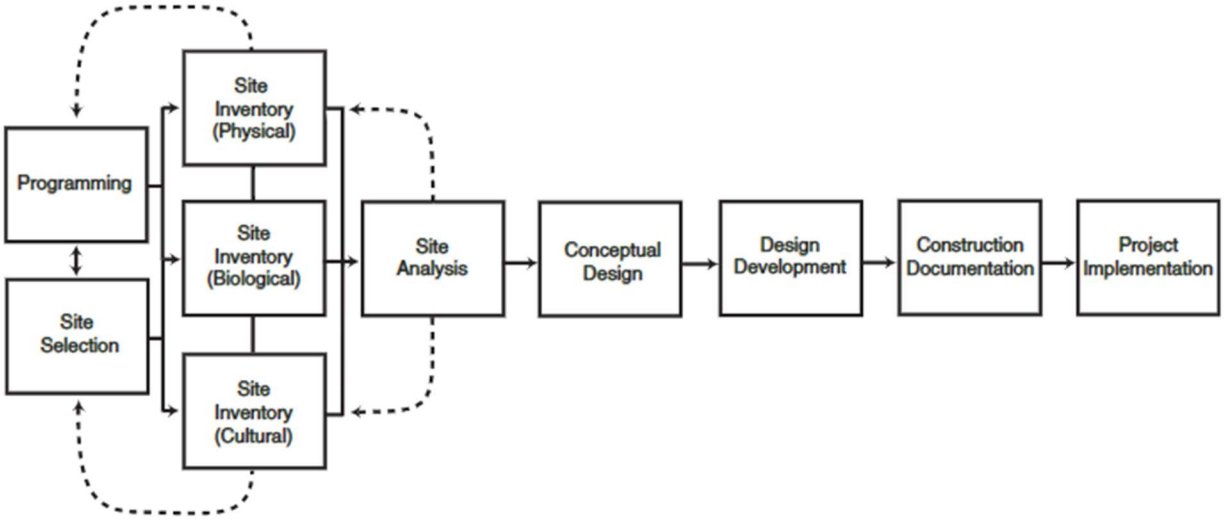


Figure 9: Real estate site planning and design process (source: LaGro, 2007, p.14)

3.1.4.1 The site planning and design process

Preproject / Predesign phase

According to Lagro (2007), the site planning process starts with the Programming phase depicted in figure 9. A client (private individual, non-profit organizations, state or local governments, etc.) initiates the site planning project, in the context of this report a real estate project. During the programming phase the client determines the projects objectives and functional requirements, taking into account his / her own objectives and preferences. In order to define these objectives and functional requirements, the client often uses data retrieved from market analysis, user demand studies, and the analysis of relevant precedents.

This stage corresponds to the first stage of the real estate development process according to Miles, et al. (2015) depicted in figure 5. Since this model approaches the real estate development process from the developer's perspective, the client's role is fulfilled by the developer.

Site assessment phases

Lagro (2007) divides the Site Assessment Phases into Site Selection, Site Inventory and Site Analysis (figure 9). The Site Selection phase can be entered in two different ways, the client (or according to the model of Miles, et al. (2015) the developer) either owns a site and chooses a program to develop on this piece of land, or he / she has a program and needs to find a site that fits this program. In paragraph 3.1.4.2 of this study the process of land valuation will be further discussed.

During the Site Inventory phases, important physical, biological, and cultural attributes are being mapped, in order to determine whether the site is suited for the respective program during the Site Analysis phase. Appendix 2 gives an overview of some relevant attributes that may be mapped during the Site Inventory phase. Many of these attributes are part of the submission requirements and the national rules set by the Dutch government for the application for an environmental permit.

Besides the fact that the site has to be suited for the development of the program on legal grounds, the Site Analysis considers the objectives and requirements of the client. According to LaGro (2007), site suitability is a function of the site's opportunities and constraints, or assets and liabilities. Platt & Curran (2003) state that the Site Analysis can be used to assess whether environmental remediation is necessary, which buildings and infrastructures can be used or have to be demolished or adjusted, and to

determine how adjacent properties can be protected from contamination during construction. Furthermore, the Site Analysis gives the developer or client a better understanding of the plot, which is important for the negotiation and design phases of the site panning process (LaGro, 2007). This stage of LaGro's site planning and design model has again similarities with the eight-stage model of Miles, et al. The Site Assessment Phases corresponds to the Idea Refinement stage (figure 5). The developer finds a specific site for the idea (Site Selection), after which he/she looks at the physical feasibility, etc., to consider whether the site fits the idea (Site Inventory + Site Analysis).

Design phases

Within this stage a distinction is made between the Conceptual Design Phase, the Design Development Phase, and the Construction Documentation Phase. During the Conceptual Design Phase, the site analysis flows directly to the concept development. Using the data retrieved during the Site Inventory and the insight from the Site Analysis, the site design will be adapted to fit the environmental constraints. This is an iterative process that eventually determines the spatial organisation of the site and often leads to multiple concept designs. The concept designs and the associated budget estimations will be assessed to determine if the program and/or the concept designs are realistic and feasible. If not, the concept developers can either go back to the drawing table or select a different site for the program. LaGro (2007), also states that multiple design concepts can be useful when seeking consensus from a diverse set of stakeholders. If for example both concepts are feasible but one of them is clearly superior to the other, comparing the two concepts can be more persuasive than presenting only one feasible concept. More information about design concepts can be found in paragraph 3.1.4.3.

In the Design Development Phase, a transformation is made from a conceptual design to a more detailed design. This includes documents of the building such as three-dimensional perspectives, the surroundings of the building including parking lots and walk paths, floor plans, sections, elevations, etc. As soon as these documents are approved, the Construction Documentation phase begins. More detail will be added to the building documents, transforming them to construction drawings with written construction specifications. Once these documents are approved and the projects financing is acquired, the governmental permits can be requested, and the Implementation Phase can begin (LaGro, 2007). This stage of LaGro's site planning and design model corresponds to the third and fourth stage of the eight-stage model of Miles, et al. (2015) as shown in figure 5. In the third stage called ''Feasibility'', the developer verifies if the design concepts suffice to the program and if the estimated revenue outweigh the estimated costs. In the fourth stage of the eight-stage model called ''Contract negotiation'', the developer decides on the final design and the contract negotiation starts. Depending on the structure of the building contract, a contractor can be appointed, and the final governmental permits can be requested.

Implementation phase

The type and number of governmental permits that are required before the construction can start depends on the location and the scope of the project according to LaGro (2007). Once these final permits are acquired and the final contracts are signed, the site planning process is over and construction works can begin. This corresponds to the fifth stage of the eight-stage model of Miles, et al. (2015) called ''Formal Commitment''. In this stage the final contracts are signed, and the last preparations are made before the construction stage begins.

It can be concluded that the first five stages of the eight-stage model of Miles, et al. (2015) (figure 5) have a significant correspondence with LaGro's site planning and design model

(figure 9). For the remainder of this study, the site planning and design model of LaGro (2007) will be used as a reference for the site planning process.

3.1.4.2 The value of land

Real estate development cannot happen without land, this ensures that the landowners who own the land have a significant amount of power in the real estate development process. A distinction can be made between active and passive landowners. Active landowners fulfil the role of the developer by making their land available for development, or by realising the development themselves. They often seek for opportunities by trying to avoid the site constraints set by the (local) government. Passive landowners have no commercial interest in land development and do not always want to sell their land to a party that wishes to develop on their land (Adams, 1994). In case a passive actor does not wish to accommodate and turns negotiations etc. down, the local authorities have the power to expropriate the land (Hobma & Jong, 2016).

As discussed in paragraph 3.1.4.1, during the Site Assessment Phases the developer or client inventories what land plot are either already acquired and available for development or are available on the market and suited for the initialized program. In both cases the developer has to determine the land value of the given plot in order to assess whether the program and later the concept design is financially feasible. According to Carmona, et al. (2010) the economic value of land is derived from two sources; 1) the socially or ‘‘community-created’’ value: the land itself, and 2) the ‘‘owner-created’’ value: the improvements built upon that land. The value of the land itself depends mostly on its geographical location and its connection to infrastructure networks (roads, electricity, and water supplies, etc.), natural amenities (forest, beaches, etc.), and physical amenities (hospitals, shops, schools, etc.). Rypkema (2001) states that this is the most extensive part of the economic value of land and that the economic value of land therefore mostly is derived from its surroundings. The community-created land value cannot be influenced by the landowner directly. He or she is dependent on the rules and regulations set by the government and the actions of the community as a whole.

The owner created land value can be influenced by the landowner to some extent (he/she must abide by government rules). This source of value is namely derived from the buildings, roads, etc. itself built on the land plot.

3.1.4.3 Concept design

After the plot is purchased, the next step in the real estate site planning process is the creation of a concept design for the plot. Real estate and/or area developers need to explore multiple alternatives during the design process. This exploration happens mostly during the conceptual stage of the design process, using pencil and paper, to create the different alternatives (Krish, 2011). Tiesdell & Adams (2004), created the concept called Opportunity Space (represented in figure 10), developed to conceptually visualise the potential or scope to create a viable development and a better design. The concept of opportunity space differentiates the developer’s opportunity space with the designer’s opportunity space. The developer’s opportunity space is framed by the three most important factors and boundaries in the real estate development process; the development site and its local context, the market context, and the regulatory context. These boundaries are flexible and depend on the negotiating abilities of the involved actors and their mutual relationship. Despite the fact that the boundaries are relatively fixed at any specific moment in time, they can change and shift over time. The market’s demand and the regulatory framework can change over time for example, creating new opportunities and enlarging or reducing the developer’s opportunity space. This is in line with another statement from Tiesdell & Adams (2011), that states that location, product, and timing are the most important factors in the real estate development process. Carmona, et al. formulate it as follows: *‘‘The right product in the right place at the right time’’.* (Carmona, et al., 2010, p.260). A larger opportunity space enables the developer to steer in its own interests, creating a situation of producer sovereignty (Tiesdell & Adams, 2011)

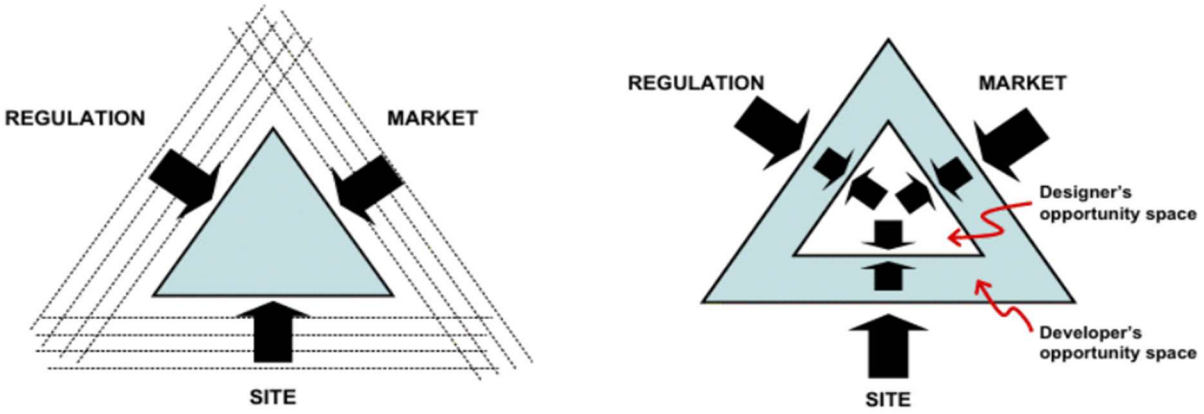


Figure 10: The developer's opportunity space (left) & The designer's opportunity space (right). (source: Carmona, et al., 2010, p. 290)

Within the developer's opportunity space lies the opportunity space of various other actors involved in the real estate site development process, often members of the developer's consultancy team. The other actor's opportunity space is, in this example the designer's opportunity space as shown in the right image from figure 10, constrained by the same forces as the developer. Moreover, it is also influenced by the way the developer interpretates these forces and subsequently steers these forces to the other actor. The real estate developer sets the initial agenda and broad parameters for the design, and the other actors (in this case the designer) compete for their own opportunity space and try to find a way to achieve their own objectives (Carmona, et al., 2010).

3.2 Evaluation and decision making within the concept design process

As discussed in chapter 2, this research focusses on the optimalization of the concept design evaluation process within real estate development, and more specifically real estate site planning, to decrease the uncertainty with regards to the feasibility of the real estate project. Now that the real estate development process and the real estate site planning process have been discussed in chapter 3.1, including a global introduction to the concept design stage in chapter 3.1.4.3, the processes within the concept design stage and the important considerations will be discussed.

3.2.1 The concept design process

Figure 11 represents the different stages within the concept design process according to Derelöv (2009). The process is divided into three main stages; 1) Information-collecting activities, which include the specification of the design goals, the synthesis where the different design alternatives are generated, and finally the analysis where the estimated behaviour of the alternatives are analysed, using pre-determined performance parameters; 2) the evaluation activity, which entails the assessment of the solution's goal fulfilment, taking the validation into account; 3) the decision-making activity, in which the potential solution(s) are selected.

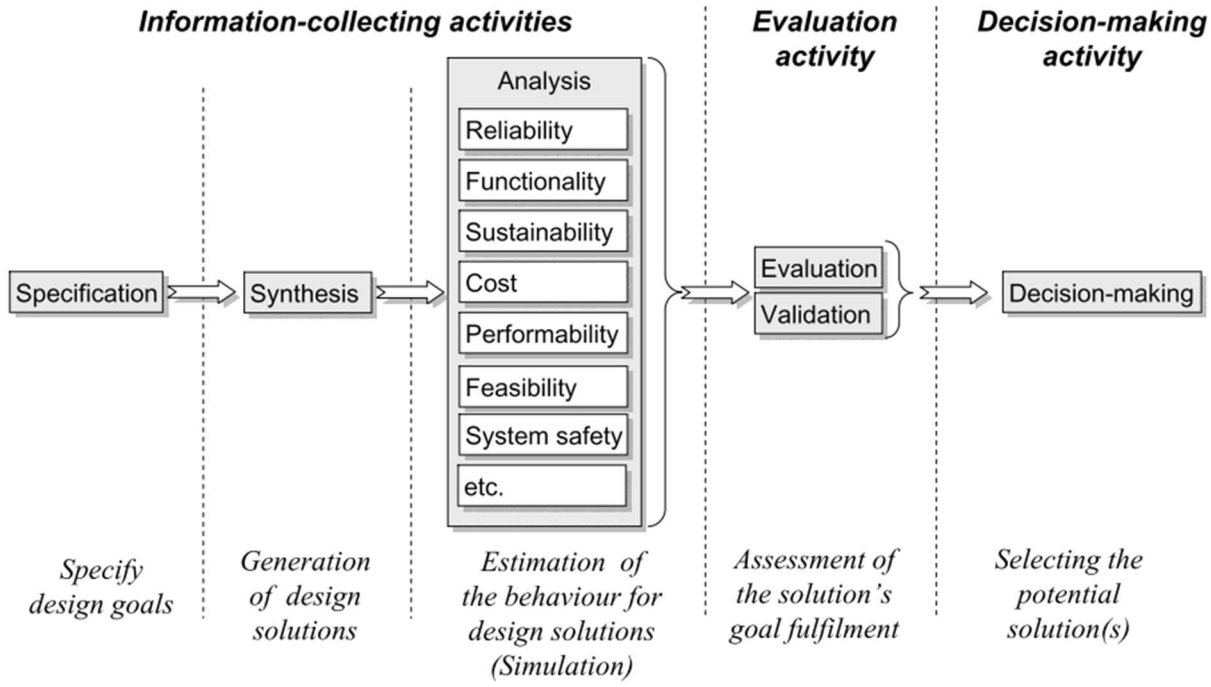


Figure 11: The design process based on the basic design cycle of Roozenburg & Eekels (1996). (source: Derelöv, 2009, p. 19)

The duration of the design process can be characterised by using two dimensions according to Derelöv (2009). The first dimension is the design freedom of the solution space, the second dimension is the knowledge about the design task/solution. Figure 12 represents the relation between these two dimensions, including the desired development of the relation between them. The dotted line represents the standard relation between the two dimensions in the design process, and the uninterrupted lines represent the desired development of the relation between these dimensions. This theory concluded that in the beginning of the (concept) design process, the design freedom is relatively high because there is relatively little knowledge of the design problem. As time progresses, the amount of knowledge about the design problem increases due to information collecting activities, with the result that the design freedom of how to solve this problem decreases. At the end of the design process, the knowledge about the design task is relatively large and the design freedom is relatively limited. Remarkable is the fact that the design choices made at the start of the design process have relatively more impact on the final design outcome than the design choices made at the end, despite the fact that these early design decisions are based on significantly less knowledge (Derelöv, 2009). This supports the importance of good information collection at the beginning of the design process.

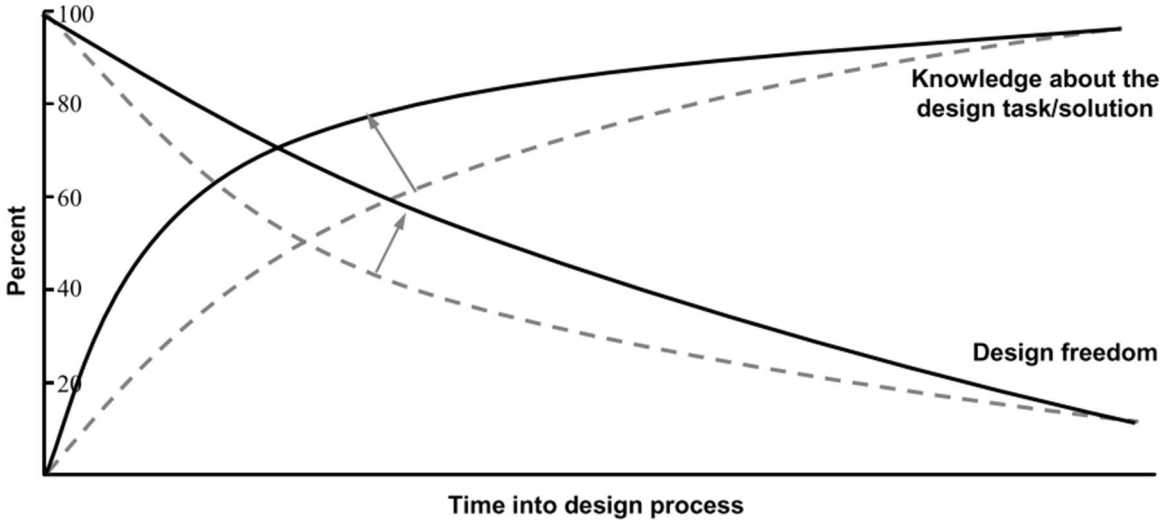


Figure 12: Desirable development of the relation between design freedom and design knowledge within the (concept) design process. (source: Derelöv, 2009, *p. 20)*

Derelöv (2009) emphasizes and elaborates that the information collecting activity (see figure 11) is focussed on increasing the understanding of a certain (concept) design solution and has a great impact on the evaluation process. Primarily because the evaluation itself is basically the assessment of the of the analysis of multiple parameters and sub-activities within the information collecting process. These sub-activities and parameters are based on the initial information. Therefore, can be concluded that the quality of the evaluation depends to a large extend on the quality and quantity of the initially collected information. In order to increase the reliability of the concept design evaluation in the early phase of the design process, it is important to improve the execution and widen the scope of the information collecting activities. It should however be noted that it is important to keep the design freedom open for as long as possible. Pahl & Beitz (1996) state that the quantity of the solutions at the beginning of the design process is more important than the quality, because this increases the possibility of having a suitable design solution for the specified problem(s). Furthermore, the large quantity of design concepts enables the creation of a large reference base, making the end result more valid.

De Boer (1990) states that one of the fundamental aspects of an efficient design process is to understand the potential and limitations of the different concept design alternatives. This increases the reliability of the decision, which is especially important during the conceptual phase. At this stage it is difficult to obtain sufficient (objective) knowledge and decisions are often based on subjective beliefs instead of objective information. Furthermore, the decisions made in this phase of the design process form the basis for the end product. Hsu & Woon state the following to emphasize the importance of early-stage decision making during the concept design stage: *"A poorly conceived design concept can never be compensated for by a good detailed design"* (Hsu & Woon, 1998, p. 1).

3.2.2 The importance of divergence & convergence

According to Pahl & Beitz (1996), Hubka & Eder (1992), and Ulrich & Eppinger (2007) the most effective design process is one in which there are iterating divergent and convergent phases as depicted schematically in figure 13. The divergent phase is the phase in which the creative part of the process takes place. The problems are analyses after which the solutions are created in the form of concept designs. After each divergent phase comes a convergent phase in which the designed solutions are analysed in order to be assessed and evaluated. The best

design solutions are then selected and refined, potentially creating more alternatives for the already existing design solution. At the end of this iterative process, there is theoretically one concept design that best fits the stated (design) goals.

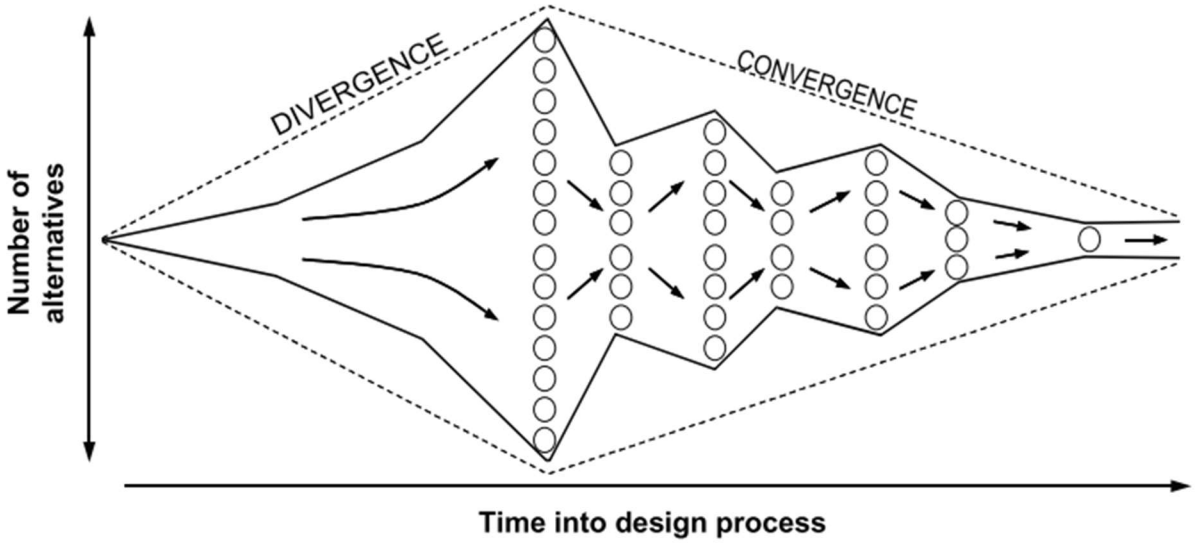


Figure 13: Divergence and convergence in the design process. (Source: Derelöv, 2009, p. 15)

3.2.3 Evaluation and decision-making

Evaluation is the act of assessing the value of something, aimed at collecting and comparing information about different solution alternatives. This could be a process, an idea, a theory, a cultural or a natural (artificial) object, etc., depending on the goals set. In a product development process like real estate development, value can determine to what extent the properties of a solution alternative (concept design) match the desired properties. (Eekels, 1990).

De Boer (1990) states that the evaluation of design(s) is poorly structured and that decision making often becomes a largely subjective activity. Examples of such subjective, often intuitive methods are discussed by Ulrich & Eppinger (2007):

- Decisions based on intuition: the decision maker does not take into account explicit criteria or trade-offs but follows its feelings.
- Decisions based on multi-voting: A group of decision makers votes which of the design alternatives should be selected, the alternative with the most votes is chosen.
- Decisions made by a product champion: An influential member of a design team decides which design alternative is selected based on personal preferences.
- Decisions made by pros and cons: The strengths and weaknesses of the different design alternatives are set against each other. The design alternative is selected based on the designer's opinion.
- Decisions are made by an external party, for example a customer or client.

To substantiate his statement about the evaluation of design(s), De Boer (1990) discussed four reasons why decision makers should pay more attention to both the evaluation and decision making within the design process. 1) Since there is an increase in the complexity of products and the number of alternatives, the size of the decision problem is also increasing, making the evaluation and decision making more complex. 2) There is a growing pressure on the performance of companies due to an increasing competitive environment, resulting in a need for the ‘‘best’’ products. 3) Overall, people prefer concrete over abstract, and tend to

prefer short-term thinking over long-term thinking. Furthermore, people are unstable in their evaluation of consequences, have a limited working memory, and are more likely to be selective in both the acquiring and processing of information. 4) There need to be many different individuals and departments involved in the decision-making process within an organisation in order to design successful products. Therefore, there is a need for more objective and explicit decision procedures within the design process.

Although evaluation is represented as a single activity in figure 11, it should not be seen as an individual activity but rather as a sub-process within the concept design process. The evaluation activities can in the basis be divided into three steps according to Roozenburg & Eekels (1996); 1) define goals, 2) collect information, and 3) evaluate information. The evaluation activity represented in figure 11 should thus be interpreted as the final phase of the evaluation process where the information is evaluated. The process starts at the beginning of the information-collecting activity with the specification of the design goals. The higher the quality of step 1 and step 2, the more adequate the result of the evaluation (step 3) will be.

According to Kinnard (2003), structuring the decision-making process into a logical, systematic procedure that aims identifying the areas of risk and uncertainty associated in a particular choice, allows the creation of an action plan to minimize uncertainty and modify plans to account for uncertainty in case the uncertainty cannot be altered by the decision-maker. De Boer (1990) studied many different existing evaluation and decision-making methods in literature. Based on these studies he defines 6 stages that should be completed in order to successfully evaluate design concepts:

1. Establish evaluation criteria, including scoring scales
2. Establish weighting factors for each criterion
3. Determine the decision rule
4. Determine the scores of each criterion
5. Examine the scores of the different alternatives
6. Based on the decision rule, decide on one alternative

The evaluation methods that fit these stages are often called matrix methods since they can easily be arranged in a matrix structure with the evaluation criteria on the x-axis, and the design alternatives on the y-axis. It is very important to note which type of characteristics should be used in the establishment of the evaluation criteria and their scoring scale, and the corresponding weighting factors. The table in figure 14 gives an overview of some common evaluation and decision-making methods and their characteristics. Wilhelms. & Derelöv (2004) have defined and discussed 4 characteristics that are essential for an objective evaluation process. The different characteristics are explained below.

- **Ordinal – Cardinal**
  According to Roozenburg & Eekels (1996), the judgement of a criterion in an evaluation can either be ordinal (qualitative) or cardinal (quantitative). An ordinal judgement method ranks the alternatives in an ordinal scale from for example worst to best, while a cardinal judgement method rates the value of the given criteria of the design alternative. For cardinal judgment, the scale of the parameter has to be quantified.

- **Relative – Absolute**
  An evaluation can either be relative or absolute according to Wilhelms. & Derelöv (2004). Within relative evaluation, only the scores and values of the current set of alternatives are considered and compared. Therefore, the evaluation is only valid for the specific set of alternatives. Absolute methods take all the possible values for the specific parameter into account and therefore need predetermined value functions. Because all the possible values are considered the evaluation values remain valid, even when the set of alternatives is changed.

- **Disjunctive – Conjunctive**
  Disjunctive means not connected. With disjunctive judgement the categories are evaluated separately, taking into account one criterion at a time. This results in a ranking or rating of the different alternatives with respect to a single criterion. With conjunctive judgement the ranking or rating is based on the scoring of multiple criteria, making it possible to balance different criteria with each other. When using conjunctive judgement methods, the weight of the different criteria has to be pre-determined (Wilhelms. & Derelöv, 2004).

- **Selecting - Eliminating**
  According to Wilhelms. & Derelöv (2004), there are two ways to reduce the number of alternatives in the concept design process. This can either be done by selecting the best scoring alternatives, or by eliminating the worst scoring alternatives. Using the selecting method, the decision maker often needs more information compared to the information needed using the eliminating method.

Evaluation methods	Characteristics							
	Ordinal	Cardinal	Relative	Absolute	Disjunctive	Conjunctive	Selecting	Eliminating
Kesselring (Pahl & Beitz,1996)		X		X		X	X	
Concept Scoring (Ulrich & Eppinger, 2007)		X	X			X	X	
Datum method (Pugh, 1990)	X		X			X	X	
"Decision Matrix" (Ullman, 2003)	X	(X)	X			X	X	
The Lexicographical Rule (Roozenburg & Eekels, 1996)	X		X		X		X	
"Elimination by aspects" (Roozenburg & Eekels, 1996)	X		X		X			X
Selection Chart (Pahl & Beitz, 1996)	X			X	X		(X)	X
"New Product Profiles" (Roozenburg & Eekels, 1996)		X		X		X	-	-

Figure 14: Evaluation and decision-making methods and their characteristics. (source: Naikar, 2013, p. 35)

3.3 Generative design

3.3.1 Introduction to generative design

The traditional design process within the AEC field uses the expertise of the designer or engineer to create or develop designs that meet the project objectives and/or needs of the end user. This is often a long process that requires a meticulous understanding of the various processes and principles needed to create a final design. The designer often uses an explicit design method where a pencil and paper, or Computer Assisted Drawing (CAD) software is used to model the designer's idea. Generative design deviates from this design method. It starts with the design intent and the constraints of certain design parameters, after which the tooling creates many possible shapes to fulfil that objective (McKnight, 2017).

Generative design is a rules-driven iterative design process, based on parametric and algorithmic modelling that uses pre-determined high-level constraints and goals to automatically explore, iterate and optimize thousands of different design variants to find the best solution (Ma et al., 2021). This partially corresponds to the definition of Singh & Gu (2012), which states that generative design is a design process that, with the help of parametric computer algorithms, automatically generates design results that can help designers automize parts of the design process. The possibility to automatically explore and iterate the design possibilities and transfer the best designs to human designers and stakeholders to support them in the decision-making process, is the most powerful capability of generative design. Since this corresponds to the concept design stage within the real estate site planning process, generative design applications distinguish themselves from other CAD applications. Other CAD applications are not able to support the designer during the conceptual design stage in such a large extend. (Krish, 2011)

Coors-Blangkenship (2020) states that topology optimization is the most basic form of generative design. The technique is often used in the engineering field. The initial design is algorithmically analysed, after which the generative design tool identifies areas where mass could be removed without compromising the design's integrity. The result is a design which performs better while using less materials. This type of generative design excels at refining existing designs, it requires an initial design and input parameters to enable the design optimization. The literature is therefore divided whether topology optimization falls under the term generative design. Kallioras & Lagaros (2020) imply that topology optimization differs from generative design since it focusses on discovering the best distribution of a certain number of materials inside a specific domain according to specific performance indicators, while the goal of generative design lies in creating a large number of initial designs that respect the user's constraints instead of finding the optimal shape.

3.3.2 Different generative design methods

According to Zheng & Yuan (2021) a distinction can be made within the generative design concept in the form of two algorithmic methods that generate design solutions: 1) rule-based generative design algorithms and 2) the AI generative design method. These methods can be seen as the extremes within the spectrum of generative design. The first method is rule-based, regarding the design process as an optimization problem. Human-defined rules are applied to iteratively approach the best solution that meets the defined requirements. In case a generated design conflicts with a specified rule, for example maximum building height, it is invalid (Landes, 2022). Examples of rule-based algorithms that have been used in the field of architectural design are the Metropolis Algorithm, the Genetic Algorithm and Simulated Annealing (Zheng & Yuan, 2021).

The second method is referred to as the AI generative design method. This method is data-driven and uses AI algorithms and cloud computations to generate design solutions with only

data input. According to a definition of Artificial Intelligence used by Joshi (2019), humanlike behaviour is the main foal of AI applications, rather than the idea of intelligence itself. According to this viewpoint, AI refers to the development of a computer programme capable of acting similarly to a human being rather than the creation of an incredibly clever machine that can quickly answer any problem. However, according to the modern perspective, if people refer to Artificial Intelligence, they mean computer programmes of machines that can do one or more of the following: solve complex computer-based problems potentially involving large quantities of data in a short amount of time, comprehend human language, provide feedback in a human-like manner, etc.

AI approaches, particularly machine learning techniques like Artificial Neural Networks (ANNs), have been widely applied in design and non-design fields. Machine learning is the process of a machine learning on its own, without having to be explicitly programmed. It is an AI application that gives the system the capacity to learn and grow from experience automatically (Hamdia et al., 2021). Arthur Samuel first used the term machine learning in 1959 when discussing the use of computers to solve the checkers game. The term machine learning refers to a computer software that has the ability to learn to create behaviour that was not specifically intended or programmed by its creator. Instead, it has the capacity to reveal conduct of which the software developer may not even be aware of. The software learns this behaviour based on three elements: 1) the data it consumes as input; 2) a metric that measures the deviation from ideal conduct; and 3) a feedback mechanism that utilizes the measured deviation to direct the program to create better behaviour in following occurrences (Joshi, 2019). An ANN is an example of a subset of machine learning, it mimics the function of the brain. Through a training procedure which requires a massive amount of training data, the network is meant to determine the relationship between the input and output parameters of the training data. The ANN model is made up of multiple interconnected nodes or neurons that are arranged into layers. Each layer has specific weights and is connected to nearby layers, making a huge network. By examining various datasets and modifying the weights between the different layers, the network learns and optimizes itself so that it eventually can generate design outcomes on its own (Hamdia et al., 2021).

3.3.2.1 AI powered generative design

Cousins (2021) states that recent advancements in cloud computing and AI (especially within the field of machine learning) have accelerated the possibilities within the generative design domain and allow for new ways to work with more complicated data sets and larger projects. Three technological factors have propelled the fast advancement of machine learning in the last decade. First, as sensing and Internet of Things (IoT) technology advance, more data has been collected. As data storage has become more affordable, considerably more data has been saved. As a result, academia and businesses have access to a tremendous amount of data. Second, the development of machine learning-oriented processors and chips allows users to have more powerful and less expensive computing resources. The third factor is the fact that in the last decade, sophisticated machine learning algorithms have been created and validated. These three factors combined allow machine learning to progress rapidly and stimulate the application within a wide range of industries, including the building industry (Hong et al., 2020).

These advancements led to the recent developments within the field of rule-based generative design approaches, that uses AI and cloud computing to boost the computational power of these rule-based generative design approaches (Landes, 2022). In practice, this rule-based approach is called ‘’AI powered generative design’’ by the upcoming providers of generative design tooling for real estate site planning and urban design (figure 15 shows an example of Spacemaker, an AI powered generative design application). As the name states, these tools are not quantified as AI generative design methods, which can (once fully trained) generate designs on its own, but as AI powered generative design methods. These tools use AI methods such as machine learning in combination with rule based generative design methods. Although there are many different AI algorithms that steer the generative design process according to

McKnight (2017), the process itself does not differ much. The generative design programme tests the structure of each iteration and learns from it. At each stage the programme then makes a small adjustment to further optimize the design solution.

Figure 14: Example of an AI powered generative design tool (Spacemaker) (source: Archdaily, 2020, https://www.archdaily.com/952850/spacemaker-proposes-ai-powered-generative-design-to-create-more-sustainable-spaces-and-cities)

McKnight (2017) describes a general way in which AI powered generative design can be used in the design process, focussed on the engineering field which is part of the AEC domain. Figure 16 shows the generative design process corresponding to the description of McKnight.

1) First of all, the design parameters and goals used as input for the generative design tool need to be establish, using the expertise of the engineer/designer. These parameters and goals depend on the type of product that has to be designed (McKnight, 2017).
2) The AI generative design tool generates a wide variety of designs using algorithms and its own reasoning. Each of the design's performances are calculated and analysed locally or uploaded to the cloud for cloud solving (McKnight, 2017).
3) After the initial calculations and analysis is done, the designer or engineer studies the best performing options according to the parameters and goals set at the beginning of the design process. In case the designer or engineer is not satisfied yet with the presented design solutions, he or she can modify or re-arrange the parameters and goals after which the generative design programme will iterate again until the most relevant design solution is identified (McKnight, 2017).
4) When the final design is finished, the design can be moved to the next phase within the design process. (McKnight, 2017)

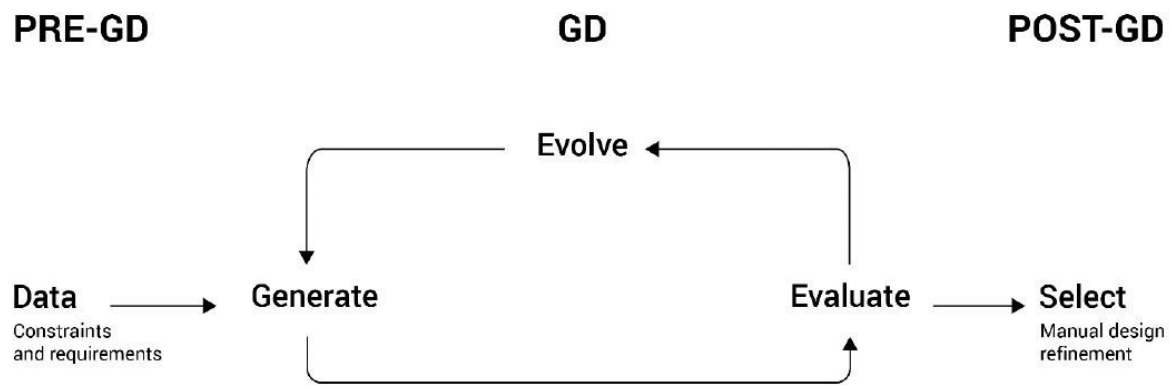


Figure 16: Generative design process (source: Villaggi & Nagy, 2018, June 18, from https://medium.com/autodesk-university/generative-design-for-architectural-space-planning-9f82cf5dcdc0)

3.3.2.2 AI powered generative design in practice

As discussed in the previous paragraphs, a new generation of AI-based generative design tooling is pushing the limits of size and complexity due to developments in computing power and the field of machine learning. According to Cousins (2021), there are big companies such as Google and Autodesk, that have acquired or developed AI powered software such as (respectively) Delve and Spacemaker. These tools use a large amount of numerical and contextual data to develop a series of optimized designs for real estate projects, neighbourhoods, and even entire city districts, based on pre-defined design objectives. This can alleviate the stress of difficult urban planning work, allowing city planners to consider a wider range of design solutions than is currently possible, allowing them to focus more on sub-characteristics such as daylight access, pavement space and traffic flows. McKnight (2017) states that the use of generative design reduces development time, increases the creativity of the designer and the efficiency of the development process. It is discussed that especially the simulation and testing as part of the generative design process is valuable for the efficiency increase.

In order to develop a concept design evaluation framework suited for the use of AI powered generative design tooling, it is important to investigate what kind of analytical tools are currently available in order to determine what kind of performance parameters can be added to the evaluation framework. Landes (2022) discusses the current available visualisation and simulation capacities of Spacemaker in his research. Cousins (2021) discusses the capabilities of both Spacemaker and Delve. In order to generate design solutions, certain parameters have to be defined such as: maximum building height; building layers; building width; accepted distance between buildings. The user can use choose different standard types of floor plans and layout types, or import / define his/her own typology. Besides the design generation capacities of the software, it enables the user to analyse the building(s) on the following performance parameters to get a better understanding of the performance of the building and its relationship with its surroundings. It should be noted that prior to the design process the user has to select the location of the building site, by doing so the software can use the environmental and location specific data in the calculation of the performance parameters.

- **Site area statistics:** important building statistics such as gross floor area, nett floor area, the built-up area of the site, and density of the buildings.
- **Noise**: using available local traffic data, the noise levels for the building facades and at the ground level can be calculated using the noise analysis tool.

- **Daylight**: the amount of daylight that reaches facades (relative to the available light on a horizontal unobstructed surface) can be calculated using the Vertical Sky Component (VSC) analysis.
- **Wind**: the wind analysis tool measures the wind velocity and speed at the ground level and couples this with the probability of the direction to calculate a specific wind comfort level.
- **Sunlight:** the amount of sun hours hitting both the facades of the building and the ground around it on a particular day of the year is measured using the sunlight analysis.
- **View distance:** the view distance tool calculates the average view distance from the façade.
- **View to area:** Users can designate certain buildings or areas as locations that future users of the building would like to have a view of. This view to area analysis specifies the parts of the facades that offer a view to this specified location.

As discussed in chapter 1, there are a number of use cases with AI powered generative design. In 2020, the French architectural firm Valode et Pistre and Spacemaker signed a research and development collaboration for two projects. In one of the experiments, two teams of architects worked on the same design proposal. One team used AI software, the other team did not. This research concluded that the team using the AI tool finished its proposal earlier than the other team, decreasing lead-time (Kiel, 2021). The French company Bouygues Immobilier, the Swedisch company Skanska, and Norway's largest housing developer OBOS have used AI powered generative design tooling in their real estate development process to find design options with higher-density complexes, trying to maximise the quality of the living units in order to maximize the return on investment. Apartments with better view and more sun hours can for example potentially be easier to sell and for a better price. In the meantime, this could also increase the municipalities support and enhance tenant well-being (Cousins, 2021).

3.4 Conclusion

The theoretical framework formed in this chapter serves as a basis for the further development of the concept design evaluation framework. Basis concepts such as real estate site planning, generative design, and concept design evaluation and decision-making have been explained. In this subchapter, parts of SQ1 and SQ2, and the total of SQ3 will be answered.

3.4.1 Sub-question 1-a

SQ1-a: ''How is the current concept design stage of the real estate site planning process organised according to the literature?''

The concept design stage is part of the real estate site planning process, which is part of the real estate development process. The real estate development process is among others described as a production process that creates the built environment (Tiesdell & Adams, 2011). Every time a developer initiates a real estate project, he attempts something that is never been done before in the exact same way. Each real estate project namely represents a unique combination of location, product, price, and market timing (Brown, 2018). Miles, Netherton & Schmitz (2015) emphasize that the development process is not linear, but partly an iterative process full of renegotiations between the different stakeholders and strategic repositioning. The authors emphasize that at each stage of the real estate development process, the remaining process stages should be considered when making decisions.

The real estate site planning process starts with either the Programming or Site Selection phase and ends just before the construction phase of the building begins shown in figure 9.

The client or developer either owns a site and chooses a program to develop on this piece of land, or he / she has a program and needs to find a site that fits this program. In the subsequent Site Inventory and Analysis phases, important physical, biological, and cultural attributes are being mapped and analysis to determine whether the site is suited for the development, giving the developer a better understanding of the site. Furthermore, the legal grounds and the client/developers' objectives and requirements are considered during these phases. In order to define his objectives and functional requirements, the client/developer often uses data retrieved from market analysis, user demand studies, and the analysis of relevant precedents (Lagro, 2007). During the Conceptual Design Phase, the site analysis flows directly to the concept development. Using the data retrieved during the Site Inventory and the insight from the Site Analysis, the site design will be adapted to fit the environmental constraints. This is an iterative process that eventually determines the spatial organization of the site and often leads to multiple concept designs. The concept designs and the associated budget estimations will be assessed to determine if the program and/or the concept designs are realistic and feasible. If not, the concept developers can either go back to the drawing table or select a different site for the program (LaGro (2007).

Figure 11 represents the different stages within the concept design process according to Derelöv (2009). This process largely corresponds to LaGros' concept development description. The process is divided into three main stages; 1) Information-collecting activities, which include the specification of the design goals, the synthesis where the different design alternatives are generated, and finally the analysis where the estimated behaviour of the design alternatives are analysed, using pre-determined performance parameters; 2) the evaluation activity, which entails the assessment of the solution's goal fulfilment, taking the validation into account; 3) the decision-making activity, in which the potential solution(s) are selected.

As explained, the concept design process is both a creative and a controlling process, in which the developer assesses whether the created concept design fulfils the predetermined constraints and goals. Tiesdell & Adams (2004) conceptually visualized the potential or scope in which the developer has to create a viable development project, called the Opportunity Space (represented in figure 10). The developer's opportunity space is framed by the three most important factors and boundaries in the real estate development process: the development site and its local context, the market context, and the regulatory context. These boundaries are flexible and depend on the negotiating abilities of the involved actors and their mutual relationship. Even though the boundaries are relatively fixed at any specific moment in time, they can change and shift over time. The market's demand and the regulatory framework can change over time for example, creating new opportunities and enlarging or reducing the developer's opportunity space.

3.4.2 Sub-question 2-a

SQ2-a: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature?''

According to Eekels (1990), evaluation is the act of assessing the value of something, aimed at collecting and comparing information about different solution alternatives. This could be a process, an idea, a theory, a cultural or a natural (artificial) object, etc., depending on the goals set. In a product development process like real estate development, value can determine to what extent the properties of a solution alternative (concept design) match the desired properties. These properties consist of the client/developers' objectives and requirements (often based on data retrieved from market analysis, user demand studies, and the analysis of relevant precedents). Furthermore, the properties must fit within the so-called developers' opportunity space according to Tiesdell & Adams (2004), consisting of following factors and

boundaries: the development site and its local context, the market context, and the regulatory context. The concept designs and the associated budget estimations will be assessed to determine if the program and/or the concept designs are realistic and feasible. If not, the concept developers can either go back to the drawing table or select a different site for the program (LaGro (2007). The calculation of the expected profit and the risk associated to the realization of that profit at forehand of the production process is of great importance according to Carmona, et al. (2010). The approach a developer uses to determine the cost or profit level at which a project in development would be financially feasible is known as a development appraisal, also known as residual value. The strategy is to determine the capital value of a projected future income (sell price of the realised development) and then subtract all the expected costs. In essence, it quantifies the development process to calculate the value of a set benchmark (Loizou & French, 2012).

Figure 8 shows the calculations of either the residual to land value or to profit. This indicates that the residual value can either represent the expected profit, or the residual land value in case the land value has been included in the costs of the development. The correctness of the input values is important for the reliability of the profit or residual land value estimation. It is challenging to account for all of the uncertainties that are involved in property development in a standard spreadsheet study. According to Loizou & French (2012), a more thorough analysis should focus on the uncertainties associated with each of the factors that influence the financial outcome of the project. According to Byrne (1995), it is generally agreed that uncertainty in the real estate development process is a result of a lack of knowledge and inaccurate or incomplete information about the input parameters that are used in the analysis. The residual results of the analysis are unclear if the developer is unable to verify the accuracy of the input parameters. MacFarlane (1995) states that real estate developers overall consistently underestimate the risk associated with real estate development. This results in the fact that for example the land value is overestimated or that the expected profit is too low to compensate for the risk level.
Furthermore, Derelöv (2009) emphasizes that the design choices made at the start of the design process have relatively more impact on the final design outcome than the design choices made at the end, even though these early design decisions are based on significantly less knowledge. The information collecting activity (see figure 11) is focused on increasing the understanding of a certain (concept) design solution and has a great impact on the evaluation process. Primarily because the evaluation itself is basically the assessment of the of the analysis of multiple parameters and sub-activities within the information collecting process. These sub-activities and parameters are based on the initial information. Therefore, can be concluded that the quality of the evaluation depends to a large extend on the quality and quantity of the initially collected information. To increase the reliability of the concept design evaluation in the early phase of the design process, it is important to improve the execution and widen the scope of the information collecting activities.

According to Kinnard (2003), structuring the decision-making process into a logical, systematic procedure that aims identifying the areas of risk and uncertainty associated in a particular choice, allows the creation of an action plan to minimize uncertainty and modify plans to account for uncertainty in case the uncertainty cannot be altered by the decision-maker. De Boer (1990) states that the evaluation of design(s) is poorly structured and that decision making often becomes a largely subjective activity. To substantiate his statement about the evaluation of design(s), De Boer (1990) discussed four reasons why decision makers should pay more attention to both the evaluation and decision making within the design process. 1) Since there is an increase in the complexity of products and the number of alternatives, the size of the decision problem is also increasing, making the evaluation and decision making more complex. 2) There is a growing pressure on the performance of companies due to an increasing competitive environment, resulting in a need for the ‘‘best’’ products. 3) Overall, people prefer concrete over abstract, and tend to prefer short-term thinking over long-term

thinking. Furthermore, people are unstable in their evaluation of consequences, have a limited working memory, and are more likely to be selective in both the acquiring and processing of information. 4) There need to be many different individuals and departments involved in the decision-making process within an organisation in order to design successful products. Therefore, there is a need for more objective and explicit decision procedures within the design process.

It can be concluded that the design parameters needed to reduce the uncertainty regarding the feasibility of the real estate project must be primarily focused on enabling the real estate developer to determine the residual (land) value of the development and that adding structure to the decision-making process could allow the real estate developer to steer at uncertainty minimization. This includes parameters that enable the real estate developer to determine the expected sell price of the realized development and the expected costs. Furthermore, since the concept designs must fit within the developer's opportunity space, it is suggested to include parameters that give more insight into these boundary properties, such as factors that can be used to determine whether the concept design meets the governmental rules and regulations.

3.4.3 Sub-question 3

SQ3: ''What is the suggested influence of the use of AI powered generative design during the concept design phase on the real estate site planning process according to the literature?''

The traditional design process within the AEC field uses the expertise of the designer or engineer to create or develop designs that meet the project objectives and/or needs of the end user. This is often a long process that requires a meticulous understanding of the various processes and principles needed to create a final design. The designer often uses an explicit design method where a pencil and paper, or Computer Assisted Drawing (CAD) software is used to model the designer's idea. Generative design deviates from this design method. It starts with the design intent and the constraints of certain design parameters, after which the tooling creates many possible shapes to fulfil that objective (McKnight, 2017). According to Zheng & Yuan (2021) a distinction can be made within the generative design concept in the form of two algorithmic methods that generate design solutions: 1) rule-based generative design algorithms and 2) the AI generative design method. These methods can be seen as the extremes within the spectrum of generative design. The first method is rule-based, regarding the design process as an optimization problem. Human-defined rules are applied to iteratively approach the best solution that meets the defined requirements. In case a generated design conflicts with a specified rule, for example maximum building height, it is invalid. The second method is referred to as the AI generative design method. This method is data-driven and uses AI algorithms and cloud computations to generate design solutions with only data input (Landes, 2022).

Cousins (2021) states that recent advancements in cloud computing and AI (especially within the field of machine learning) have accelerated the possibilities within the generative design domain and allow for new ways to work with more complicated data sets and larger projects. These advancements led to the recent developments within the field of rule-based generative design approaches, that uses AI and cloud computing to boost the computational power of these rule-based generative design approaches (Landes, 2022). In practice, this rule-based approach is called ''AI powered generative design'' by the upcoming providers of generative design tooling for real estate site planning and urban design. As the name states, these tools are not quantified as AI generative design methods, which can (once fully trained) generate designs on its own, but as AI powered generative design methods. These tools use AI methods

such as machine learning in combination with rule based generative design methods. Although there are many different AI algorithms that steer the generative design process according to McKnight (2017), the process itself does not differ much. The generative design programme tests the structure of each iteration and learns from it. At each stage the programme then makes a small adjustment to further optimize the design solution.

According to Cousins (2021), AI powered generative design tooling uses a large amount of numerical and contextual data to develop a series of optimized designs for real estate projects, neighbourhoods, and even entire city districts, based on pre-defined design objectives. This can alleviate the stress of difficult urban planning work, allowing city planners to consider a wider range of design solutions than is currently possible, allowing them to focus more on sub-characteristics such as daylight access, pavement space and traffic flows. McKnight (2017) states that the use of generative design reduces development time, increases the creativity of the designer and the efficiency of the development process. It is discussed that especially the simulation and testing as part of the generative design process is valuable for the efficiency increase. These simulation and testing (analysing) capacities of the software include categories such as (site/outdoor) area statistics and environmental parameters (wind, noise pollution, sunlight, daylight, view to area, view distance) that allow the project developer to get a better understanding of the performance of the concept design and its relationship with its surroundings (Landes, 2022). This ties in well with De Boer's (1990) statement on efficient design processes, the author states that one of the fundamental aspects of an efficient design process is to understand the potential and limitations of the different concept design alternatives and that this increases the reliability of the decision, which is especially important during the conceptual phase, since at this stage it is difficult to obtain sufficient (objective) knowledge and decisions are often based on subjective beliefs instead of objective information. Furthermore, the decisions made in this phase of the design process form the basis for the end product. Furthermore, the ability to create large quantities of concept designs corresponds to the theory of Pahl & Beitz (1996) regarding the concept design process, who state that the quantity of the solutions at the beginning of the design process is more important than the quality, because this increases the possibility of having a suitable design solution for the specified problem(s). Furthermore, the large quantity of design concepts enables the creation of a large reference base, making the end result more valid.

4. Context: Case study

In order to form a basis for the development of the concept design evaluation framework and further specify the identified problem, both case documentation study and key-actor interviews will be performed. This practical data collection contributes to the process of answering SQ1 and SQ2 and will provide the researcher with a practical overview of the real estate site planning and concept design process. As stated in the chapter 2, interviews, observations, and documentation study are the three main types of data collection for conducting qualitative research. The use of multiple data sources can increase the reliability of the research according to Yin (1984).

First of all, the case selection & specification will be elaborated on. Subsequently, the case documentation study and key-actor interview process will be discussed, after which the chapter ends with a final conclusion and the answering of the following sub questions:

- *SQ1-b: "How is the current concept design stage of the real estate site planning process organised according to the key actors and case documentation?"*

- *SQ2-b: "Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the key-actors and case documentation?"*

4.1 Case selection & specification

4.1.1 Case selection & introduction

Since this research focusses on specific stages within the real estate site planning process, according to the rules and regulations set in the Netherlands, certain case study criteria were defined at the beginning of the study. This resulted in the following criteria:

- The case project has to be an inner-city development located in the Netherlands.
- The real estate development process should be recently finished, to increase the trustworthiness of the data collection (interviews).
- The case project has to be developed by Dura Vermeer for practical reasons.
- The available case documentation must include the following:
    - Information regarding the development schedule / process
    - Information regarding the different concept designs
    - Information regarding the concept design evaluation and decision-making process
- Key-actors should be willing to cooperate
- The project typology should be an apartment building with at least three floor levels.

This list of case selection criteria resulted in a case project located in Rotterdam (the Netherlands). At the start of this research, the development phase of the project is recently finished, and the construction phase is about to start. The case documentation will be used for data collection and validation of the concept design evaluation framework.
The real estate development process of the case project can be summarised as follows according to key-actors of the process. The project developer Dudok had purchased the monumental building (1A figure 20) with the neighbouring building (1B figure 20) with the idea to redevelop this neighbouring building. The municipality of Rotterdam wanted the adjacent plot of land (2 figure 20) to be co-developed in the development vision of Dudok. Dudok started with the development of this adjacent plot during this early stage of the real estate development

process, the Municipality of Rotterdam simultaneously drew up a Memorandum of Principles. Dura Vermeer joined Dudok to further initiate the development process. Multiple concept designs were created by different architects. Eventually, one of these architects was selected for the design of real estate development of the land plot.

4.2 Case documentation study

As explained earlier in this chapter, the main goal of the case documentation study is to get a practical insight into the real estate site concept design process and to enable the researcher to answer SQ1 and SQ2. First of all, the uniform real estate site planning process at Dura Vermeer will be examined. Since this uniform process takes the whole real estate development process into account (from initiative to delivery of the real estate project), the researcher will zoom in on the parts of the real estate development / site planning process that are relevant for the scope of this study. The case documentation is primarily Dutch, the relevant terms and concepts used and discussed in this research will be translated to English.
After a general overview of the real estate site planning process at Dura Vermeer is created, the real estate site planning process of the case project will be examined.

4.2.1 Real estate site planning process – Dura Vermeer

Dura Vermeer is one of the largest, and most innovative and sustainable construction companies in the Netherlands with more than 165 years of experience. With more than twenty independent operating companies, Dura Vermeer combines strong regional roots with the knowledge, strength, and resources of a nationally operating company. The company's core activities concern the development and realization of construction and infrastructure projects, maintenance, and renovation.

Dura Vermeer makes use of a uniform process for in-house real estate development of ground-level homes and apartments, referred to as ''Flow''. The Flow consists of a process diagram containing different phases within the real estate development process, figure 17 shows a simplified version of this diagram. This process starts at step 0 called ''Initiative'' and ends at step 7 called ''Usage phase''. Below, the Initiative Phase and the Structure Design phase from the Flow is further elaborated on. Since this research is primarily focused on the concept design stage, only the phase 0 and 1 will be investigated.

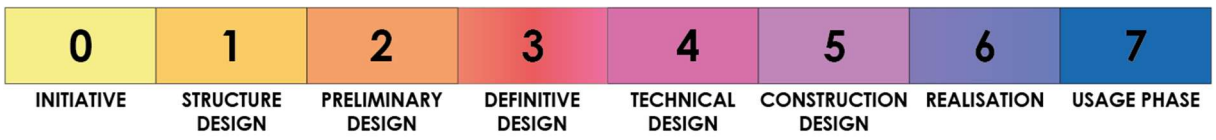


Figure 17: Simplified Real Estate Development process Dura Vermeer

4.2.1.1 Flow phase 0: Initiative

Figure 18: Simplified Real Estate Development process Dura Vermeer – Initiative phase

Goal: Inventorying and recording the ambitions, requirements, wishes, expectations and conditions of the client and future users in such a way that a design process can start on that basis.

Main activities:

- Analysing the organisation(s) to be accommodated and the processes or activities to be accommodated and the processes or activities to be accommodated with the accommodation.
- Formulating the (performance) requirements, wishes, expectations and conditions with regard to the to be developed building, and documenting these in the Programme of Requirements.

The most relevant activities within this phase of the real estate development process, with regards to the scope of this research, are:

- If applicable: Summary of the real estate development request
- Quickscan: Market & Customer, Product, Location, Time, Risk analysis
- Final bid/price with registration documents
- Program of principles
- Spatial planning frameworks (Spatial Planning Act).
- Investment request including:
  - Market advice
  - Legal/tax advice
  - Plot allotment/ concept design
  - BEO with cash flow
  - Risk analysis

Responsibility: the development manager is responsible for the activities within the Initiative phase of the Flow. After the Initiative phase is finished and the project enters the Structure Design phase (phase 01), the development manager transfers his responsibilities to the project manager and the project developer. The activities of the development manager include, among others; obtaining relevant market information for projects by maintaining existing contacts and obtaining new contacts; investigating development locations and development opportunities; and the organization of the development process. However, this division of roles is not limited by a clear boundary. The project developer and/or project manager sometimes also fulfil a role in this stage of the process.

4.2.1.2 Flow phase 1: Structure design

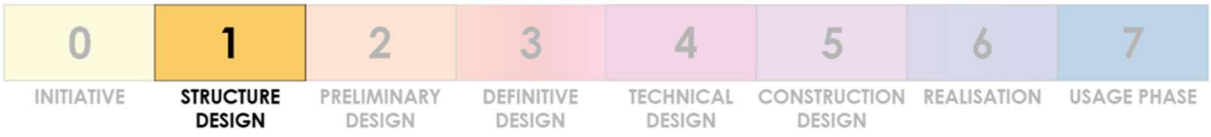


Figure 19: Simplified Real Estate Development process Dura Vermeer – Structure design phase

Goal: Developing a global presentation of the project in such a way that it provides a good picture of the solution on an urban development scale and of the main form and layout of the buildings.

Main activities:

- Making an urban development plan with regard to buildings and landscape
- Designing the main form and the main layout of the buildings ‘‘spot plan’’
- Exploring the constructive design (principles of the main supporting structure)
- Advising on possible energy supply and installation concepts

The final products within this phase of the real estate development process, with regards to the scope of this research, are:

- Structure design
- Allotment
- Counting model
- Product-market combination (target group, types)
- Construction budgets
- Update BEO (Budget exploitation plan) set-up
- Opportunities and risk list

4.2.1.3 Feasibility of the real estate development project

As discussed in the theoretical framework of this research, the financial feasibility of the project can be determined by calculating the gross residual land value or the profit of the development. Dura Vermeer uses a BEO (budget exploitation plan) to determine the feasibility of the project, thus to what extent the development plan has an expected positive residual land value or profit. For the feasibility calculations, the project developer makes use of the following relevant properties:

- Information concerning the expected lead-time of the project
- Information concerning the programme of the building, including the Gross Floor Area, the Useable Area, the Rentable Floor Area, and the ration between these parameters.
- Information concerning the number of parking spots
- Information concerning the square meters of the land plot (total square meters, the buildable area, issuable land)
- Information concerning different cost posts, among others; building costs, advisory costs, general costs, etc.

4.2.2 Real estate site planning process – Case project

First of all, the real estate site planning process of the case project will be summarized, including an introduction of the location and the motivation for the development. Subsequently, the spatial planning framework development process will be explained, after which the main uncertainties regarding the feasibility of the project will be discussed.

The monumental ensemble is located at the ‘‘Tail’’ of the Dakpark (2 in figure 20). The Dakpark was developed in the late 1990s on the site old rail yard between Bospolder-Tussendijken and the Merwe-Vierhavensgebied. The Porth authority owned the site and wanted to realise shops and other real estate at the location. Residents of Bospolder and Tussendijk desired a neighbourhood park. In the end, a solution was found in a combination of both. The basis of the Vierhavenstrip became an elongated building called the Strip, with retail outlets and a large public park on the roof. The development of the Vierhavenstrip came to a standstill due to the financial crisis in 2008. Now, more than 10 years later, the market is more favourable again which gives room to develop the last two plots: the Head and the Tail.

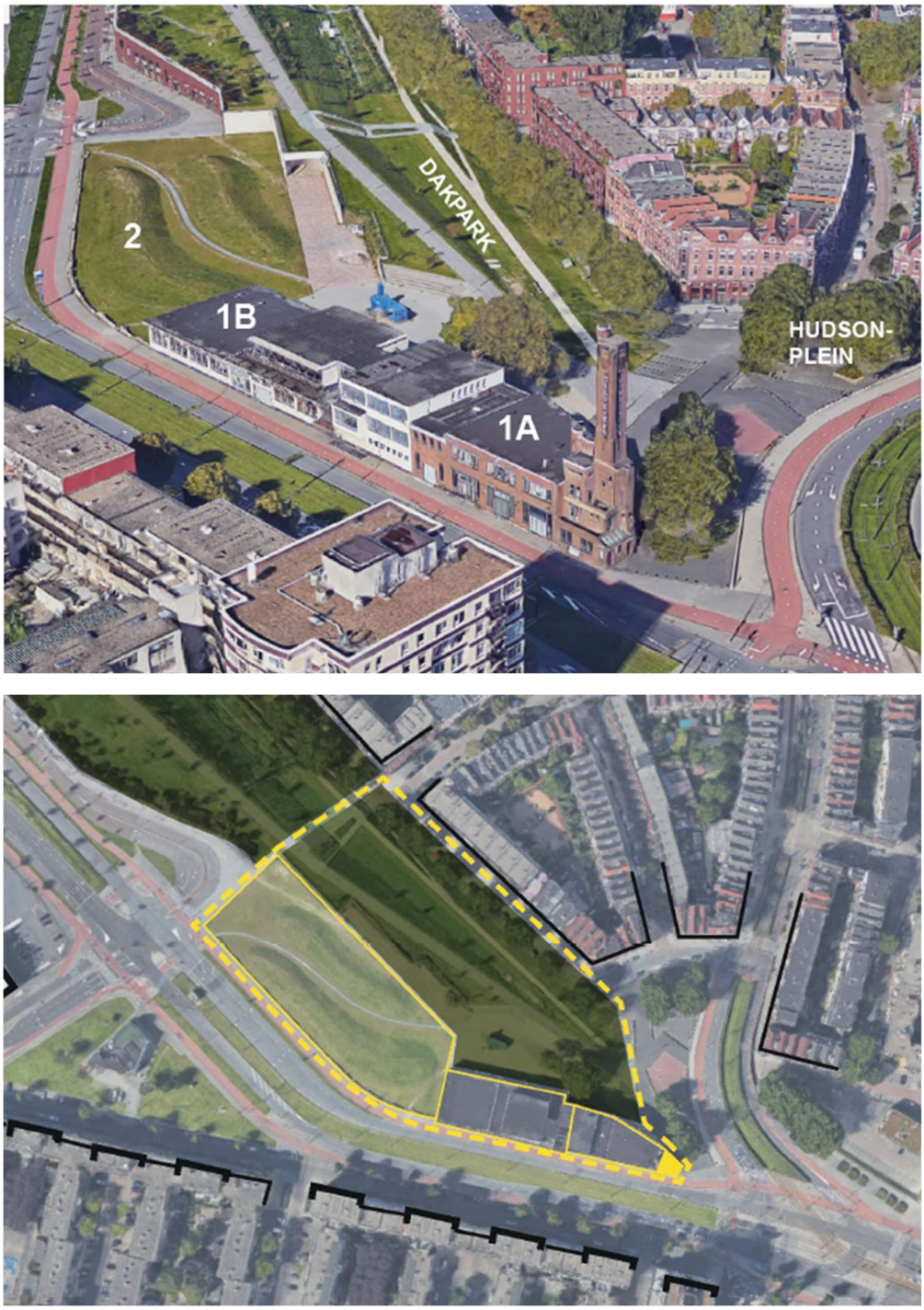


Figure 20: Case project site plot (source: Case project Memorandum of Principles)

According to the Memorandum of Principles from the Municipality of Rotterdam, Dudok Real Estate bought the monumental complex (1A and 1B in figure 20) with the intention of restoring the monument (1A in figure 20) and to give it a new use destination. Furthermore, they had the objective to redevelop the adjacent location (1B in figure 20) with housing. According to the municipality of Rotterdam, this location could not be separated from the adjacent location (the Tail), which is the eastern end of the strip mall, and decided that it was necessary to draw up a spatial framework for an integrated development of these locations and did so initially in the form of a Memorandum of Principles. The location is designated as a potential housing site because of the large inner city densification objective of the municipality Rotterdam. The aim for the location was to create an attractive and mixed residential environment at the Dakpark,

for both families and other urban households. The new buildings had to match in terms of structure, height, and appearance to the buildings in the area. The intended typology is a closed building block with a combination of ground-based and stacked homes, facilities, and activity in the inner garden. The new complex must fit the large scale of the strip mall, contribute to the appearance of the national monument (1A figure 20), and form an attractive transition to Dakpark (figure 20). The parking facility must be arranged within the area in accordance with the local parking norm.

Dura Vermeer joined Dudok in the real estate development process after the municipality of Rotterdam published the Memorandum of Principles. Together the companies developed multiple concept designs in cooperation with different architects. Eventually, the concept design of one of the architects was chosen and the development process continued.

4.2.2.1 Case project spatial planning framework

As explained in paragraph 4.1.2.2, the municipality decided it was necessary to draw up a spatial planning framework for the development of the Tail. The spatial planning framework refers to the spatial vision and the implementation strategy for the policies of the (local) government described in the spatial vision and the land-use plans as described in the theoretical framework. The location of the case project (the Tail) is subject to regulations within the land-use plan of the area Bospolder-Tussendijken. Important to note is that the case project has been developed by the development combination Dura Vermeer and Dudok on the basis of the guidelines of the municipality, published in the Memorandum of Principles. Appendix A-1 summarizes the guidelines set out in this Memorandum of Principles. The reason for this process will be explained in more detail in this section. The relevant parts of the frameworks within which the case project had to be developed will be described on the basis of the principles set out in the Memorandum of Principles, and the building regulations and norms in the Netherland described in the building decree.

The land-use plan Bolpolder-Tussendijken, which was established in 2007 (and became irrevocable in 2009), was no longer up to date at the end of 2017. Both because of the age of the zoning plan, and because of the development plans at the case project location at the Tail, it was decided to revise the land-use plan. The draft land-use plan was available for inspection in the summer of 2019. Prior to the submission of the draft land-use plan, the municipality of Rotterdam published a Memorandum of Principles containing the guidelines for the development of the location where the case project is now being realised. After the draft land-use plan was published, the land-use plan revision process came to a standstill due to a response from the Porth authority on this draft. The response of the Porth authority meant that the acoustic studies had to be revised. Changing the basic principles of the investigation meant that it took a long time before a definitive investigation was completed. This has influenced the land-use plan revision process. Adjustment of the studies was also necessary because of the design of the case project as the largest development location in this land-use plan had changed in the meantime.

The current development of the case project location consists of five residential apartment buildings with a height of four to eleven storeys with a maximum of 190 homes in total. Two residential buildings are on the Vierhavensstraat, the other buildings are on the Dakpark side. It concerns rental and owner-occupied homes with a surface area of 50 to 110 m2. Facilities or catering facilities are also possible in the plinth of one of the buildings. A global zoning area has been included for the case project location in the design land-use plan because at the time, the development had not yet progressed far enough to include a detailed plan. The design for the case project site was further elaborated in the period between the submission for inspection and the adoption of the draft land-use plan, in close consultation with the municipality. For now, the redevelopment of the monumental building has been postponed. There was pressure on the progress of the development of the case project location for several

reasons, in particular to achieve the housing assignment from the coalition agreement. At the time, it was important that the land-use plan would be finished in the short term in order to be able to achieve the intended start of construction in 2021, and therefore meet the council's objective of increasing the housing stock by 18.000 homes and adding additional rental homes for the middle rent class. In addition, the land-use plan would also allow other developments in the area

The design land-use plan, which was available for inspection in mid-2019, included a large, global zoning area for the case project location with a maximum building height of 35 meters. At that time, there was no detailed construction plan yet, but only a global Memorandum of Principles. The building plan for the case project location had been further elaborated when the final land-use plan was finalized. That is why a more detailed destination has been described for this location, in line with the final case project design plan. On balance, the area that is currently being developed has decreased compared to the allocated area described in the design land-use plan. The western side of the residential zoning is cancelled. A new entrance to the Dakpark is now being realized there. The maximum building height of 35 meters that applied to a large part of the global zoning area is also replaced by a building height per building. This varies from 11,5 meters to 35 meters. Depending on the building block, this involves 4 to 11 storeys.

4.2.2.2 Concept design process case project

During the real estate development process, multiple concept design iterations have been performed. First of all, Dudok developed a concept design in cooperation with an architect. This concept design will not be included in the remainder of this study. After Dura Vermeer joined the development, the development collaboration continued with multiple iterations, performed by different architects. The timeline of this process can be found in figure 21.

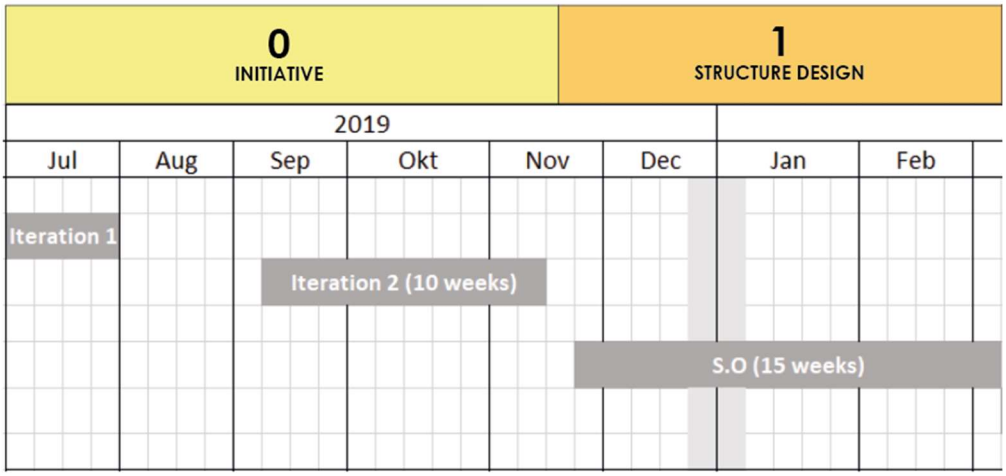


Figure 21: Timeline concept design process case project

The concept designs studied for this research can be divided into two iterations. For the remainder of this research these iterations will be referred to as iteration 1 and iteration 2. Iteration 1 includes the three different concept designs of the Design Studio, represented in figure 24, 25 & 26. Iteration 2 includes the three concept designs of the three architects, that were designed after the key-actors chose one of the concept designs from iteration 1, represented in figure 27, 28 & 29.
Prior to the concept design process of iteration 1, the design studio conducted location and market research. Figure 22 was part of this location analysis. In addition to the strengths of the area, some points of attention are also shown, namely the presence of noise pollution (indicated by the volume icon in red) and the windmill biotope (indicated by the white dotted circles). Figure 23 represents the SWOT-analysis made during this analysis.

Figure 22: location analysis case project. (Source: Dura Vermeer)

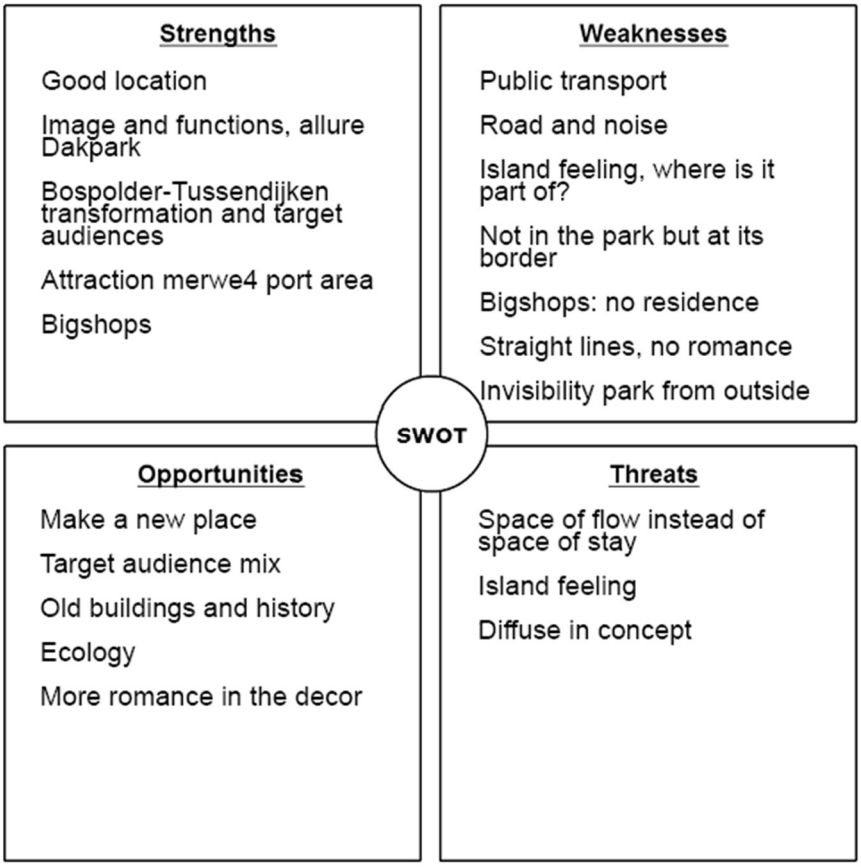


Figure 23: SWOT-analysis of the case location (Source: Dura Vermeer)

Figure 24: Iteration 1 - Concept design 1 (Source: Dura Vermeer)

Figure 25: Iteration 1 - Concept design 2 (Source: Dura Vermeer)

Figure 26: Iteration 1 - Concept design 3 (Source: Dura Vermeer)

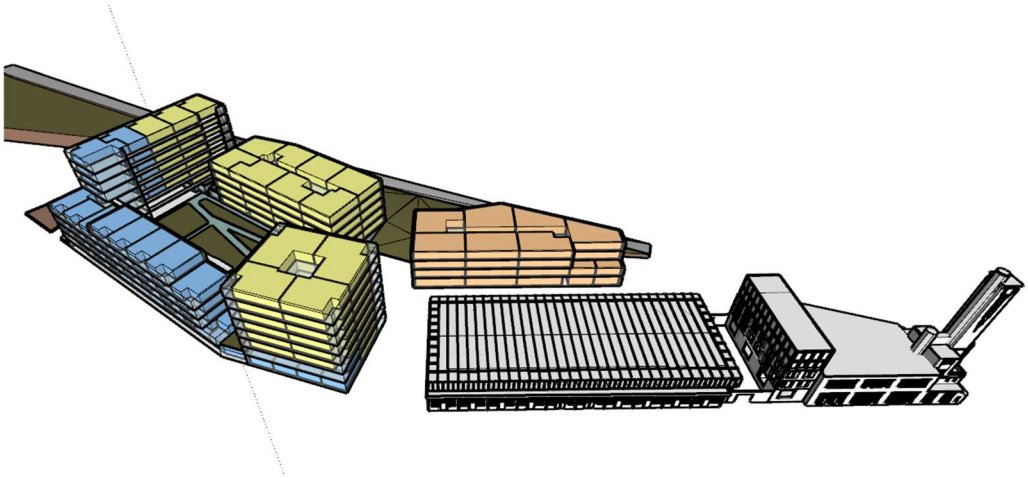


Figure 27: Iteration 2 - Concept design 1 (Source: Dura Vermeer)

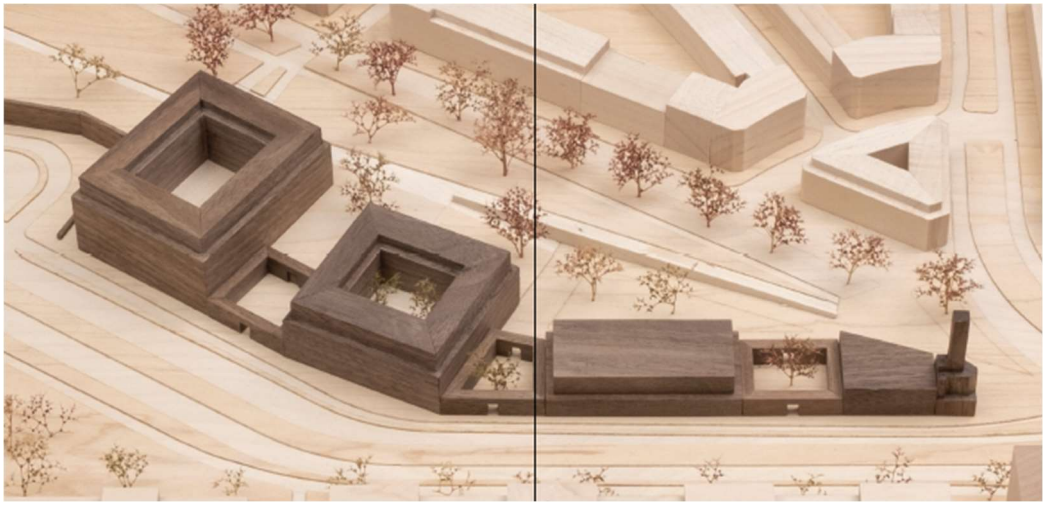


Figure 28: Iteration 2 - Concept design 2 (Source: Dura Vermeer)

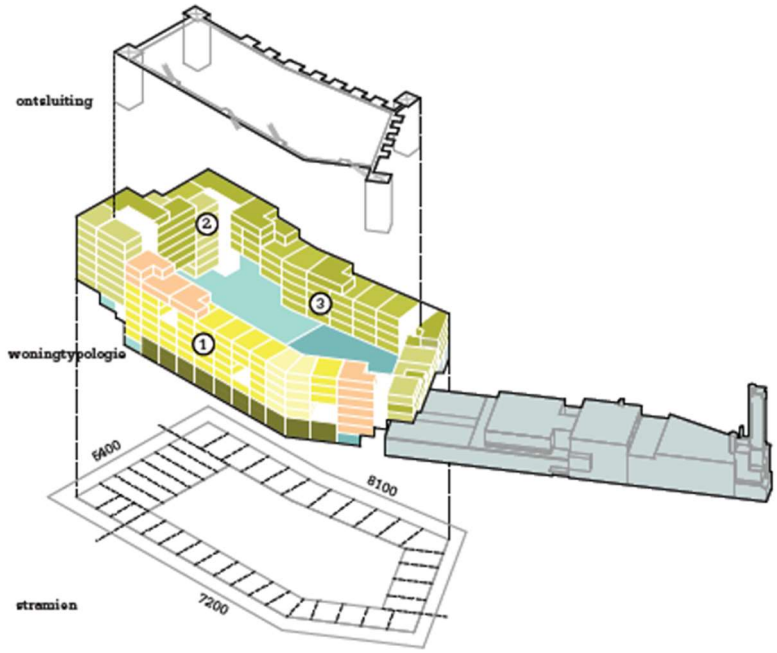


Figure 29: Iteration 2 - Concept design 3 (Source: Dura Vermeer)

4.2.2.3 Decision making process case project

As discussed in this subchapter, the concept design process of the case project can be divided into two iterations. There are no specific records of the decision-making process of iteration 1, but concept design 1 was chosen and used as basis for the design iteration 2. For iteration 2 there is a limited amount of documentation regarding the evaluation and decision-making process of the three architects. For the evaluation and decision-making process of iteration 2, the municipality of Rotterdam and the development combination Dura Vermeer - Dudok organized an architect selection. In total, the concept designs of the architects were assessed by a jury consisting of 8 people (with an equal vote). 4 persons employed by the municipality of Rotterdam and 4 persons employed by the development combination Dura Vermeer - Dudok. Figure 30 shows the scoring table during the architect selection. A more elaborate specification of the architect selection can be found in Appendix A-5

	Architect #1	Architect #2	Architect #3
Vision on design (40%)	35	28	16
Vision on process (25%)	21	20	17
Construction cost design (25%)	17	21	13
Fee proposal (10%)	7	7	7
Total (100%):	**80**	**76**	**53**

Figure 30: Scoring table architect selection (iteration 2). (Source: Dura Vermeer)

Some key points from the evaluation of the winning entry are:

- The diverse structure of the ensemble gives the whole design a small-scale grain size and nice variety, without falling apart. The integration and elaboration of the monumental ensemble, including the hide club, is very well thought out and convincing, both in itself and in line with the whole. In the elaboration, attention to the public/private relationship is a point of attention. Due to the fact that many building blocks are oriented on one side, there is a high pressure on the functioning of the various public spaces. That still makes the plan vulnerable.
- The Maakstraat is conceptually a very strong intervention and has a lot of potential. At the same time, the overall design now relies heavily on the arrival of this Maakstraat, which is still uncertain from a planning point of view.
- Through the input of a group of parties: from concept developers to end users, a strong whole has been created in which the preservation of the vision during the process and the creation of a truly new part of the city are easily imagined. The story is convincing in all aspects: the structure of the architect and its partners, the collaboration with the young architects, the extensive experience in these kinds of processes and all this with infectious enthusiasm.
- The design can be phased well, but contains many access points and a relatively large façade surface. The design suggested in the presentation does therefore not fit within the set budget, this is another major concern.

4.2.2.4 Uncertainties regarding the feasibility of the case project

The Bospolder-Tussendijken design land-use plan from July 2019, was available for inspection in September 2019 with a draft Higher Values Decree (Dutch: Hogere waardenbesluit). In the draft land-use plan, road traffic noise was regarded as dominant and industrial noise was still regarded as secondary. In that situation, the industrial noise was considered both spectrally and in an absolute sense without the contribution of nest noise. The Port Authority subsequently made a number of official comments on the draft land-use plan. Among other things, a request was made to investigate the noise from moored ships (nest noise) from the

zoned industrial areas Waal-Eemhaven and Havens Noordwest Oost-Frankenland. The decision of the Council of State a few months later concluded that nest noise should be considered in the industrial noise. This is also apparent from the PAG and the Environmental Act supplementary decree.

In January 2020, halfway through the SO phase of the case project development, the first noise pollution study has been performed by an external advisor in a building physics report. At the beginning of April 2020, the building physics report was adjusted in response to the uncertainties regarding the feasibility of the case project development due to the nesting noises from the port. The location experienced a noise pollution as result of various noise sources, in which the Pelgrimsstraat and the Waal/Eemhaven industrial estate turned out to be decisive. Because nest noise has a relatively low-frequency character, the standard soundproofing of the façade for noise pollution turned out to be unsuited for this type of noise. The investigation showed that the nest noise could have major consequences on the feasibility of the case project with regard to the noise pollution requirements. Figure 31 shows a visualisation of the amount of dB on the southeast façade of the chosen design.

Figure 31: Noise moored vessels [annual average, 70% berth occupancy] – Southeast view (source: Dura Vermeer)

Based on the information that was available at the time, the following estimate was made about the consequences for the process:

- **Design consequences**: When making the Structure Design (phase 2 from Flow), based on the design land-use plan and the acoustic research that formed part of this, nest noise was not considered. As a result, no deaf facades have been included in the design. If the design had to be adapted to this recent information, the Structure Design

stage had to start over. Meaning that they would have to review the program and adjust the outdoor spaces.

- **Consequences of process**: It was estimated that it would take at least 3 months to adapt the Structure Design to this new insight. Together with the preparation time this would result in an estimated delay of 4,5 months.
- **Housing Quality and Cost**: The possible measures have a negative effect on the quality of living and are cost increasing. The Structure Design connects with the environment through the form of the residential blocks and the position and/or construction of the outdoor areas. The changes required to fulfil to the new requirements are estimated. Based on these estimates, the following consequences for the development of the real estate project are estimated:
    - The blocks get a more closed contour, which makes the design of the public spaces is weakening.
    - The outdoor areas are turned inwards / screened so that the quality of living and safety in the public area is decreasing.
    - The development consortium and the municipality must incur costs to carry out the design review.
    - The costs of making the indoor balconies / deaf facades are higher, which means that the land value also decreases.

Around this period in time there was still a lot of uncertainty with regards to the principles that would be used in the noise part of the facet land-use plan, nest noise was one of the uncertain points. For the case project location, various scenarios were therefore investigated in collaboration with the Port Authority and municipality of Rotterdam. The worst-case scenario was also investigated, in which among other things, the low-frequency noise (which is a component of nest noise with a major impact on the environment) had been considered. From a legal point of view, it was not yet possible to include nest noise as industrial noise because the facet land-use plan had not yet been established. It could therefore not yet be included in the compliance assessment of the Noise Abatement Act. It could be concluded that the noise nuisance process was extremely complex.

Because the land-use plan was not yet final, the municipality of Rotterdam and the development combination Dura Vermeer – Dudok Real Estate, could still work on a solution. Around October 2020, the municipality deviated from the standards set in the land-use plan regarding a low-noise façade on the south-east sides of the apartment complexes. Ultimately, extra insulation measures were taken to meet the noise pollution requirements. The following motivation led to the deviation from the exemption policy:

- A noise-free inner garden will be created with a high residential quality.
- Extra living quality is offered by the direct proximity of the Dakpark.
- The houses are oriented on several sides as much as possible.
- Spatially, the urban design is highly desirable: the composition with relatively small building blocks ensures a recognizable plan with a human dimension. By cutting the building blocks loose with access to the porch where possible, massive building blocks with long galleries are avoided. Varying in shape and height creates a lively play of building blocks next to the monumental ensemble and the Dakpark.
- The homes are in the immediate vicinity of amenities (big shops and monumental building programming) and the homes are in an easily accessible location (public transport and car). This provides extra living quality.
- The new homes (approximately 190) make a substantial contribution to reducing the housing shortage.

Furthermore, the feasibility of the project was jeopardized because two of the five buildings did not meet the maximum building height requirements with regard to the mill biotope rules. At the Voorhaven in the historic Delfshaven is a malt mill located called ‘‘De Distilleerketel’’, that was originally built in 1899. The area around this mill is a mill biotope. The mill biotope was created to establish the relationship between the mill and its environment. The space kept free between the mill and the surrounding buildings is important for the wind capture of the mill. Furthermore, the visibility of the mill is also important. The mill biotope formula is a simple way to calculate the maximum acceptable height of obstacles around a mill, such that the mill does not experience insurmountable hindrance from surrounding buildings. The formula is therefore mainly used to determine whether or not an obstacle at a certain distance from the mill is ‘‘too high’’. To guarantee free wind and a view of traditional windmills in the South Holland landscape, a mill protection zone has been established with a radius of 400 meters calculated from the centre of the mill. The area around the mill within a radius of 100 meters should be free of obstacles, an ascending line applies from 100 to 400 meters. The case project development site falls within this 100-400 ascending line, viewed from the east side, approximately halfway. In April 2021 (during phase 3 - Definitive design) it turned out that buildings 1 and 4 did not meet the mill biotope height requirements. In total, the buildings blocked approximately 130 m2 of wind according to the established rules and calculations. Ultimately, the design of the building blocks was adapted in such way that it blocked less than 100 m2 of wind, so that the exceedance was within the limit of being an exception to the rule. Further explanation about the mole biotope can be found in Appendix A-4, together with the specifications for the case project location.

4.3 Key-actor interviews

The main goal of the semi-structured interviews is to enable the researcher to answer SQ1 and SQ2 and to give insight into the concept design evaluation process from multiple key-actor perspectives within the real estate site planning process. This data can be used as input for the development of the concept design evaluation framework.
The semi-structured interviews are based on the interview protocol (Appendix B-1). This enables the researcher to collect similar type of information from each of the interviewees (Holloway & Wheeler, 2010). The interview questions are based on the documentation and literature study findings, according to Wengraf (2001) this is necessary in the process of conducting semi-structured interviews.

First of all, the interviewees were selected based on their role within the real estate development process. This process will be further elaborated on in paragraph 4.1.3.1. Subsequently, the interview protocol was created. A trial interview was conducted prior to the interviews. Based on the results and feedback from the trial interview, the interview guide has been adapted to the version that can be found in Appendix B-1.

4.3.1 Participants

Within the real estate development process, there are a variety of roles, departments, and functions that play a role in the initial stages of a real estate development project. Since this study focusses on the concept design stage within the real estate site planning process, key-actors involved in this stage of the process will be interviewed. The case documentation study shows that the following functions, among others, play a major role in this process: development manager, project developer, concept designer. All the interviewees were involved in the real estate development process of the case project. Based on these prerequisites, five

interviewees have been selected. The interviewee demographics can be found in figure 32 below.

Interviewee	Role	Age [years]	Relevant working experience [years]	Gender	Education level
#1	Senior project developer	43	19	Male	Master (HBO/WO)
#2	Senior development manager	51	20	Male	Master (HBO/WO)
#3	Project developer	25	3	Male	Bachelor (HBO/WO)
#4	Director project development	51	20	Male	Master (HBO/WO)
#5	Head of concept development	43	19	Male	Master (HBO/WO)

Figure 32: Interviewee demographics

4.3.2 Data collection & analysis

For the semi-structured interviews, five key-actors of the case project have been interviewed. The goal of the interviews was to get insight in the concept design process as input for the development of the problem statement and investigate how the evaluation and decision-making process could be improved according to the interviewees. This input can be used for the development of the concept design evaluation framework. The interview protocol can be found in Appendix B-1.
As stated before, the interviews were conducted in Dutch because this is the native language of both the interviewer and the interviewees. The interview guide is translated to English. Permission was asked to record the interview, after which the recordings have been transcribed. The interview transcriptions can be found in Appendix B

Before the data from the interviews could be analysed, the transcribed interviews have been analysed and subsequently coded. In qualitative research, coding is the act of assembling, categorizing and thematically sorting acquired data to provide a structured framework on which the researcher can draw conclusions from (Williams & Moser, 2019). Figure 33 gives a schematic representation of the coding process according to Williams & Moser (2019).

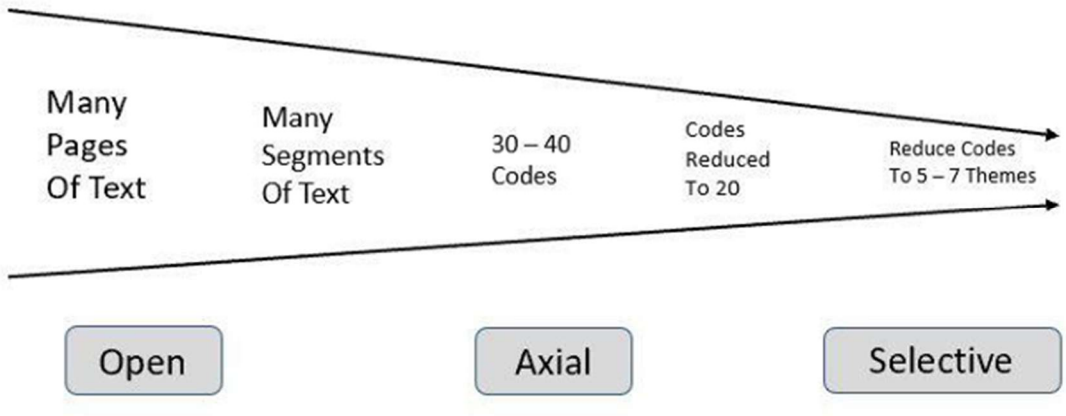


Figure 33: Schematic representation of coding process (source: Williams & Moser, 2019, p. 47)

As represented in the interview guide, the interview questions are subdivided into subjects (real estate development process, concept design process, evaluation and decision-making

process, concept design feasibility, and the case project). First of all, the answers to the questions are analysed by using open and subsequently axial coding (Appendix B-7 – B-12). Based on these coding, the interview results have been analysed in subchapter 4.3.3. Relevant quotes have been incorporated into this analysis.

4.3.3 Interview results

4.3.3.1 Real estate development

According to the interviewees, the real estate development process and the initiative phase within the real estate development process are both inconsistent processes. The initiative phase often starts with a location, followed by an opportunity analysis in which the potential for the location is investigated, and ends with an investment decision. The goal of this opportunity analysis is to determine whether the location could provide a (financially) feasible real estate development business case. A market analysis is used to give insight into the local circumstances. Some important factors mentioned by the interviewees are: the ownership of the land plot, the adjacent neighbourhoods, the vision and land-use plan of the municipality, the target group for the location, local provisions such as public transport, environmental conditions, etc. These factors and conditions form the preconditional framework of the project. Within this preconditional framework the real estate developers look for possibilities on the given plot. The market research and the vision of the municipality often reveal a certain target group (ratio) for the plot. According to the interviewees, each target group belongs to a certain type of home(s), or in other words, to a certain number of square meters they can afford. At an early stage of the real estate development process, an estimation is made to determine the order size in which real estate can be developed on the plot. This estimation, combined with the market analysis and possibilities within the preconditioning framework result in a structure model, consisting of the (estimated) number of houses, Gross Floor Area (BVO), Useable Floor Area (GO), etc., and one or multiple concept designs. Both the (concept) designs and the structure model are initially created on a mass study detail level, after which they become increasingly specified throughout the real estate development process. The most important action in the early stage of the real estate process, before the investment (decision) is made, is to determine whether the business case is feasible, in a practical manner, but primarily in a financial manner.

4.3.3.2 Concept design process

Three of the five interviewees literally stated that each concept design process is unique, the others did not mention anything about the consistency of the process. As explained during the real estate development theme, the concept design process starts after a real estate developer finds a location and has the intention to investigate whether it could provide a feasible business case. Interviewee #1 states the following about the concept design process:

‘‘*The concept design process is not very clearly defined, so you have your starting points: a piece of land, then you have your preconditions that you map out and then your design process begins. So, depending on whether it is a blank sheet or already very much coloured, suppose it is a bit in the middle; you have some basic principles from the municipality and sometimes a land-use plan’’.*

The market analysis is very important input for the concept design process. At Dura Vermeer, the concept designers at the Design Studio are responsible for the market analysis. They come up with a few possible set ups for the plot, based on the output of the market analysis. The following example is given in interview #2:

‘‘The different products for different target groups determine the way in which you can divide an area. What we will then look at is how we can organize the area? We do this in consultation

with our Design Studio, because on the one hand they can set up masses in areas, and on the other hand we have our analysts there who will take a look with us, or at least give a suggestion or give advice about the location: this is the place, these are the facilities in the area, we think that the following target groups would like to settle in this place and that could be, for example, young families with children or a combination of families, some elderly or empty nesters. This again includes a certain product; ground-bound, semi-detached, apartments, city apartments, city houses. Well, something comes out of that and with that knowledge you then try to look at how you could best fill in the area with those volumes. With that, of course, the preconditions from the municipality or provincial policy play a role. For example, the plot should contain 30% social housing, it must contain 40% medium rent and 30% more expensive, well then you know which target groups belong to that specification, which products belong to that and that is how you will fill the plot in.''

The design of the concepts starts on mass study level, in which the masses are placed on the land plot, within the boundaries of the preconditional framework. Together with the mass study, a structure model is created in which the financial feasibility of the concept design(s) is determined by the real estate developer on a very broad scale. The importance of the financial feasibility comes to light in the majority of the interviews. According to the interviewees, there is no consistency in the number of concept designs and concept design iterations. The interviews indicate that the developers usually first make a (few) basic concept design, ether by sketching themselves of in case of Dura Vermeer in collaboration with a (internal) concept designer, in which the preconditions and programmatic principles for the design are determined. This basis is then passed on to the (external) architect(s), who further develops the design. Interviewee #1 states the following about the consultation of advisors during the concept design process:

''The moment you consult an advisor depends very much on what your preconditions are, based on your experience you know, or based on what the preconditions say, you know what is critical in a certain location, or we don't have a good feeling here, is it right? Perhaps the municipality is asking for a very challenging energy concept, well then you ask for such an advisor, so that too cannot be clearly stated in advance, because that's how we always do it. Sometimes you don't involve advisors at all and other times you still need multiple advisors''.

All the interviewees reacted positively when being asked to what extent it would be of added value for them to be able to choose from more concept designs. They stated that in the current concept design process, a limited number of designs are created because it takes a lot of time and therefore costs a lot of money to make a concept design. In the early stage of the concept design process, when the first concept designs are made, there is still a lot of uncertainty regarding the feasibility of the project. Therefore, the development managers try to invest as little time and money as possible before a viable business case is made.
When being asked about the problems they are currently phasing during the concept design process, all the interviewees give a response related to the human factor of the concept design process. They state that the concept design process is very dependent on the capacity (both time and functional) and creativity of the concept designers, employees of the municipality and real estate developers. On the one hand this human factor is one of the most important aspects of the real estate development process, it is the core development; the design begins with a land plot and someone's vision. On the other hand, can this human imagination be a limiting factor. Interviewee #1 states the following:

''Sometimes you are simply stuck in a certain pattern or because you have read the preconditions of the municipality you are already in a certain frame of mind. The more out of the box ideas you have the better. I do feel that when you can do something with parametric design, you are pushed a bit out of the box. That designs that you may not have thought of are simply generated and could have scored high. In that sense, you always run into limitations in such a design process with the designers you work with. Well, we happen to have very good

concept designers, but you are very dependent on the person at your desk who is going to make plans for you."

Furthermore, the concept design process overall is regarded as inefficient. This varies from an inefficient design process to an inefficient evaluation process, and the overall lead time being too long. Half of the interviewees indicated that there is a need for optimizing the collecting/creation, analysis and assessment of the data and concept designs withing the concept design process and suggested the use of some sort of software to assist them during these activities. However, there is some concern that the use of this type of software may have a negative impact on the manageability of the concept design evaluation and decision-making process.

4.3.3.3 Evaluation and decision-making process

All the interviewees stated that the evaluation and decision-making process in real estate development is primarily subjective, since real estate development is a creative process, based on a (commercial) feeling. This feeling is based on the objective information the development managers / project developers acquire and the calculations they make during the initial phases of the real estate development / concept design process. Interviewee #4 states the following about the decision-making process:

"The trade-off is actually the balance between programme and money, and risk."

The interviewees do not see any use for the assessment of the subjective parameters, nor do they see how this could be realised in practice. The emphasis is constantly placed on the subjective nature of the concept design process, and the emergence of a "feeling" that determines the decision-making process. Objective data is seen by all interviewees as the basis for the subjective feeling, which determines the choices to be made. Interviewee #4 states the following about the objective aspects of the concept design evaluation and decision-making process:

"You will of course consider which factors influence the development so much that it really changes your design completely and which things you can simply implement in your plan, there is of course a difference. You have to consider very carefully what the environmental factors are, actually in a due diligence investigation. Before you buy a location, you always look; what are the factors that will influence my design? The land-use plan is often one, with nuisance contours added, perhaps there is a Natura 2000 area in a circle of two kilometres within your project".

From the interviewees' answers, it can be concluded that the concept design evaluation and decision-making process is structured to a lesser extent. Interviewee #1 indicated that the structure is limited to the making of the Budget exploitation plan for the project:

"A lot of data is translated into the land value, so you are going to enter data when you make a land value calculation, a BEO. How many houses are there? how much BVO? how much GO? Those GO's in particular are always difficult in a concept phase, because then you obviously don't know exactly how the building will be accessed. How many meters do you lose in common areas? how thick are your walls? All such things ultimately determine how your Useable Area/GFA ratio will be. However, based on your experience and the GFAs that come from the concept design, you can estimate how your GOs will come out. Your GOs eventually yield money, which you estimate based on market advice, and then a land price rolls out and you compare one plan with another."

One of the interviewees stated that the assessment of the location is in some sense structured. They use a checklist for the analysis and assessment of the plot to determine whether there is

housing allocation, the hinder contours applicable to the location, the public transport facilities of the location, etc. However, this form of structure is not aimed at concept design level, but rather at mapping the potential of a location.

4.3.3.4 Feasibility

The majority of the interviewees indicate that the feasibility of the concept design is tested during the decision-making process by assessing the financial feasibility of the design and indicate that this is the most important factor for the feasibility of the project. Interviewee #3 states the following:

"It is certainly already being tested on the main line, so very broad. Also, because you will continue to invest so you have to be sure of; we think what we are doing is promising or we think it is not promising. So, for the case project, for example, we looked at different variants for those existing buildings and on that basis, we also wanted to see whether we thought it was interesting enough to give it a follow-up or not. So, do we see enough yield potential and enough feasibility for this plan to involve an architect or bring in an advisor who will look at certain themes?"

Two interviewees indicated that environmental factors are broadly considered in determining the feasibility of the concept design. The other interviewees didn't mention environmental factors. It emerged from the interviews that, in addition to the available data, this is primarily based on the experience and knowledge of the development manager or project developer. In case there is an existing land-use plan for the plot, there should be data available concerning the noise pollution (up to a certain extent). Interviewee #3 states the following about a situation where there is no land-use plan yet:

"If you have to adjust a land-use plan, as was the case with the case project and with another project we have been working on, then you do not know that, but then it is conceivable that when you are on the road, you have to deal with a high noise level and that you have a certain amount of noise and provisions must be made. So, you know that, but it's not verifiable yet. You will check it when you have a certain certainty about the positioning of your building blocks, then you will do research or have it done at the land-use plan. You are not going to do noise research for every variant, that would however be ideal."

This example also clearly shows another finding from the interview; the developers often say they "know" that certain environmental factors can cause difficulties, but that this is mainly based on assumptions and experience. These assumptions are verified when there is a certain degree of certainty regarding the, in the case of noise pollution for example, positioning of the building. When the interviewees were asked how, in their opinion, the uncertainty regarding the feasibility of a project could be reduced, everyone indicated that more (preliminary) research could certainly be of added value to reduce uncertainty. Three of the five interviewees stated that besides more research, bringing forward this knowledge could also have a positive influence on the uncertainty reduction in their view. In addition, half of the interviewees emphasized that reducing the risk by mapping out influential factors of the project is part of the job of a real estate developer/ development manager.

4.3.3.5 Case project

Both the general project development process and the concept development process as described in the documentation study correspond to the process described in broad outline by the interviewees. All interviewees indicated that the concept design process of the case project can be considered a relatively normal process within the framework of inner-city project development. Two interviewees emphasized that environmental conditions have a major impact on inner-city real estate development projects. Some background information was

gathered regarding the evaluation and decision-making of the final concept design for the plot (Iteration 2). Interviewee #4 states the following:

‘‘*Well one design was one big monolithic block, very cool gesture, very robust, big block. Then you go back into the subjective discussion with each other of yes, the M4H area is of course a very industrially large area. What you want is that you will get a much more intricate living environment, if you then make such a big gesture, you are actually stamping out those industrial characters while you want to get that sweetness and niceness into it. Based on those kinds of factors, a design was chosen that simply has much nicer small blocks. So, one of the three designs had already fallen off because it was way too colossal. Then you look at how can we ensure that you can live comfortably in such an area? Well, there we have a very nice interior space here in the design that we have chosen. This design was the best fit because you got a very nice, nice indoor area in which people are on the one hand close to the city, close to industry, but still have their own quiet living environment in this area. That is how this design was ultimately chosen.’’*

The final decision regarding the concept designs was, as indicated above, primarily subjective. The interviewee did emphasize that the architects had the objective properties in the preconditional framework to their disposal. When being asked which problems the interviewees encountered during the concept development process, the same issues were given overall. In general, it can be seen that these challenges have a number of things in common: In general, they are problems related to the environmental factors of the design; the mill biotope, noise pollution and the sheet piling, which meant that the building had to be moved slightly. Each of these challenges also had in common that the provision of information played a decisive role. Concerning the mill biotope problem there were two different documents from the municipality, each of which indicated a different dimension. With the sheet piles there was a problem with the communication, and with the noise pollution it was unclear (for the municipality, developers, and advisers) how the nest noise had to be considered in the calculation of the noise pollution.
Half of the interviewees came up with an interesting insight regarding the removal of uncertainties during concept development. Interviewee #4 described this as follows:

‘‘The disadvantage is, if you want to avoid everything, you have to keep yourself very specific to each starting point, but then you are really doing yourself a disservice. This means that you skip a lot of things that are in the grey area and then you also miss a lot of things that can make a project much smoother, better, or higher. You miss all of that because you stick to the rules so neatly. Look I always say; you have green, orange, and red. You should not come in red, most of it should be in green, but there will be some things in orange and afterwards you can say; yes, I may or may not have done that, but you can only say that with today's knowledge. I wouldn't want us to just have people who are just in the green field and say, "I don't do orange because it's too dangerous." Then you simply miss a lot in your projects and that is a shame. So, you should always look for the grey or orange area, in order to get the most out of your project.’’

4.4 Conclusion

In order to form a general picture of the concept design process in practice, and gain a better understanding of the current problems, both a case documentation study and interviews were conducted. In this sub-chapter, the second part of SQ1 and SQ2 will be discussed (the practical side of the sub-question). In chapter five, the answers of SQ1a-b and SQ2a-b will be compared to finalize the sub-questions.

4.4.1 Sub-question 1-b

SQ1-b: ''How is the current concept design stage of the real estate site planning process organised according to the key actors and case documentation?''

The practical research shows that each inner-city real estate development process is unique. In general, every project goes through the same phases and overall, the same products have to be delivered. In the case of Dura Vermeer, this real estate development process is called the FLOW (figure 17). However, the course within these phases is different. This is partly due to the fact that every real estate development project is located in a unique location with its own unique environmental conditions that influence the plot. The environmental conditions therefore play a major role in the preconditional framework of a real estate development project and play a large role in the preconditional framework.

The initiative phase often starts with a location, followed by an opportunity analysis in which the potential for the location is investigated in an iterative design process, and ends with an investment decision. The goal of this opportunity analysis is to determine whether the location could provide a (financially) feasible real estate development business case, within the preconditions set in the preconditional framework. The preconditional framework consists of design goals and requirements set by the development party and imposed requirements set by the (local) government. A market analysis is used as input for the opportunity analysis to give insight into the local circumstances and determine the target group and associated housing types for the development. The target group specifications are often part of the preconditional framework set by the municipality.
The design of the concepts starts on mass study level, in which the masses are placed on the land plot, within the boundaries of the preconditional framework. Together with the mass study, a structure model is created in which the financial feasibility of the concept design(s) is determined by the real estate developer on a very broad scale. The importance of the financial feasibility comes to light in both the documentation study and in the majority of the interviews. According to the interviewees, there is no consistency in the number of concept designs and concept design iterations. The interviews indicate that the developers usually first make a (few) basic concept design, ether by sketching themselves of in case of Dura Vermeer in collaboration with a (internal) concept designer, in which the preconditions and programmatic principles for the design are determined. This basis is then passed on to the (external) architect(s), who further develops the design. Although on paper, the concept design stage ends with the investment decision at the end of the Initiative phase, when the design enters the Structure Design phase, the results from the interviews indicated that this is not a strict line. During the Structure Design phase, the masses of the design can still be changed if needed. This is often referred to as rework because it sets the progress back. Already completed tasks have to be repeated, causing higher development cost and a longer lead-time.

4.4.2 Sub-question 2-b

SQ2-b: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the key-actors and case documentation?''

During the concept design evaluation process, the developers assess whether the concept design(s) fit within the preconditional framework, and whether the development of the design would potentially lead to a financially feasible business case. Based on the case study and the key-actor interviews it can be concluded that the evaluation and decision-making process within the concept design process is primarily subjective, based on a (commercial) feeling.

This feeling, however, is based on the objective information the developers acquire and the calculations they make during the initial phases of the concept design process. Interviewee #5 stated that when the decision is made to make buy a plot, about 70% is known, based on objective information and 30% is based on gut feeling. He emphasised however, that environmental information is not included in the 70% objective information, and that it would be very interesting to acquire more objective knowledge on potential pitfalls such as high noise pollution on the façade. This is, however, a subjective estimation that indicates that there is a substantial lack of knowledge during the early stages of the real estate development process.

These environmental conditions are currently not further investigated at that time because doing so, would cost 1 or 2 weeks according to the interviewee. This is also the reason why in the current concept design process, only a few design possibilities are being made. The interviewees indicated that this process is very labour-intensive and therefore costs a lot of time and money. Because there are many uncertainties and risks in the early stages of the development process, the developers try to keep investment costs low up till the point that there is more certainty that the development will continue.

The interviewees indicated that more research, also in the form of a larger number of concept designs for a location, could possibly have a positive effect on the concept design process and the end result because they assume this would lead to less re-work at a later stage of the real estate development process, and would therefore increase the feasibility of the project. This corresponds to the findings from the documentation study, which revealed that the two major reasons for rework and therefore a longer lead-time where problems related to the environmental relationship of the building: the noise pollution on the façade and the building height that exceeded the mill biotope regulations.

It can therefore be concluded that especially environmental parameters could be relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project. The practical data collection revealed that especially the following parameters play a role in the preconditional framework of a real estate development project: Noise pollution on the façade, sunlight hours on the façade, and daylight hours in the building. Furthermore, since the feasibility of the project is determined by calculating the expected residual (land) value, it can be concluded that all parameters that influence the costs and revenue of the development overall can be seen as important to decrease the uncertainty regarding the feasibility of the project.

5. Problem specification

In this chapter, SQ1 and SQ2 will be answered by comparing the answers of SQ1-a and SQ1-b, and SQ2-a and SQ2-b. In combination with the answer of SQ3 given in subchapter 3.4.3, these results can be used to further specify the initially identified problem, and to find a possible solution to this problem in sub-chapter 5.1.

5.1 Comparison between theory and context

5.1.1 Sub-question 1

SQ1: ''How is the current concept design stage of the real estate site planning process organised according to the literature, key-actors and case documentation?''

It can be concluded that the current concept design stage of the real estate site planning process as specified in SQ1-a, generally corresponds to the practical process described in SQ1-b. Summarized; the concept design stage falls within the real estate site planning process, which is part of the real estate development process. Each real estate development process is unique, since it has a different mix of location, market timing, product, and price. It starts either with a piece of land or an idea, but according to the practical research often with a piece of land. Overall, the process ends when the building is finished and operational. The real estate site planning process ends just before the construction phase begins. The concept design stage starts when the developer finds a location and has the intention to investigate whether it could provide a financially feasible development business case. According to the literature, it starts with the specification of the design goals, after which the first concept designs are created. Information retrieved from the preconditional framework, and location- and market studies is used as input for the concept design process. According to the literature, this is called the developers opportunity space (Carmona, et al, 2010) as depicted in figure 10. These are boundaries in which the real estate developer can operate and create a concept design.

The concept design process is an iterative process, in which the designs are continuously tested against the set requirements and goals, after which a decision is made and the process is repeated, until a final concept design is chosen. The (expected) financial feasibility plays a decisive role in this process. During the concept design stage, not all decisions are based on objective information, due to a lack of knowledge, a lot of decisions are based on assumptions and gut feeling. The decision-making process will be further elaborated on in SQ2. After the final concept design is chosen, the design is taken to the next phase of the process, often referred to as the Structure Design (SO) phase in practice, in which the mass study is further developed technically. The boarder between these phases is less strict as suggested in the literature and case documentation study. During this process, as more objective knowledge about the design task is gathered, it happens that decisions based on initial assumptions or gut feeling appear to be wrong. This can cause rework, additional costs, a longer lead time, and therefore a less accurate initial feasibility estimation.

5.1.2 Sub-question 2

SQ2: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature, key-actors and case documentation?''

It can be concluded that the results from SQ2-a and SQ2-b generally correspond with each other. Summarized: The concept design evaluation and decision-making process is largely a subjective process according to both the literature and practical data analysis. The case

documentation showed that the decision-making process regarding the concept design iteration 2 from the case project was primarily subjective. Both the literature and the practical data analysis indicate that this subjective decision is based on a combination of objective information and a subjective (commercial) gut feeling and assumptions. Because there are many uncertainties in the early stages of the development process, the developers try to keep investment costs low up to the point that there is more certainty regarding the continuation of the real estate development project. In the current process, the information concerning the environmental parameters must be retrieved with the help of an advisor, and because it is currently not possible to do this analysis for every concept design in a relatively short time, this information is often retrieved after a final concept design is chosen, during the Structural Design phase. This means that a at the time of the decision-making, these environmental parameters are assessed based on assumptions and experience instead of objective knowledge.

The feasibility of the project is determined by calculating the expected residual (land) value / profit of the project. The possibility of rework and a less accurate cost estimation accuracy could have a negative influence on this residual (land) value. It can be concluded that this uncertainty has a negative influence on the (expected) feasibility of the project. Figure 34 gives a schematic representation of the relationship between the GDV, the total costs, the gross residual value / profit, and the role that uncertainty plays in the determination of the reliability of these values.

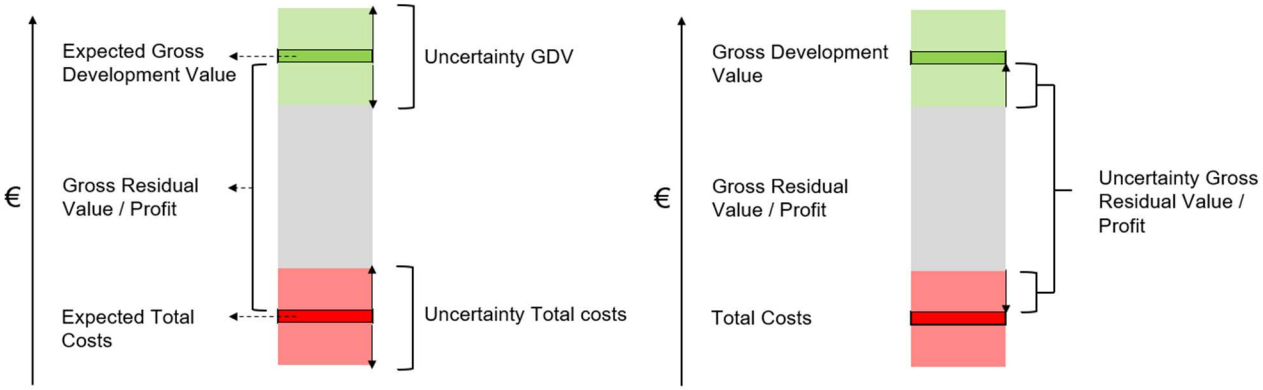


Figure 34: Uncertainty with regards to the feasibility of a real estate development project

According to the literature, the correctness of the input values is important for the reliability of the profit or residual land value estimation, which is used to determine the feasibility of the real estate development project. It is stated that a more thorough analysis should focus on the uncertainties associated with each of the factors that influence the financial outcome of the project. The interviewees indicated that more research, also in the form of a larger number of concept designs for a location, could possibly have a positive effect on the concept design process and the end result, because they assume this would lead to less re-work at a later stage of the real estate development process, and would therefore increase the feasibility of the project. This corresponds to the findings from the literature and documentation study. The documentation study revealed that the two major factors that jeopardized the feasibility of the project (due to rework which led to a longer lead-time and additional costs) where problems related to the environmental relationship of the building: the noise pollution on the façade and the building height that exceeded the mill biotope regulations.

It can therefore be concluded that especially environmental parameters could be relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project. The practical data collection revealed that especially the following

parameters play a role in the preconditional framework of a real estate development project: Noise pollution on the façade, sunlight hours on the façade, and daylight hours in the building. Furthermore, since the feasibility of the project is determined by calculating the expected residual (land) value, it can be concluded that all parameters that influence the costs and revenue of the development overall can be seen as important to decrease the uncertainty regarding the feasibility of the project. In addition, parameters that give more insight into whether the design fits within the boundaries of the developers' opportunity space are also suggested to be important for the concept design evaluation to decrease the uncertainty regarding the feasibility of the project. According to the literature, the included design parameters should enable the developer to steer the process into a logical, systematic procedure that aims at identifying the areas of risk and uncertainty associated with the particular project.

5.2 Conclusion

Based on the theoretical framework, practical data analysis and the answers of SQ1, SQ2 and SQ3, the problem statement can be further elaborated on. In sub-chapter 1.1 of this research, it was discussed that uncertainty due to a lack of knowledge during the decision-making process of the concept design process plays a large role in the current real estate development process. This uncertainty needs to be considered in determining the value and therefore the feasibility of a project. A lot of decisions made at an early stage are based on educated guesses, which if estimated wrong, could lead to consequences in the form of rework, additional design iterations and an increasing lead time that potentially could jeopardize the feasibility of the project.

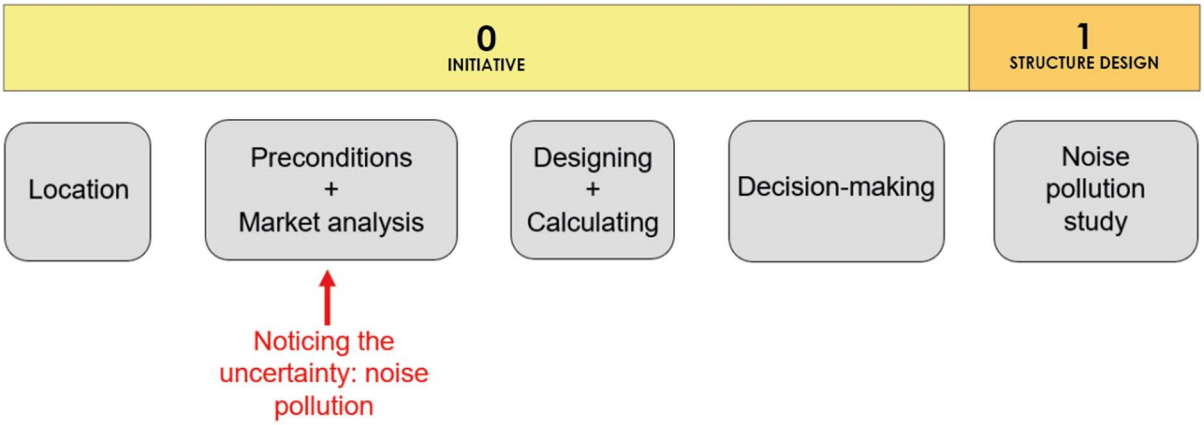


Figure 35: Example of the current concept design process (simplified)

This lack of knowledge can be further specified as follows; mainly the environmental parameters which are part of the preconditional framework are estimated at the early stages of the concept design process. According to the research, this is also the main cause of rework and therefore additional costs, and a longer lead-time. Figure 35 gives a schematic representation of this part of the problem. During the early stage of the concept design process, it is found that (in this example) the environmental parameter noise pollution forms an uncertainty for the development of the project. The developers notice that the noise pollution could potentially disturb the development and jeopardize the feasibility of the project during the location/market analysis. However, only after the concept design decisions are made and one design is further developed, the first noise pollution study is performed.

The feasibility of the project is determined by calculating the expected residual (land) value / profit of the project as shown in figure 8. The profit is calculated by determining the expected capital value of the project and subsequently subtracting the expected total costs. Unexpected additional costs caused by rework, higher loan-costs due to additional lead-time, or higher

building expenses make the original project feasibility estimation less reliable. Within the scope of this research can be concluded that rework and a less accurate cost estimation are the cause of this problem.

When being asked about the problems they are currently facing during the concept design process, all the interviewees give a response related to the human factor of the concept design process. They state that the concept design process is very dependent on the capacity (both time and functional) and creativity of the concept designers, employees of the municipality and real estate developers. On the one hand they conclude that this human factor is one of the most important aspects of the real estate development process, it is the core of the development process; the design begins with a land plot and someone's vision. On the other hand, this human imagination can be a limiting factor in a sense that there are more design possibilities than a single human can think of. Furthermore, the current concept design process overall is regarded as inefficient according to the key-actors. This varies from an inefficient design process to an inefficient evaluation process, and the overall lead time being too long. Half of the interviewees indicated that there is a need for optimizing the collecting/creation, analysis and assessment of the data and concept designs withing the concept design process and suggested the use of some sort of software to assist them during these activities. However, there is some concern that the use of this type of software may have a negative impact on the manageability of the concept design evaluation and decision-making process. As stated in sub-chapter 1.1, the use of AI powered generative design tooling during the concept design stage of the real estate development process could potentially be used to analyse and evaluate the impact of the design on its environment with objective information, increase the quantity of concept design, and therefore reduce the uncertainty with regards to feasibility of the project, there is currently no scientific method to help the designer evaluate the concept designs and enable them to make more grounded decisions based on these criteria.

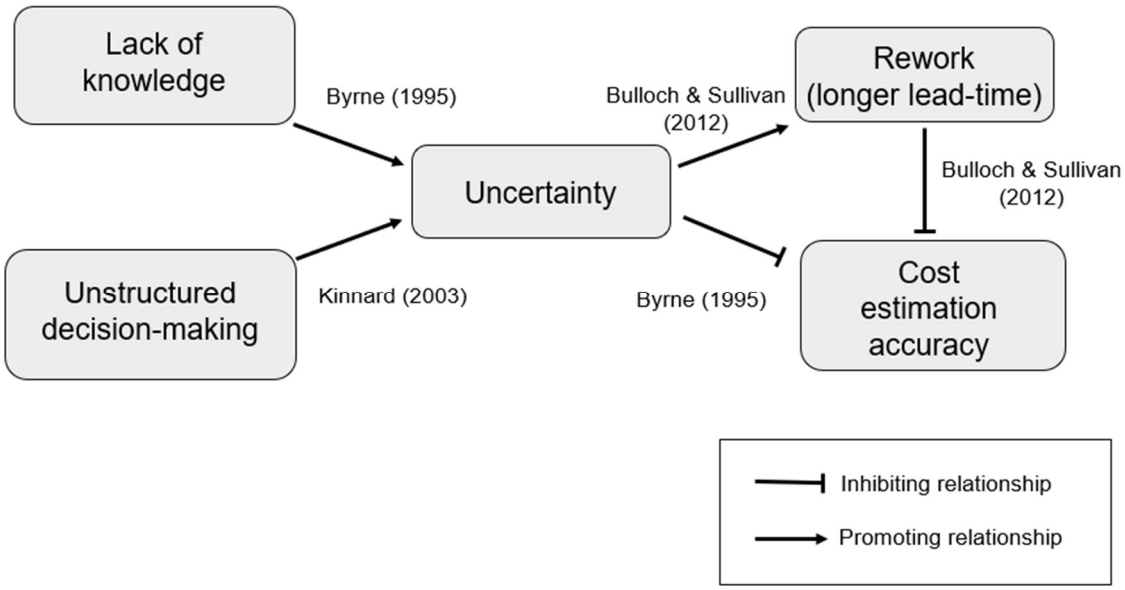


Figure 36: Causal network: current situation

In order to visualise the relation between the discussed problems, a causal model has been developed (figure 36). The causal relations are based on the literature from the theoretical framework. As explained in figure 34, the feasibility of the project is determined by the difference between the cost and development value of the project. Given the time scope of this research, the focus will be on validating the causal network depicted above. In the next part of this research, it will be validated whether the causal model and the suggested solution in the form of the artifact will have a positive influence on the observed problems.

II - Design Solution & Specification

6 Development needs

Based on the theoretical framework and practical data collection, the researcher has further specified the earlier identified problem statement in sub-chapter 5.2. This problem specification, and the gathered knowledge can be used during the second step of the Design Cycle: The Treatment Design, or as called in this research; the Design Solution & Specification. In this step, the goal is to design an artifact that could treat the identified problem. First of all, the development needs will be further elaborated on in this chapter, after which in chapter 7, the design process of the artifact will be discussed. Finally, in the last part of this Design Cycle step, the researcher will validate whether the designed artifact meets the Development needs and the stakeholders' goals. At the end of this process in chapter 8, the researcher is expected to answer the last sub-question of this research:

SQ4: *"How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?*

6.1 Stakeholders

The group of stakeholders that would directly benefit from the treatment of the identified problem according to the Problem Investigation are the real estate development professionals within the early stage of the real estate development process, more specifically: the concept designers, development managers and real estate developers. This group of stakeholders gave more insight into the real estate development process and concept development process during the key-actor interviews. This is used as input for the problem specification in sub-chapter 5.2

6.2 Development goals

In order to design an artifact that could potentially treat the identified problem in sub-chapter 5.2, the development goals have to be further specified. Figure 36 gives a schematic representation of the causal relation between the different aspects within this scope of the research. An extensive explanation of the problem can be found in sub-chapter 5.2. Summarized can the causal relation be explained as follows: There is a certain lack of knowledge during the concept design process, especially at the beginning during the initiative phase. Combined with the unstructured decision making, this lack of knowledge leads to a certain degree of uncertainty, which has a negative influence on both the potential for rework during the real estate development process, and on the accuracy of the cost estimation.

In order to solve the further specified problem from sub-chapter 5.2, the following design needs have been specified (visualised in figure 37): Decrease the lack of knowledge and the unstructured nature of the current decision-making process, thereby decreasing the uncertainty within the real estate development process, which should lead to a decreased potential of rework, subsequently increasing the cost estimation accuracy. This should therefore have a positive influence on the uncertainty regarding the feasibility of the real estate development process. The different development goals have been further elaborated on in the following sub-chapter.

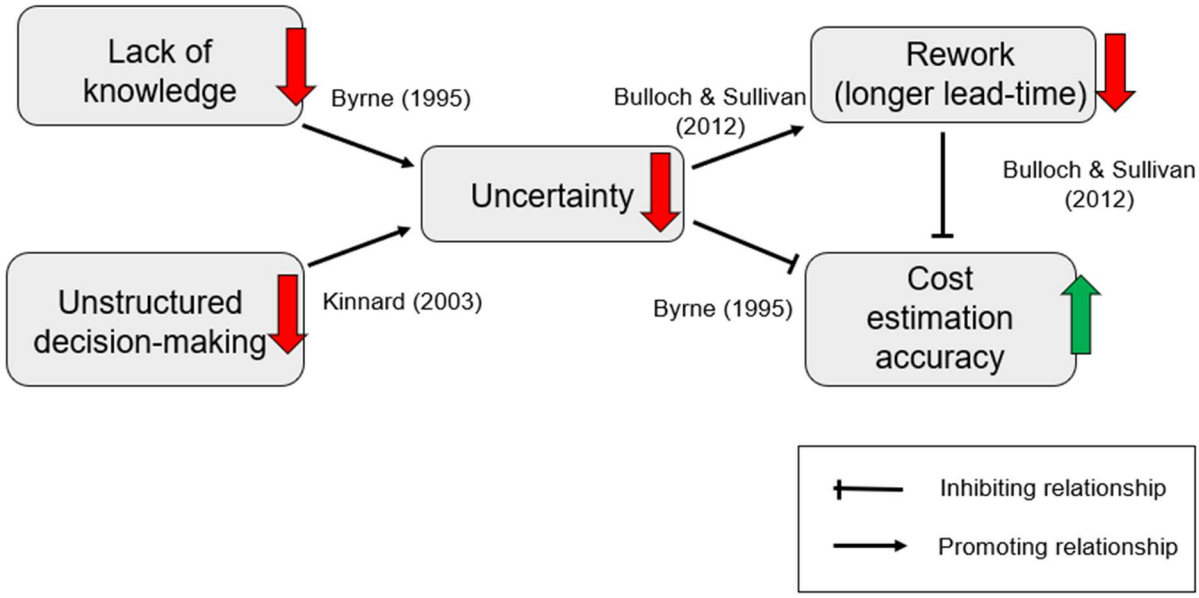


Figure 37: Development goals visualised in the causal network

6.2.1 Development need specification per problem

6.2.1.1 Lack of knowledge

The first development goal is to decrease the lack of knowledge in the early stage of the current concept design process, especially related to the environmental parameters of the concept design. Figure 38 gives a schematic representation of this change to the current concept design process with the example of the environmental parameters noise pollution, which corresponds to the theory from Derelöv (visualised in figure 12). In order to solve the problem of a Lack of knowledge during the concept design stage, the literature from the theoretical framework suggests bringing the information collecting activity forward, focussing on the information collecting activity prior to the decision-making process and thereby increasing the amount of knowledge and understanding of the concept design. This should have a great impact on the quality of the evaluation process and the reliability of the concept design evaluation in the early phase of the design process. Derelöv states that it is important to improve the execution and widen the scope of the information collecting activities, while keeping the design freedom open for as long as possible. Furthermore, Pahl & Beitz (1996) state that especially the quantity of the design solutions is important, since this increases the possibility of having a suitable design solution that fits within the preconditional framework of the location.

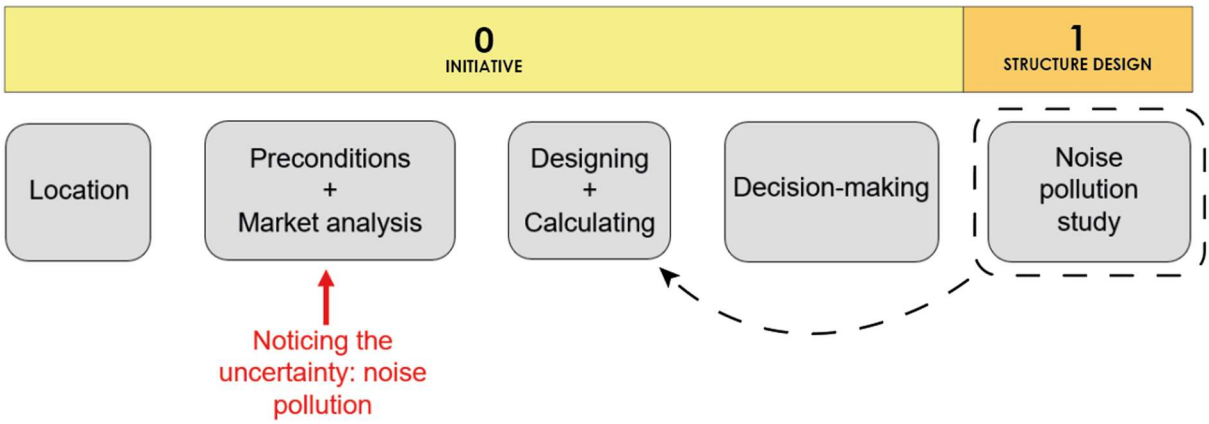


Figure 38: Example of a desired change to the current concept design process (simplified)

In addition, the interviewees indicated that more research, also in the form of a larger number of concept designs for a location, could possibly have a positive effect on the concept design process and the end result because they assume this would lead to less re-work at a later stage of the real estate development process, and would therefore increase the feasibility of the project.
Sub-chapter 3.2.1 further elaborates on the importance of increasing the knowledge in the early phase of the concept design process, it can however be concluded that in order to solve the lack of knowledge, the artifact should enable the (concept) developer to increase the quality and the quantity of the collected information, by widening the scope of the information collecting activity and increasing the quantity of concept design solutions.

6.2.1.2 Structured decision-making

As discussed in the problem specification, the use of AI powered generative design tooling could potentially be used to reduce the lack of knowledge that the current concept design process is facing, there is currently no scientific method to help the designer evaluate the concept designs and enable the developer to make more grounded decisions based on these criteria. In addition, from the results of the interviews can be concluded that the current concept design evaluation and decision-making process is structured to a lesser extent, and the interviewees indicated that significantly increasing the number of concept designs could become confusing. There is a desire to keep the selection process manageable.

Furthermore, as discussed in the theoretical framework, Kinnard (2003) states that structuring the decision-making process into a logical systematic procedure that aims at identifying the aeras of risk and uncertainty associated with a particular situation, allows the creation of an action plan to minimize uncertainty and modify plans to account for uncertainty in case the uncertainty cannot be altered by the decision-maker. In sub-chapter 3.2.3, the need for more structured decision-making is further elaborated on.

It can be concluded that in order to structure the concept design evaluation and decision-making process, the artifact has to enable the developers to better steer the concept design (process) into a desired direction. Furthermore, the evaluation and decision-making process must remain manageable with the use of the artifact.

6.2.1.3 Rework

According to the theoretical framework, uncertainty needs to be considered in determining the value and therefore the feasibility of a project. A lot of decisions made at an early stage are based on educated guesses, which if estimated wrong, could lead to consequences in the form of rework, additional design iterations and an increasing lead time that potentially could jeopardize the feasibility of the project.

As visualised in the causal network (figure 36), rework is the consequence of uncertainty due to a lack of knowledge. Solving the lack of knowledge could hypothetically decrease the chance that rework is necessary. In order to be able to validate whether this hypothesis is correct during the validation of the artifact, the following goal regarding rework is defined; the artifact has to enable the developer to decrease the chance of rework.

6.2.1.4 Cost estimation accuracy

According to the theoretical framework, the approach a developer uses to determine the cost or profit level at which a project in development would be financially feasible is known as a development appraisal (figure 8), also known as residual value. The strategy is to determine the capital value of a projected future income (sell price of the realised development) and then

subtract all the expected costs (Loizou & French, 2012). Uncertainty makes the accuracy of the calculated results unreliable.

As visualised in the causal network (figure 36), rework and uncertainty have an inhibiting influence on the cost estimation accuracy. Reducing the uncertainty and chance of rework could hypothetically have a positive impact on the cost estimation accuracy. In order to be able to validate whether this hypothesis is correct during the validation of the artifact, the following goal regarding the cost estimation accuracy is defined; the use of the artifact must have a positive influence on the cost estimation accuracy.

7 Artifact development

The goal of this research is to develop a concept design evaluation framework that can be used by the real estate developer, during the concept design stage of inner-city apartment buildings in the Netherlands. This framework should help the concept designer(s) to make more informed and structured choices (based on additional objective information) earlier on in the design process to decrease the uncertainty with regards to the feasibility of the real estate development project. In order to use the concept design evaluation framework, it is suggested to use AI powered generative design tooling to deliver some of the design parameter output. Therefore, for the remainder of this research, the concept design evaluation matrix and the AI powered generative design tooling will be referred to as the artifact.

In chapter 6, the development needs for the artifact have been specified. Based on these needs, the causal model (figure 36) has been adapted to the hypothetical causal model depicted below (figure 39). As visualised in the causal network, the artifact is subdivided into two parts: 1) AI powered generative design tooling and 2) concept design evaluation matrix. The first part of the artifact should hypothetically decrease the lack of knowledge, and the second part should stimulate structured decision-making in order to decrease the uncertainty and therefore, as a whole, reduce the chance of rework and improve the cost estimation accuracy of the project, this should then lead to less uncertainty regarding the financial feasibility of the project. In order to do so, the design requirements in sub-chapter 7.1 have been developed to ensure that the artifact is able to meet the goals set in chapter 6.

Sub-chapter 7.2 elaborates on the two parts of the artifact and the development of the concept design evaluation matrix, after which in sub-chapter 7.3 the artifact as a whole is verified using semi-structured interviews.

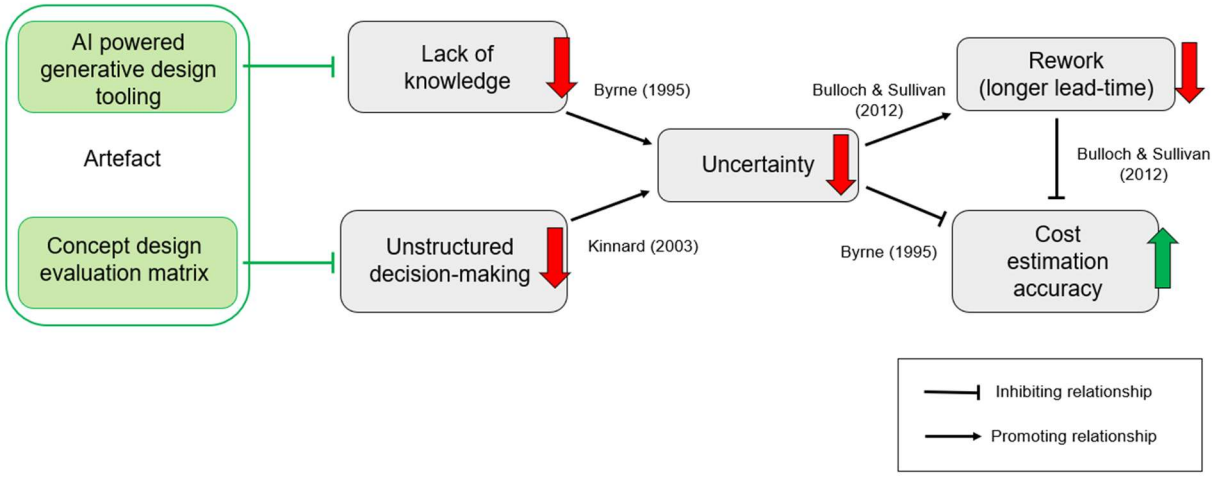


Figure 39: Hypothetical causal model: Situation using the developed artifact.

7.1 Artifact design requirements

The design requirements have been developed in order to ensure that the artifact meets the goals set in chapter 6. Each need has its own design requirements as shown in figure 40 and 41.

7.1.1 Design requirements for need: Decrease the lack of knowledge

As stated in sub-chapter 6.2.1.1, the artifact should enable the (concept) developer to increase the quality and the quantity of the collected information, by widening the scope of the information collecting activity and increasing the quantity of concept design solutions.
In order to meet these goals, the following design requirements have been formulated:

- The artifact should increase the quantity and quality of the objective information that is currently being used during the concept design evaluation and decision-making process.
- The artifact should increase the quantity of objective information by adding a new relevant information category that can be used during the concept design evaluation and decision-making process.
- The artifact should increase the quantity of concept design solutions.

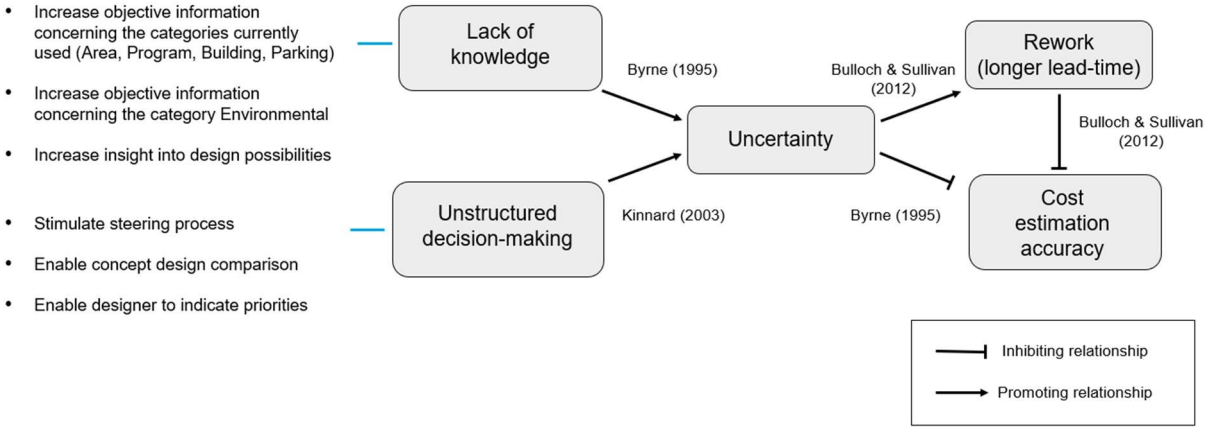


Figure 40: Design requirements for the developed artifact (part 1)

7.1.2 Design requirements for need: Stimulate structured decision-making

As stated in sub-chapter 6.2.1.2, the artifact has to enable the developers to better steer the concept design (process) into a desired direction. Furthermore, the evaluation and decision-making process must remain manageable with the use of the artifact.

In order to meet these goals, the following design requirements have been formulated:

- The artifact should enable the (concept) developer to steer the concept design process into a preferred direction.
- The artifact should enable the (concept) developer to compare different concept designs.
- The artifact should enable the (concept) developer to indicate his/her priorities.

7.1.3 Design requirements for need: Reduce chance of rework

As stated in sub-chapter 6.2.1.3, the artifact should enable the developer to decrease the chance of rework.

In order to meet this goal, the following design requirement has been formulated:

- The artifact should enable the developer to reduce the chance of re-work in general

- The artifact should enable the developer to reduce the chance of re-work due to environmental parameters. Within the scope of this research the focus will be on the environmental parameter noise pollution.

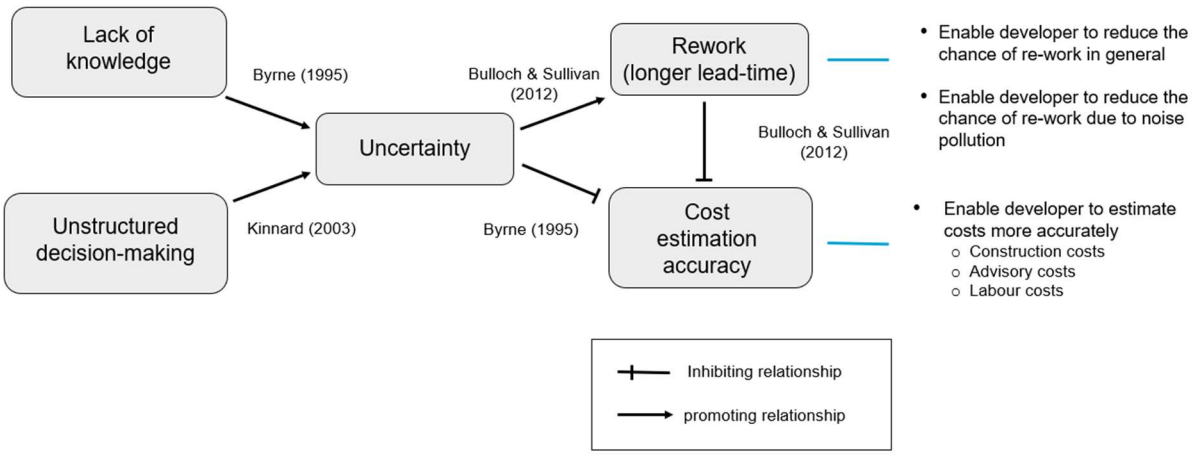


Figure 41: Design requirements for the developed artifact (part 2)

7.1.4 Design requirements for need: Increase cost estimation accuracy

As stated in sub-chapter 6.2.1.3, the use of the artifact must have a positive influence on the cost estimation accuracy.

In order to meet this goal, the following design requirement has been formulated:

- The artifact should enable the developer to increase the cost estimation accuracy, on the following categories: construction costs, noise advisory costs, labour costs (due to longer lead-time)

7.2 Artifact development

As discussed in the introduction of this chapter, the developed artifact has been divided into two parts. The artifact is subdivided in these two parts because each part fulfils a different goal, as explained earlier in this chapter. Part two of the artifact is developed by the researcher and makes use of already existing technology: AI powered generative design tooling (part one). First of all, the use of part one will be further elaborated on in subchapter 7.2.1, followed by the development specifications of the second part of the artifact in subchapter 7.2.2.

7.2.1 Artifact part 1: AI powered generative design tooling

As explained in the introduction of this chapter, the goal of the AI powered generative design tooling (part one) within the artifact is to reduce the lack of knowledge during the early stages of the concept design process. The formulated design requirements have been specified in subchapter 7.1.1

As discussed earlier on in this research, Spacemaker is used as AI powered generative design tool for this research for the verification and validation of the artifact. According to the theoretical framework, AI powered generative design tooling has the distinctive ability to allow users to generate a wide variety of concept designs, increasing the quantity of design solutions. Given the scope of this research, this is not further investigated in this study. Another feature

of the tooling; the simulation and testing of the concept designs is, as stated in the theoretical framework, valuable for the efficiency increase and to give the developer a better understanding of the performance of the concept design and its relationship with its surroundings. Based on the theoretical framework and the practical data analysis, it can be concluded that especially the environmental parameters of the AI generative design tooling are of added value for the current real estate development process. As explained in subchapter 3.3.2.2, these parameters include: Noise, Daylight, Wind, Sunlight, View distance/View to area. By using the AI powered generative design tooling prior to the decision-making process, as depicted in the example (figure 38) in chapter 6.2.1, the lack of knowledge could hypothetically be decreased. Examples of the use of the AI powered generative design tooling Spacemaker during the concept design phase of the real estate development process can be found below, focussed on the environmental parameters, and including a short description of the subject.

7.2.1.1 Elaboration on environmental parameters

There are certain environmental factors that must comply with the laws and regulations in the Netherlands. According to the interviews and case documentation, most significant problems that influence the real estate development process stem from environmental factors. These factors are currently not assessed objectively during the concept design evaluation and decision-making process. However, according to the practical data analysis, parameters that fall within this category such as noise pollution (dB) on the façade can have a big impact on the process.

Noise pollution [db]: Can be divided into noise pollution on the ground and on the façade of a building. This parameter is part of the preconditional framework set by the municipality and influences the living quality of the building. The noise pollution on the façade influences the building costs due to noise pollution measures and often leads to rework according to the problem investigation. As shown in figure 42, the noise pollution values are subdivided into the red zone (noise pollution level that exceeds the maximum permissible noise exposure with exemption, in urban area [dB]), the yellow/orange zone (noise pollution levels between the preferred value and the maximum permissible noise exposure with exemption, in urban area [dB]) and the green level (noise pollution levels below the preferred value [dB]). However, it is currently only possible to analyse rail and road noise pollution. It is currently not possible analyse industrial noise. Further information regarding the noise pollution preconditions can be found in Appendix A-2.

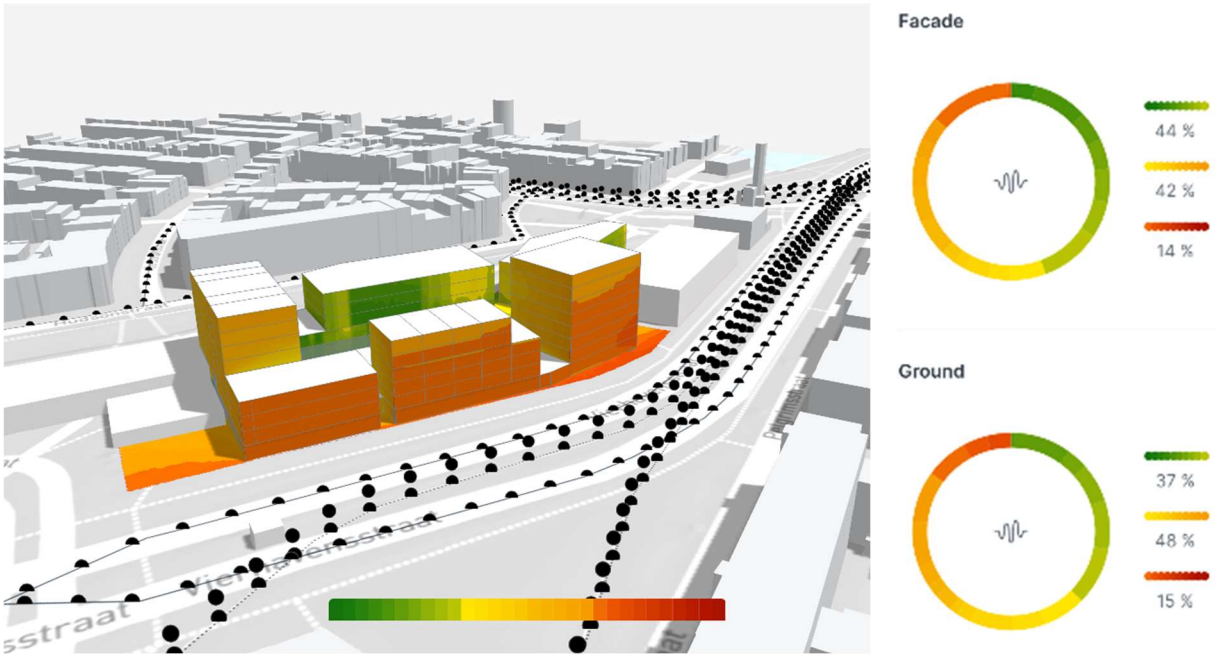


Figure 42: Example of noise pollution analysis using an AI powered generative design tool (part 1 of artifact)

Wind analysis [comfort / m/s]: Influences the living quality of the real estate development project and the surrounding area. Is judged according to the extent to which it is experienced as pleasant by the generative design tooling (see figure 43), and is expressed in the probability of a certain wind speed [m/s] as depicted in figure 44.

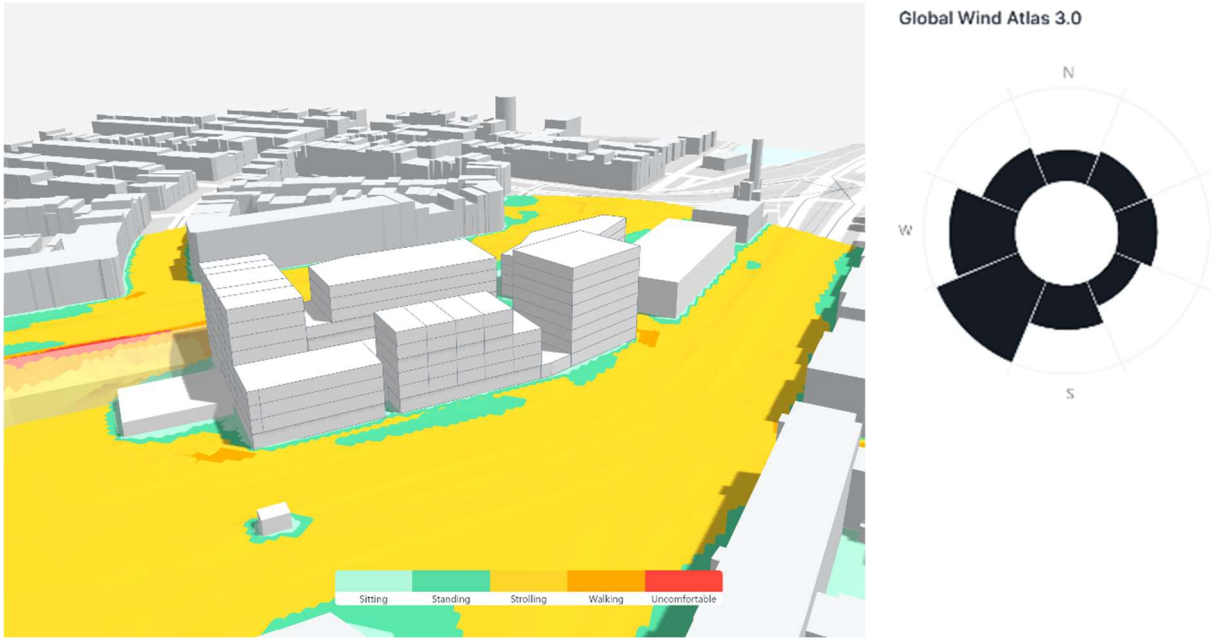


Figure 43: Example of wind analysis (part 1) using an AI powered generative design tool (part 1 of artifact)

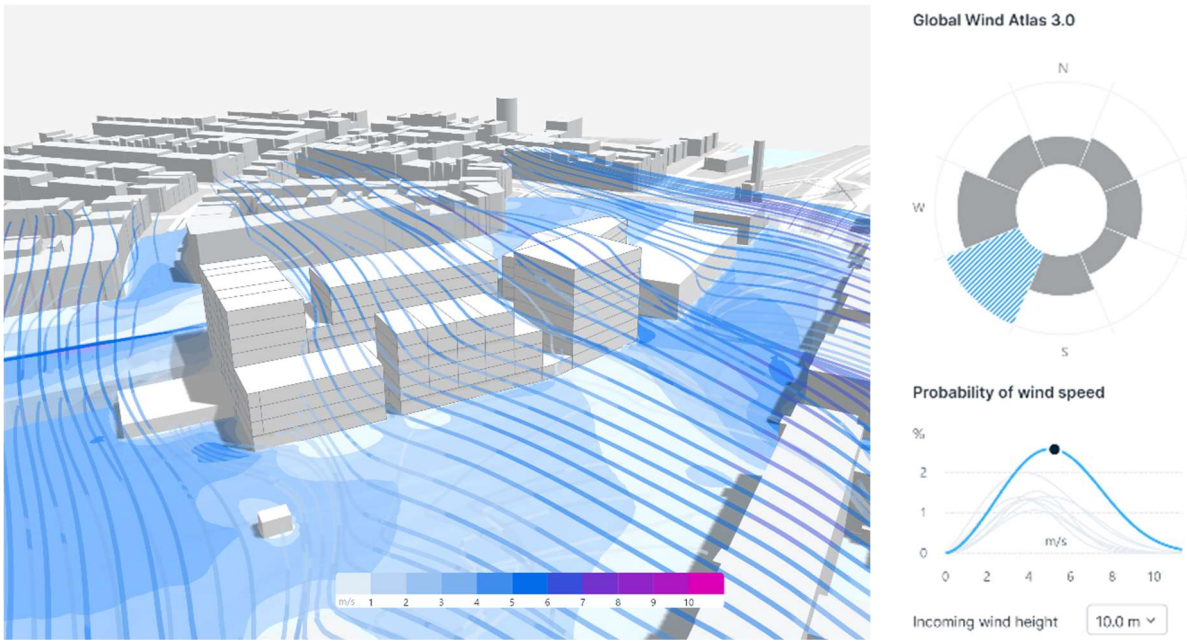


Figure 44: Example of wind analysis (part 2) using an AI powered generative design tool (part 1 of artifact)

Daylight on façade [VSC]: The amount of daylight that reaches facades (relative to the available light on a horizontal unobstructed surface) according to the theoretical framework. Is calculated by using the Vertical Sky Component (VSC) analysis as shown in figure 45. However, the use of the VSC analysis is not commonly used or mandatory in the Netherlands. It could however be used to optimize the daylighting of the building.

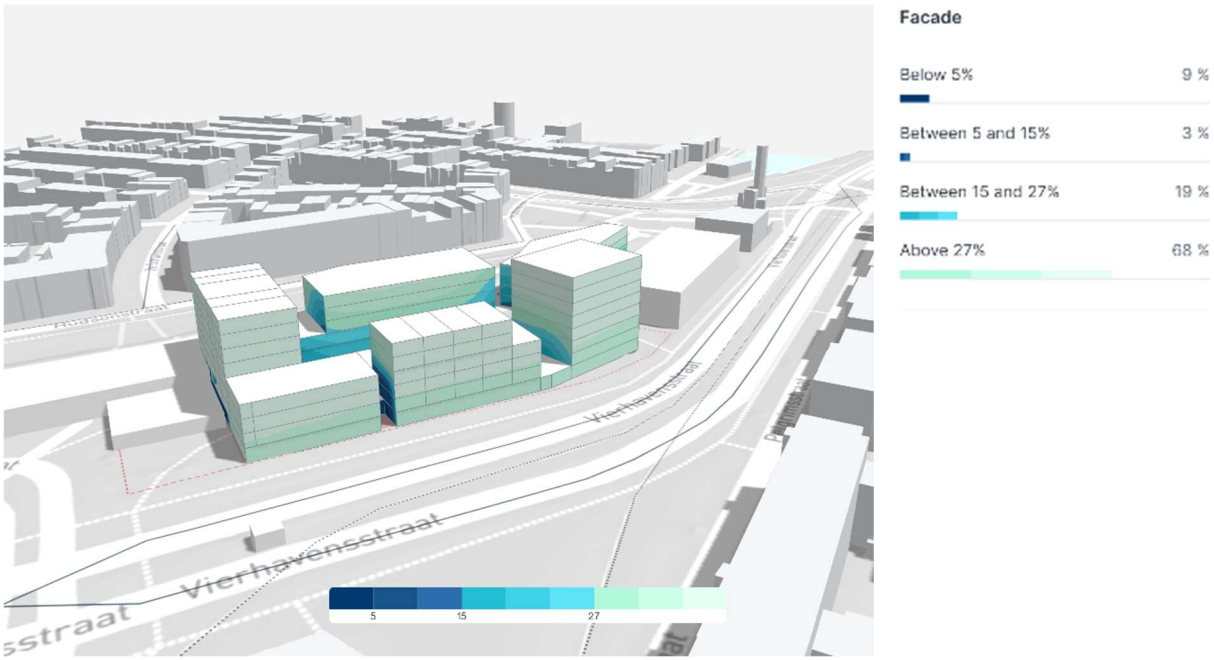


Figure 45: Example of daylight analysis using an AI powered generative design tool (part 1 of artifact)

Viewing distance [m]: The view distance tool calculates the average view distance from the façade in meters, as shown in the example in figure 46. Can be used to increase the value and living quality of the apartments.

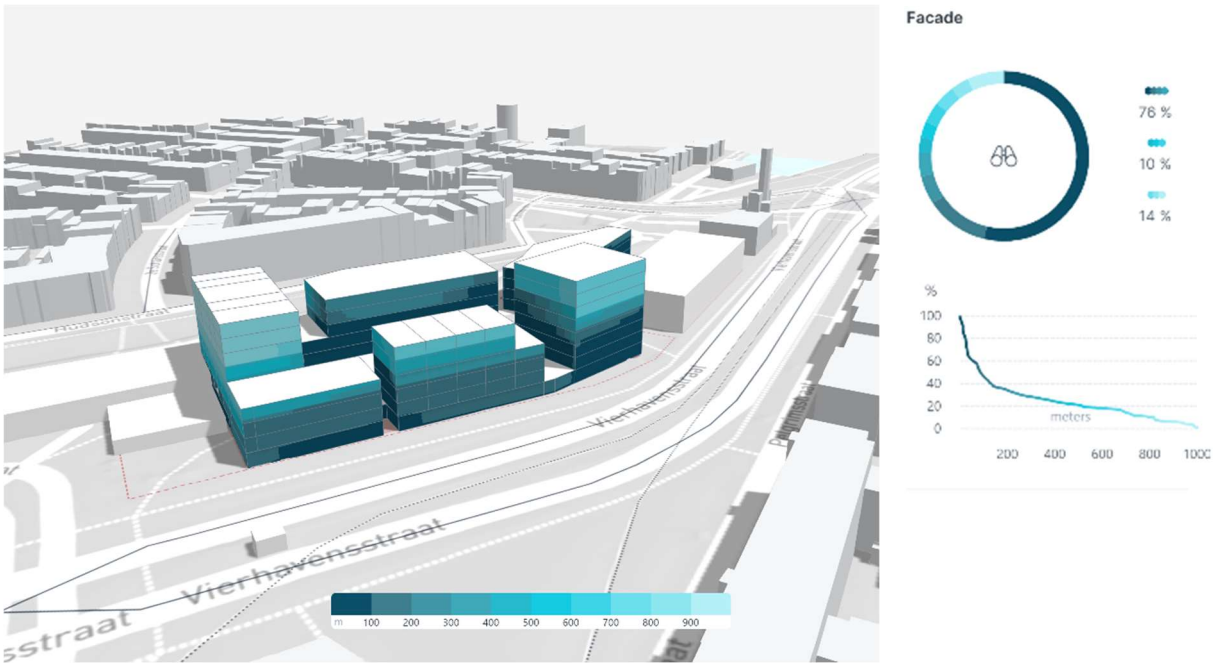
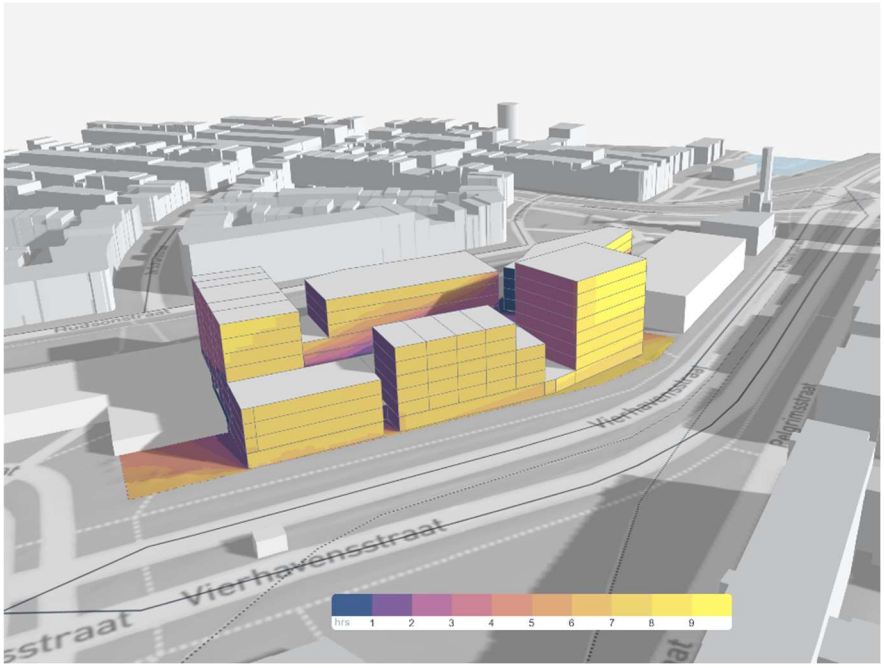


Figure 46: Example of viewing distance analysis using an AI powered generative design tool (part 1 of artifact)

View to a certain point [m]: Users can designate certain buildings or areas as locations that future users of the building would like to have a view of. This view to area analysis specifies the parts of the facades that offer a view to this specified location (similar to the viewing distance). Can be used to increase the value and living quality of the apartments.

Sunshine duration on façade [hours]: Calculates the number of sun hours hitting both the facades of the building and the ground around it on a particular day of the year (see figure 47). Is calculated by measuring the number of sun hours on the façade/ground within 24 hours. Although there are no laws and regulations for insolation in the Netherlands, it is often part of the preconditional framework of the municipality, especially when a newly developed building casts shadow on the existing buildings (for more information see Appendix A-3). Furthermore, the sunshine duration can influence the quality and therefore the value of the real estate development project.



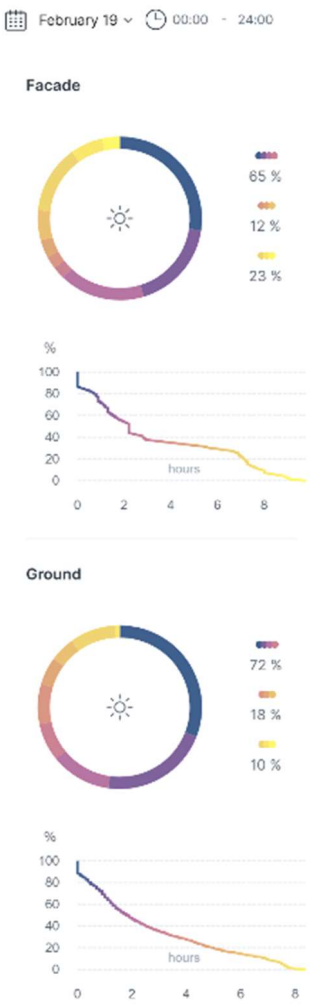


Figure 47: Example of sunshine duration analysis using an AI powered generative design tool (part 1 of artifact)

7.2.2 Artifact part 2: Concept design evaluation framework

As explained in the introduction of this chapter, the goal of the Concept design evaluation matrix (part two) within the artifact is to reduce the unstructured decision-making character of the concept design process. The formulated design requirements have been specified in subchapter 7.1.2.

Based on the findings from the literature review, case documentation study and key-actor interviews, the following important categories can be formed to summarize the parameters that play a large role in the determination of the feasibility of real estate development projects: Area, Programme, Building, Parking, Environmental. After the categories have been defined, a list of relevant parameters for the concept design evaluation framework has been compiled based on the Problem Investigation. A short elaboration on each category and parameter can be found in subchapter 7.2.2.2 below.

7.2.2.2 Elaboration on evaluation categories and parameters

Below, an elaboration on each of the categories and parameters within the concept design evaluation matrix is given. An explanation of the environmental category and associated parameters can be found in subchapter 7.2.1.

Area: Information about the number of square meters of the plot, etc. Important to determine the land value and/or the gross development value.

- **Operating area [m^2]:** The preconditional framework often includes a maximum Built-up area for the land plot. This can be specified in percentages or in absolute terms. In order to determine the percentage of the Built-up area, the operating area is necessary. Furthermore, it plays an important role in the determination of the land value.
- **Built-up area (Dutch: BTO) [m^2]:** Often part of the preconditional framework set by the municipality. Represents the number of square meters of the area which is built upon.
- **Issuable land [m^2]:** Land which is build and the associated land that is sold. Important to determine the development revenue.

Programme: Part of the market analysis is to determine what target group might fit well at the development location. Each target group often have a specific number of square meters they desire and can afford, which influences the desired GFA and useable floor area of the concept design. Furthermore, the target group and the percentage of owner-occupied or rental properties is often part of the preconditional framework set by the municipality.

- **Houses [n]:** Central parameter in the determination of the financial feasibility of the project. Important to determine the gross development value of the development as part of the residual (land) value of the development.
- **Home types:** Can be expressed in square meters (example: unit of 50 m2). Is related to the preconditions set by the municipality in the preconditional framework and influences the residual (land) value of the development. The key-actors indicated that specific target groups can afford a specific number of square meters. Example: an apartment of 50 m2 is developed for a different target group than an apartment of 150 m2.
- **Purchase/rent ratio:** Expressed in rental units [%] and purchased units [%]. Often part of the preconditional framework set by the municipality. Is related to the residual (land) value of the development and influences the GO's and VVO's of the project. If an apartment may be rented out for a certain maximum rent, this affects the type of housing that is being developed.

Building: This category summarizes the parameters that eventually play a large role in the determination of the Gross Development Value (GDV) of the project.

- **Gross floor area (Dutch: BVO) [m^2]:** The number of square meters that will be built. Important in the determination of the development costs and therefore the residual (land) value.
- **Useable area (Dutch: GO) [m^2]:** The number of square meters that is being sold. The living space within apartment buildings, not considering the communal access to the building. Important for the determination of the gross development value.
- **Form factor (useable area/GFA):** Represents the ratio between the number of square meters that is being sold (or rented out) versus the number of square meters that is being build. Important in the determination of the financial feasibility of the project. The lower the form factor is, the less efficient the design is and the more expensive the development will be.
- **Façade surface [m^2]: C**ontains the openable and closed parts of a building's facade. affects the construction costs of the development.
- **Lettable floor area (Dutch: VVO) [m^2]:** The number of square meters that can be rented out after the development is completed. Can be compared to the useable area (GO).

- **Maximum building height [m]:** Often part of the preconditional framework of the municipality. Influences the number floor levels and therefore the number of units that can be placed into the apartment buildings.

Parking: Parking happens to be a determining factor and often even a limiting factor in the real estate development process. Overall, municipalities in the Netherlands demand a certain parking norm in an area. This depends on the target group and the number of square meters of the property.

- **Parking spaces / houses:** According to the key-actors one of the most important parameters and often a limiting factor within the real estate development process. The number of parking spaces per house is part of the preconditional framework set by the municipality and is differs per housing type. Influences (and often limits) the number of houses that can be developed
- **Parking spaces [n]:** According to the key-actors one of the most important parameters and often a limiting factor within the real estate development process. The number of parking spaces per house is part of the preconditional framework set by the municipality and is differs per housing type. Influences (and often limits) the number of houses that can be developed. The number of parking spaces is needed in order to determine the parking spaces/houses ratio.

7.2.2.2 Questionnaire results

Before the established parameters were processed in the concept design evaluation framework, a questionnaire was distributed among a group of real estate development professionals (n=35) to investigate to what extend the parameters are important for the determination of the feasibility of the project during the concept development phase according to the respondents, with the following Likert scale question:

"How important is information about each of the following parameters during the concept development phase of an inner-city real estate development project (Flow initiation phase), for determining the feasibility of the project in this phase?"

In addition, a number of questions have been asked to map out the respondents' demographics. Figure 48 shows the overall results of the question described above. A more detailed overview of the questionnaire protocol and the results can be found in Appendix C, including the results per profession. Based on the results it can be concluded that overall, all the parameters described in subchapter 7.2.2.1 have a relatively neutral or high importance for the determination of the feasibility of a real estate development project during the concept development stage. Overall, the environmental parameters are regarded as least important for the determination of the feasibility during the concept design stage of the real estate project. The answers on the open question can be found in the table below (translated):

ID	Answer
5	For all environmental aspects, the importance depends on the project. If the relevant aspect is present at the location, then it is generally important in the concept phase. Depth on the theme often follows a little later.
24	We are currently working with programs that do not allow us to perform and check analysis with regard to noise, daylight, etc. Therefore, we do not actually look at these criteria. If we are close to the railway / roads, we always consult maps. In such cases it would be very useful to be able to incorporate sound into the model. This certainly has an impact on feasibility (very expensive facades).
27	- Rough construction costs per m2 GFA - Residual land value calculation / output also important

28	For us, all the points mentioned are actually important since the concept phase is about a total vision.
32	All parameters are important in development.
35	All these points are important but depending on the type of project. For example, an inner-city development will have many more influences (such as sunlight, wind nuisance, views, etc.) than a development on an empty piece of land.

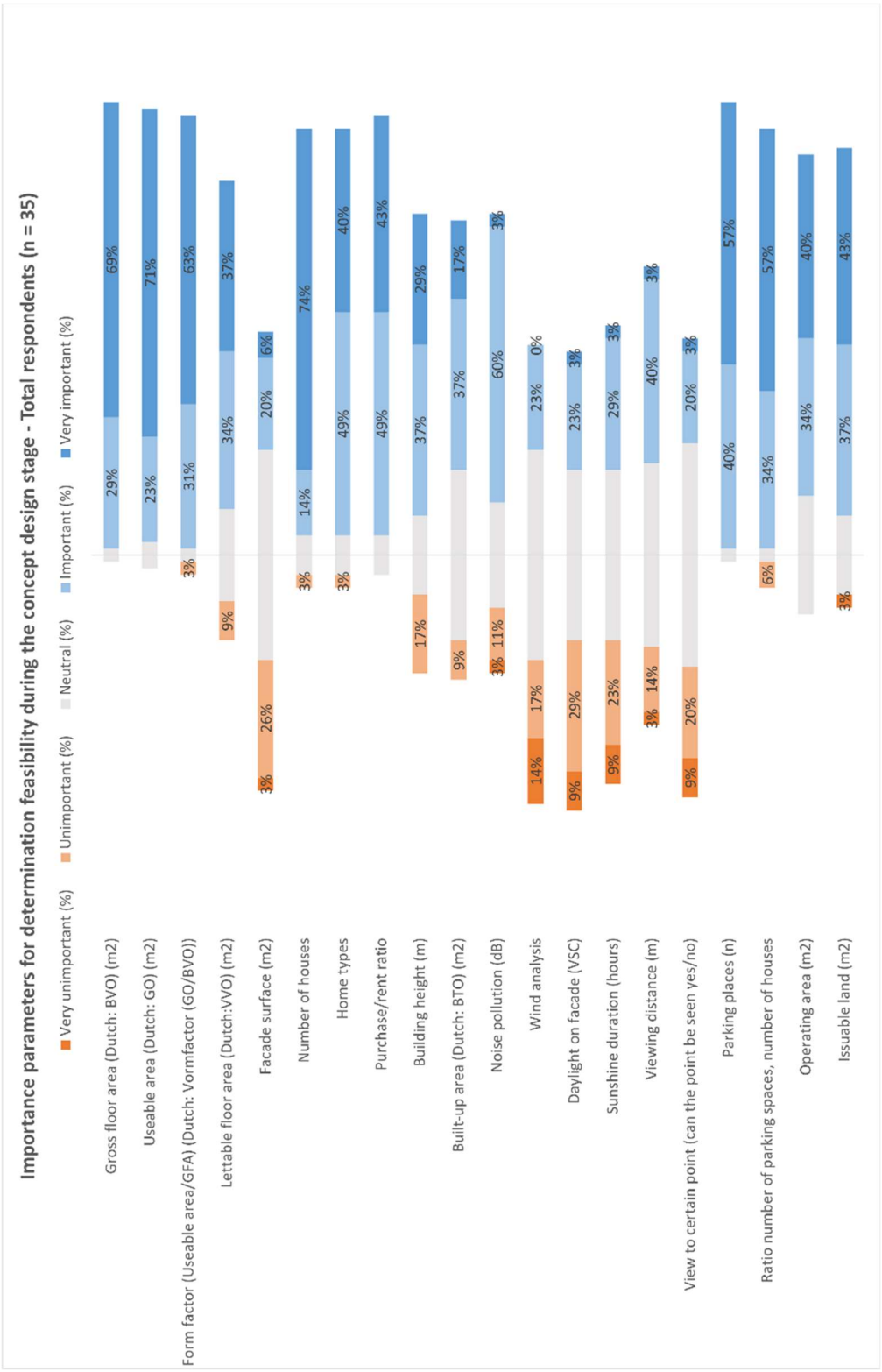


Figure 48: Importance parameters for determination feasibility during the concept design stage – total respondents

Figure 49 gives an overview of the respondents' job distribution. All respondents are actors within the early stage of the real estate development process. The ''other'' category consists of other real estate professionals that play a role in the early stage of the real estate development such as members of the board, a sales manager, a project manager, and a trainee. A full overview of the survey results can be found in Appendix C-2.
Half of the respondents are younger than 36 years as shown in figure 50, 69% is male and 31% is female as shown in figure 51, and the respondent are relatively high educated. 40% has a Bachelor's degree as highest education, and 60% has a Master's degree as shown in figure 52.

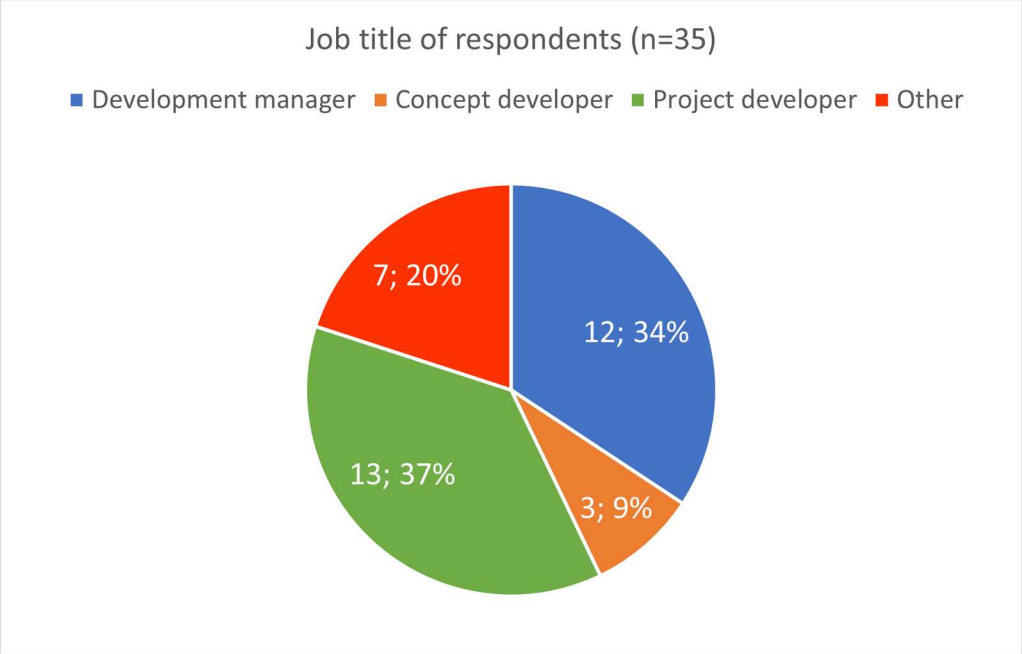


Figure 49: Job title of respondents

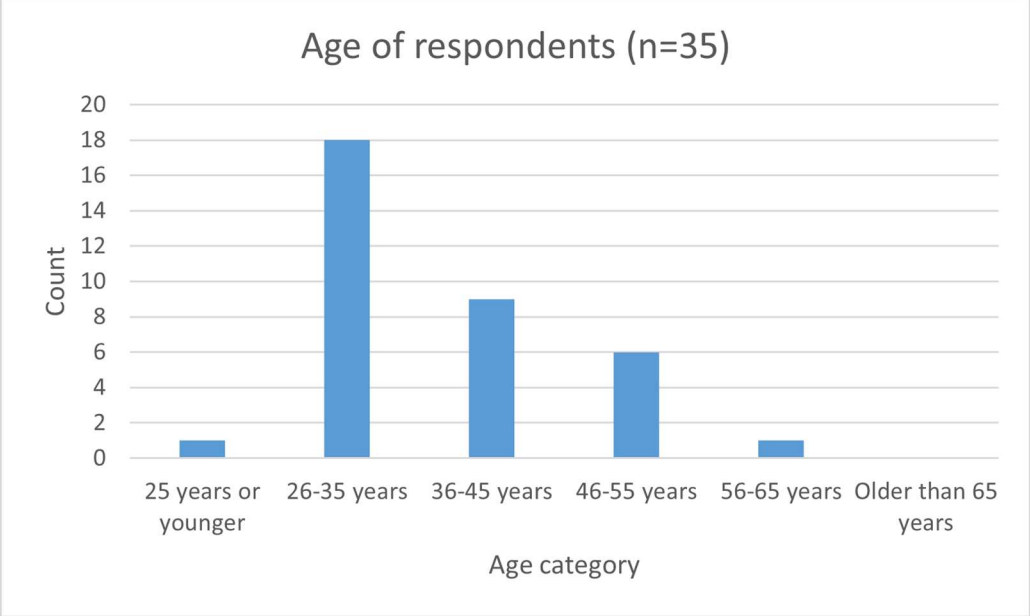


Figure 50: Age of respondents

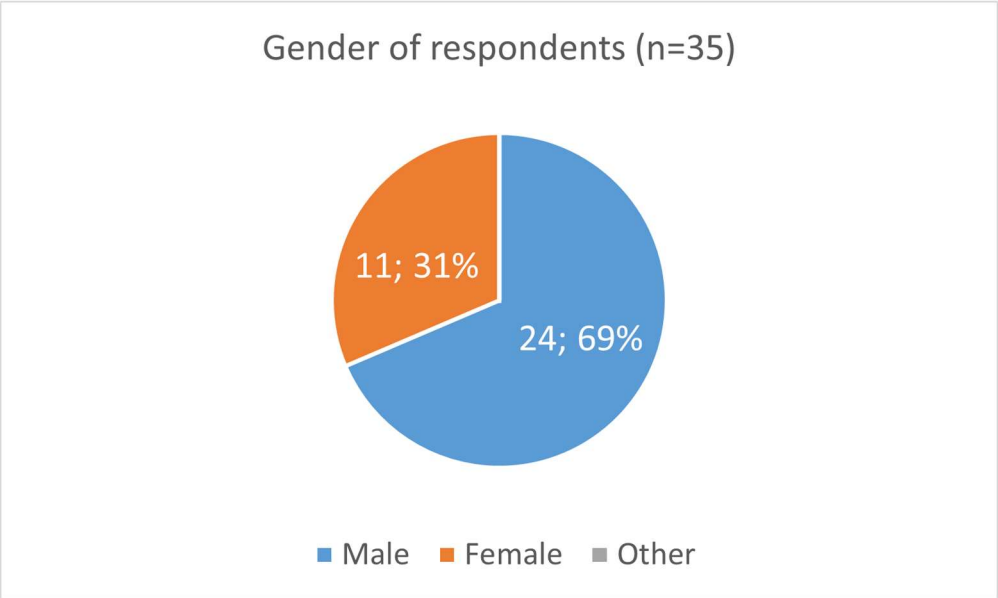


Figure 51: Gender of respondents

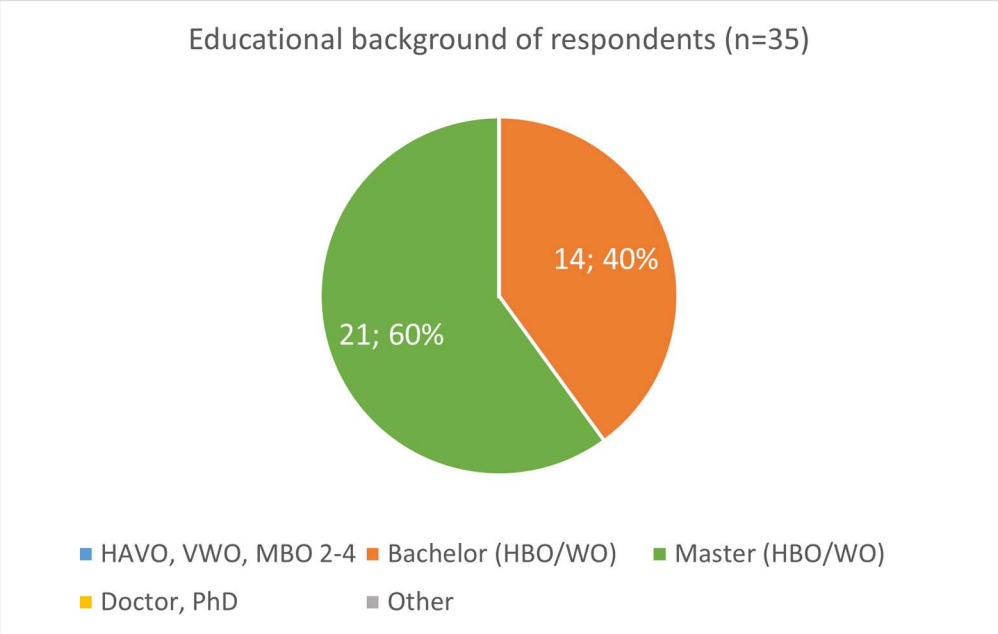


Figure 52: Educational background of respondents

7.2.2.3 Evaluation framework development

Subsequently the concept design evaluation framework itself has been developed based on existing evaluation frameworks retrieved from the literature (subchapter 3.2.3). This overview of excising evaluation and decision-making approaches in other engineering fields contains the characteristics of each method. As described in the theoretical framework, a distinction is made between; ordinal/cardinal, relative/absolute, disjunctive/conjunctive, and selective/eliminating characteristics. For the development of the concept design evaluation framework. As explained earlier in this research, the preferred characteristics have been formulated, after which an existing method is used as basis for the framework. The selection of the characteristics is explained below. This resulted in the use of the ‘‘The Lexicographical Rule’’ (Roozenburg & Eekels, 1996) as basis for the concept design evaluation framework. The term lexicographic order refers to the ranking of importance of the characteristics. The

lexicographic decision rule stimulates a choice of the design alternative that scores the best on the most important characteristic. If there are two equally scoring characteristics on the design alternatives, the decision will be made based on the best scoring characteristic of the design alternative that comes next in the ranking order (Svenson, 1979). This decision rule is referred to as a relatively simple decision rule by the authors, which fits the stakeholders of the concept design evaluation artifact.

However, the lexicographical decision rule will be used as inspiration for the concept design evaluation matrix. As explained above, the lexicographical decision rule is quite strict in a sense that it purely looks at the best scoring characteristics. Since both the real estate development and concept development processes have primarily a subjective characteristic at the end, at least in terms of the final decision-making, it is decided to use the lexicographic principle to assist the real estate developer in the evaluation and decision-making process rather than applying it as a strict evaluation and decision-making rule.

- **Ordinal – Cardinal**
  According to Roozenburg & Eekels (1996), the judgement of a criterion in an evaluation can either be ordinal (qualitative) or cardinal (quantitative). An ordinal judgement method ranks the alternatives in an ordinal scale from for example worst to best, while a cardinal judgement method rates the value of the given criteria of the design alternative. For cardinal judgment, the scale of the parameter has to be quantified.

  As explained in the theoretical framework, the concept design process depends on both the developer's and the designer's opportunity space. The boundaries are flexible and depend on the negotiating abilities of the involved actors and their mutual relationship. This corresponds to the findings from the interviews and case documentation study. Furthermore, the interviewees emphasized that every project is different and that projects can have different priorities. The concept evaluation framework should act as a handle to enable the designer/developer to make their own (subjective/qualitative) choices based on objective data. Therefore, the decision is made that an ordinal character is most suitable for the concept design evaluation framework.

- **Relative – Absolute**
  An evaluation can either be relative or absolute according to Wilhelms. & Derelöv (2004). Within relative evaluation, only the scores and values of the current set of alternatives are considered and compared. Therefore, the evaluation is only valid for the specific set of alternatives. Absolute methods take all the possible values for the specific parameter into account and therefore need predetermined value functions. Because all the possible values are considered the evaluation values remain valid, even when the set of alternatives is changed.

  As explained in the theoretical framework, the concept design process depends on both the developer's and the designer's opportunity space. The boundaries are flexible and depend on the negotiating abilities of the involved actors and their mutual relationship. Each project has a unique mixture of location, market timing, product, and price. This corresponds to the findings from the interviews and case documentation study, where the interviewees emphasized that every project is different and that projects can have different priorities. Since every project has different objectives and goals, the decision is made that a relative characteristic is most suited for the concept design evaluation framework. It is however important to take the absolute boundaries from the rules and regulations in the Netherlands (the building decree) into account.

- **Disjunctive – Conjunctive**
  Disjunctive means not connected. With disjunctive judgement the categories are evaluated separately, considering one criterion at a time. This results in a ranking or rating of the different alternatives with respect to a single criterion. With conjunctive judgement the ranking or rating is based on the scoring of multiple criteria, making it possible to balance different criteria with each other. When using conjunctive judgement methods, the weight of the different criteria has to be pre-determined (Wilhelms. & Derelöv, 2004).

  As explained in the theoretical framework, the concept design process depends on both the developer's and the designer's opportunity space. The boundaries are flexible and depend on the negotiating abilities of the involved actors and their mutual relationship. This corresponds to the findings from the interviews and case documentation study. Furthermore, the interviewees emphasized that every project is different and that projects can have different priorities. The concept evaluation framework should act as a handle to enable the designer/developer to make their own (subjective/qualitative) choices based on objective data. Furthermore, the developers emphasize that the evaluation method should be manageable. A conjunctive evaluation method uses weights for each criterion. In order to prevent the evaluation process from becoming cluttered, and the developers/designers starting to assess on the basis of a final number resulting from the evaluation, it has been decided that a disjunctive character is most suitable for the concept design evaluation framework.

- **Selecting - Eliminating**
  According to Wilhelms. & Derelöv (2004), there are two ways to reduce the number of alternatives in the concept design process. This can either be done by selecting the best scoring alternatives, or by eliminating the worst scoring alternatives. Using the selecting method, the decision maker often needs more information compared to the information needed using the eliminating method.

  The theoretical framework shows that the design process is characterized by divergence and convergence of the number of alternatives. It is emphasized that in this process the best design solutions are selected and then further developed. In addition, the interviews and case documentation study also showed that the current process already functions on the basis of a selective character. Therefore, it is decided that the selective method would be most suitable for the concept design evaluation framework.

By using the lexicographical principle (order the different design characteristics based on importance for the specific case), the real estate developer, and the other relevant stakeholders, are encouraged to carefully consider what they consider important for this specific real estate development project prior to the evaluation process, considering the location-specific characteristics. In this way, it is expected that the developer can better steer the process and focus on mapping any uncertainties and/or risks during the process (in accordance with the theory from Kinnard (2003)), can more easily evaluate the different concept designs with stakeholders by using the ranking scores of the characteristics in negotiations/discussions, and can ultimately achieve a better (design) result. This corresponds to the literature from Roozenburg & Eekels (1996) covered in the theoretical framework. Figure 53 below represents the suggested process and the three steps of Roozenburg & Eekels.

Figure 53: Suggested concept design evaluation matrix process, focussed on minimizing uncertainty

The result of the concept design evaluation framework development can be found in figure 54. The evaluation matrix subdivides the different design parameters into five design categories in the first and second column: Area, Programme, Building, Parking, Environmental. In the third column, the developer can fill in the preferred/preconditional values of the design variables. In the fourth column, the user can fill in his/her preferences (based on the lexicographical principle), in other words, rank the different variables. The subsequent columns all represent a different concept design, the real estate developer can fill in the values of the different design parameters for each concept design and use the overview in the concept design evaluation and decision-making process to make more objective decisions.

Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:						
	Built-up area (Dutch: BTO) [m2]:						
	Issuable land [m2]:						
Programme	Houses [n]:						
	Home types:						
	Purchase/rent ratio:	*Rent %*					
		Purchase%					
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*					
		Residential:					
		Parking + storage:					
	Useable area (Dutch: GO)	*Residential:*					
	Form factor (Useable area/GFA):						
	Facade surface [m2]:						
	Lettable floor area (Dutch: VVO) [m2]:						
	Max. Building height [m2]:						
Parking	Parking places [n]:						
	Parking spaces / Houses:						
Environmental	Noise pollution	**Facade**					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
	Wind analysis:	*[Assessment 3D model]*					
	Daylight on facade [VSC]:	*Less than 5 %*					
		Between 5 and 15 %					
		Between 15 and 27 %					
		More than 27 %					
	Sunshine duration on facade [hours]:	**Februari 19:**					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		June 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		October 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
	Viewing distance [m]:	*Less than 400 m [%]*					
		Between 400 and 700 m [%]					
		More than 700 m [%]					
	View to certain point [%]:						

Figure 54: Concept design evaluation framework

7.3 Artifact verification

The design verification is performed by assessing the design requirements assigned to the artifact in sub-chapter 7.1. As part of the artifact verification process, four of the five key-actors that were interviewed during the Problem Investigation stage of this research, have been asked to verify (using semi-structured interviews) whether the artifact in the form of the concept design evaluation matrix in combination with the AI powered generative design tooling meets the design requirements set in sub-chapter 6.2. In order to verify whether the developed artifact meets the set development requirements, it is important that the interviewees have a clear understanding of the differences between the situation with and without the artifact. In order to achieve this, the researcher presented the original concept development process of the case project and made a rerun of how the process would have looked like using the developed artifact. A detailed insight into the verification process including the verification interview protocol, the verification interviews, the interview coding results. The different processes (the ‘‘current’’ process and the ‘‘new’’ process) used during the verification interviews can be found in Appendix C.

The survey distributed among the real estate development professionals shows that noise pollution is the most important parameter according to the respondents for determining the feasibility of the project during the initiation phase. Furthermore, noise pollution plays an important role during the real estate development process according to the practical data analysis. Therefore, the researcher decided to highlight this parameter from the Environmental category during the verification interviews.

7.3.1 Verification design requirements for need: Decrease the lack of knowledge

In order to meet the goals set in sub-chapter 6.2, the following design requirements have been specified:

- The artifact should increase the quantity and quality of the objective information that is currently being used during the concept design evaluation and decision-making process.
- The artifact should increase the quantity of objective information by adding a new relevant information category that can be used during the concept design evaluation and decision-making process.
- The artifact should increase the quantity of concept design solutions.

Al the interviewees expect that they have more objective information to their disposal in the new situation with the use of the artifact compared to the current situation and think this is of added value to the real estate development process. This applies to both the existing categories (categories where there is currently information available during the concept design evaluation and decision-making process), and the environmental category. One of the interviewees mentioned that the reliability of the environmental parameters should be examined before the artifact could be implemented in the concept design process.

All the interviewees expect that the artifact would allow them to increase the quantity of concept designs (within a specific period of time) compared to the current situation and that this would be of added value. However, three of the four interviewees mentioned that they would have to rethink about the organisation of the real estate concept design process.

7.3.2 Verification design requirements for need: Stimulate structured decision-making

In order to meet the goals set in sub-chapter 6.2, the following design requirements have been formulated:

- The artifact should enable the (concept) developer to steer the concept design process into a preferred direction.
- The artifact should enable the (concept) developer to compare different concept designs.
- The artifact should enable the (concept) developer to indicate his/her priorities.

Half of the interviewees indicated that the artifact would contribute to more structured decision-making, the other two interviewees didn't mention this topic during the interview. All the interviewees expected that the artifact would allow them to steer the process in different ways, for example to reduce risk, to make more efficient building blocks, or to focus on a specific design criterion they find important. Interviewee #1 concluded:

"But really now that I see this (concept design evaluation matrix), I realise that we don't focus enough on what constitutes an efficient block design. Especially because elements are expensive, you would like to know which design has the least facade surface per house. Just as interesting as the gross/net ratio. Parking is of course important, how many spaces do you have per home. So yes, with the new situation you can steer your designs even more analytically if you have more information. Ultimately, you can then opt for the most efficient design at an early stage."

Furthermore, the interviewees state that they expect that the artifact would allow them to compare (and optimize) the different concept designs better than they currently do. The ranking method is also a valuable part of the artifact according to the interviewees. Interviewee #5 stated:

"I think that conversation about that ranking is valuable, to discuss with each other at the beginning what we find important."

7.3.3 Verification design requirements for need: Reduce chance of rework

In order to meet the goals set in sub-chapter 6.2, the following design requirement has been formulated:

- The artifact should enable the developer to reduce the chance of re-work

All the interviewees expect that the chance of rework will become smaller with the use of the artifact. They indicate that it is difficult to estimate how much it would differ, interviewee #2 states the following:

"In general, it is difficult to estimate how much it would matter to rework, every project is different, and you always run into different problems. But in general, I think that the more knowledge you have at the start of your process, the better you can assess those risks and steer your project accordingly."

In the current process, the noise pollution on the façade analysis is done during the SO phase (Appendix C-6.7), when there is more certainty about the positioning of the building. However, the interviewees indicated that it would be ideal to know this information earlier on in the process, so it could be considered when determining the positioning of the building. Interviewee #2 states the following regarding the noise pollution analysis and the related chance of rework.

"Yes, what could happen in the current situation is that the result of that study (indicates period sound study process of the case project on timeline, appendix C-6.7) is so bad that you have to go back (start again with your SO phase) and that you have to do additional research. I expect you could get that rework out, but it's not that additional studies come in very often, or that studies have to be done twice. But because it can sometimes happen, I generally expect that the chance of rework will decrease. In this case, it could therefore be 2 to 3 months difference if it turns out during that noise study that the positioning of the buildings is simply not right. Ideally, the sound study in your initiation phase would like to know that you have already done it for your architect selection (iteration 2). Then it is simply a precondition that is included in the design requirements."

7.3.4 Verification design requirements for need: Increase cost estimation accuracy

In order to meet the goals set in sub-chapter 6.2, the following design requirement has been formulated:

- The artifact should enable the developer to increase the cost estimation accuracy, on the following categories: construction costs, noise advisory costs, labour costs (due to longer lead-time)

The interviewees expect that the use of the artifact would increase the cost estimation accuracy. Interviewee #1 states the following regarding the building cost estimation accuracy:

"I think you can estimate your building costs more accurately, that seems obvious to me. The more you know, the better you can estimate costs."

In addition to the cost estimation accuracy, three of the four interviewees mention that the use of the artifact could assist them to steer on more cost-efficient concept designs. They are especially positive on the prospect of being able to reduce the rework and therefore the lead-time of the project. Three of the four interviewees expect that they would be able to estimate the advisory costs more accurately, because the chance of rework would become smaller. Interviewee #2 has in interesting point of view regarding this subject:

"What you ultimately want to get out of it is not so much saving those consultancy costs, but that you do something fundamental in the design that does not lose those costs. So, suppose you have to make a 100% deaf facade, which you can actually say; I want to go to 50% deaf facade, what kind of model should I develop, because a deaf facade is very expensive. This will fill in a kind of gap in the design and fundamentally save costs. That's really interesting, and that's something a sound consultant doesn't deliver. So, it's not so much saving, it's replenishing something that is not being delivered now. But it's not so much about deducting 2000 euros from your consultancy costs, in my opinion that's peanuts. I think the structural change that you will achieve is in the design of the facade and the positioning, because then you don't have to make all those expensive facades."

7.3.5 Conclusion

It can be concluded that the artifact in the form of the concept design evaluation matrix combined with the AI powered generative design tooling meets the initially defined design requirements from sub-chapter 6.2.

Interviewees #2 and #3 discussed the consequences of a negative noise pollution report during question 4 of the semi-structured verification interview. During the interview they both stated that a negative result could have led to rework. In case the building would have had to move due to noise pollution on the façade, this would have meant that the SO-phase could have

started over again. This would hypothetically lead to an delay of 8 weeks as depicted in figure 55 below.

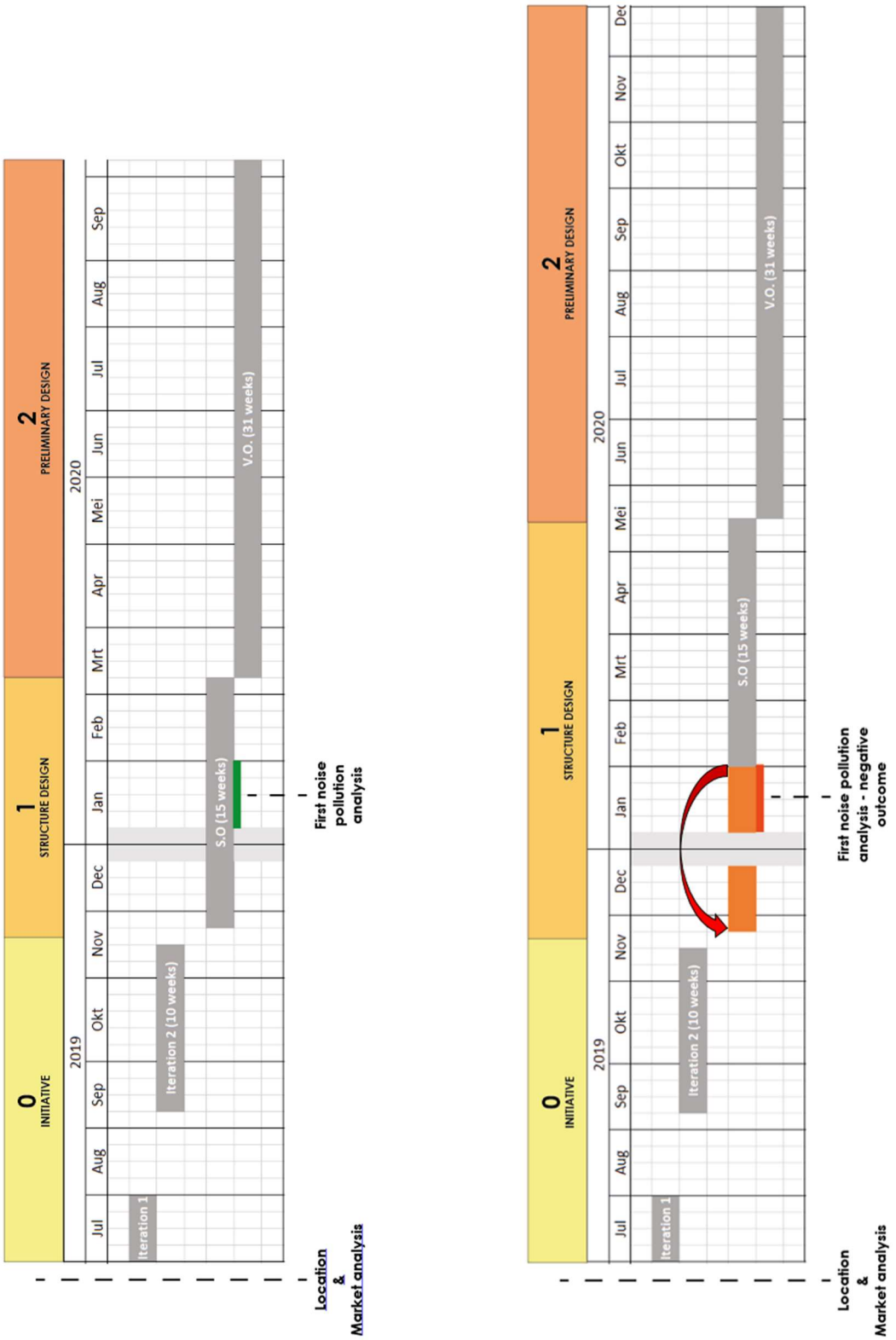


Figure 55: Hypothetical difference in lead-time between situation with sufficient noise pollution report (left) and a negative noise pollution report (right).

This scenario has been analysed by the researcher and resulted in the following analysis. The graphs in figure 56 represent the hypothetical consequence of a negative noise pollution report during the concept design process of the case project. The additional labour costs that would hypothetically have been made during the initiative phase (from the moment design iteration 1 started) and the SO phase would have led to an increase of approximately 25% of the total labour costs during the described period, making the initial cost estimation less accurate. This hypothetical number does not consider other costs that could have been made due to the rework and is based on a lot of assumptions. More details regarding these assumptions and calculations can be found in Appendix C-18.

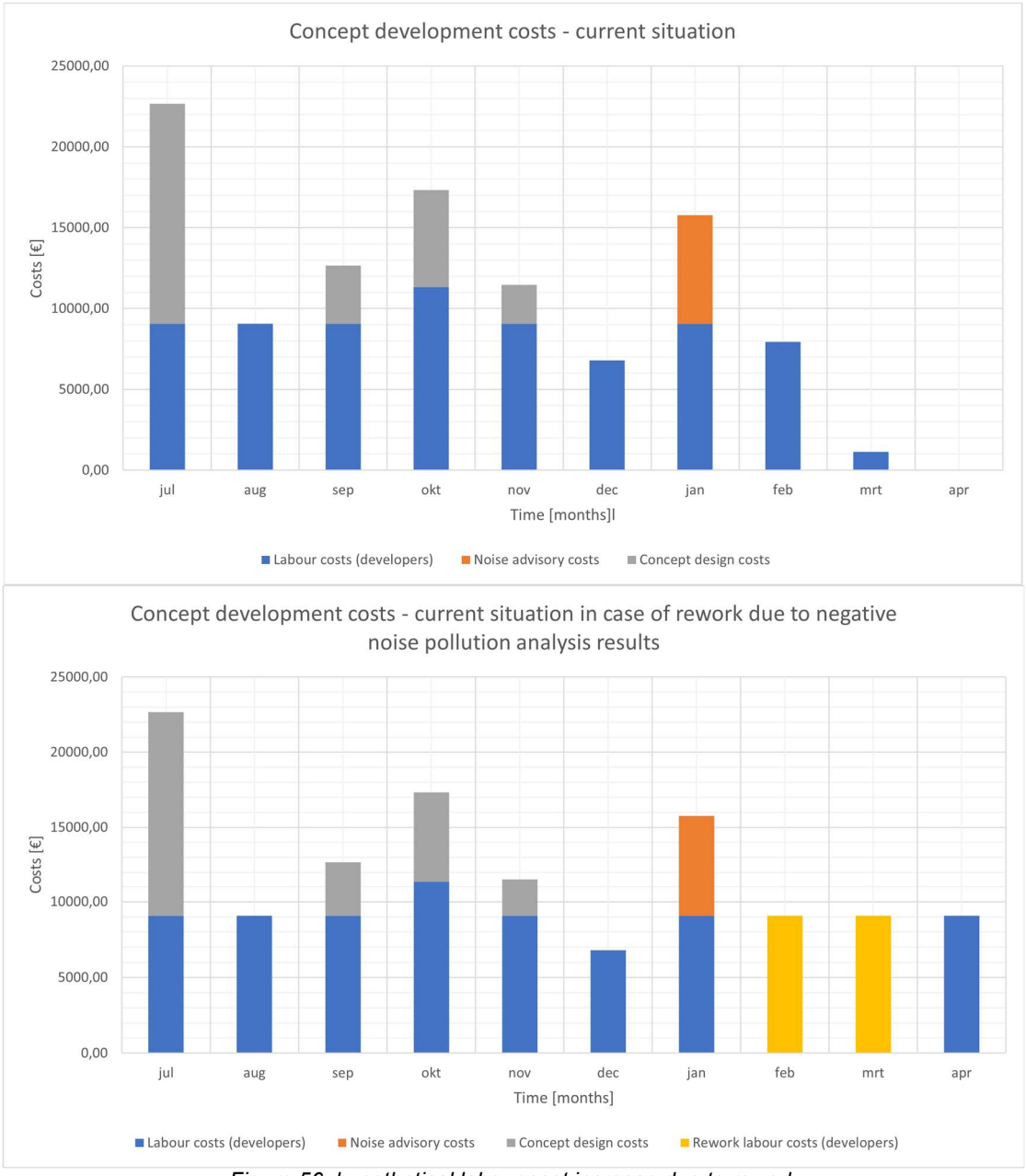


Figure 56: hypothetical labour cost increase due to rework

8. Development validation

Before the designed artifact can be implemented in the real estate development process, the final step in the Design Cycle (as part of the Engineering Cycle in figure 2) consists of the validation of the developed artifact. In order to assess whether the developed artifact in the form of the Concept design evaluation matrix and the AI powered generative design tooling meets the needs of the intended stakeholders presented in chapter 6, an expert panel consisting of three real estate development professionals has validated the artifact. This process will be elaborated on in subchapter 8.1. The results will be presented in subchapter 8,2, after which the answering of sub-question four can be found in the conclusion of this chapter:

- SQ4: *"How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?"*

8.1 Expert panel validation

The expert validation panel consist of three real estate development professionals, who have varying experience and roles. Figure 57 shows the demographics of the individuals within the expert panel. These individuals have not been involved in the development process of the case project, nor have they been involved in this research.

Expert panel member	Role	Age [years]	Relevant working experience [years]	Gender	Education level
#1	Senior project developer	48	23	Male	Master (HBO/WO)
#2	Project developer	28	5	Male	Bachelor
#3	Senior project developer	41	17	Male	Master (HBO/WO)

Figure 57: Expert panel demographics

In order to validate whether the artifact meets the goals set in chapter 6, it is important that the expert panel gets a clear idea of how the artifact would interact with the problem context. By doing so, the expert panel can predict how the artifact would behave if implemented in a real-world context. It is therefore important that the expert panel has a clear understanding of the hypothetical impact of the artifact. Therefore, the researcher gave a short presentation prior to the validation of the artifact, including the following topics: Research introduction including the problem description; introduction of the development goals and the artifact, and the simulation used during the verification of the process, including the differences between the current situation and the rerun of the case project. Finally, in order to structure the validation process, the artifact has been validated with the following questions:

- *Do you recognize the problem(s) described in the problem description (causal network)?*
- *Do you think that the development needs would contribute to the problem solving?*
- *Does the artifact satisfy the development needs?*
- *Do you have any remarks or suggestions?*

8.1.1 Validation results

A transcription of the export group validation can be found in Appendix D. The panel recognized the presented problem, represented by the causal network. They discussed that

there is indeed always a certain amount of uncertainty during the concept development process, it is part of the real estate development process. They discuss that they currently often just have to decide based on experience, to be able to assess that decision afterwards. Even if they have the feeling beforehand, that the results from the design decision could have a negative result on for example the noise pollution on the façade, they have to let the advisor make a noise pollution calculation just so that they can adjust the design based on the information they receive.

The expert panel agreed that the development needs would contribute to solving the earlier described problem and no feedback on this part. The expert panel agree with the hypothetical causal network depicted in chapter 7 and Appendix D. After a discussion about what other concept designs could have been created for the case project using the developed artifact, and to what extent the chosen design could have been further developed with the use of the artifact, the expert panel agreed that they expect the artifact to satisfy the development needs, thereby reducing the chance of rework and a enabling them to make more accurate cost estimations. They discussed that the earlier you reduce the uncertainty, the less additional time and cost you have to invest due to the need for rework, and because you can make certain design decisions definitive earlier on in the process due to this objective knowledge, you have to deviate less from these design choices, making the initial cost estimation more accurate in their opinion.

Furthermore, the researcher showed the hypothetical labour cost increase due to hypothetical rework for the case project. The expert panel agreed with the hypothesis that the rework would lead to an increased labour cost of 25% within the scope of the hypothesis, given all the assumptions made (as discussed in Appendix C-18). In addition, they stated that the cost increase could be further specified by taking the additional advisory costs (both the architect and the noise advisor) into account. This is further discussed in the discussion in chapter 9.

At last, the expert panel discussed that they would be interested to use the artifact in some of the projects they are currently working on, to experience what the influence would be on a new development project.

8.2 Conclusion

It can be concluded that developed artifact has been validated by the expert panel. It does suffice the needs formulated in chapter 6. This enables the researcher to answer the last sub-question of this research: SQ4.

8.2.1 Sub-question 4

SQ4: ***"How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?"***

Based on the answers to sub-questions 1, 2 and 3, and the additional information gathered in the problem investigation phase, the problem related to this research has been specified in sub-chapter 5.1.3. The causal model in figure 36 visualises the defined problem within the scope of this research. Based on his problem description, the researcher was able to define development needs for the artifact in chapter 6 and specify the hypothetical causal network including the artifact, subsequently design the artifact in chapter 7 and finally validate this hypothetical causal relationship.

The feasibility of the real estate project is within the scope of this research determined by calculating the residual (land) value. The (expected) residual land value can be calculated by

subtracting the (expected) development costs from the (expected) gross development value (depicted in figure 34). Uncertainty due to a lack of knowledge leads to an increased chance of rework, which subsequently decreases the initial cost estimation accuracy.

The developed artifact is subdivided into 1) AI powered generative design tooling, and 2) the concept design evaluation matrix. The use of part one of the artifact allows the (concept) developer to reduce the lack of objective knowledge concerning the real estate development task by increasing the quantity of knowledge, on the one hand by increasing the knowledge regarding the design possibilities, on the other by increasing the quantity of knowledge on design categories that are already assessed during the concept design evaluation process, and by widening the scope of the objective knowledge by adding environmental parameters such as noise pollution on the façade.
Furthermore, the second part of the artifact allows the (concept) developers to indicate their preferred design parameter and compare different concept designs which enables them to steer the project in a desired direction. The expert panel validated that the use of the artifact is expected to lead to less uncertainty during the concept development process, which would result in a decreased chance of rework and would allow the (concept) designer to increase the cost estimation accuracy. Furthermore, the decreased chance of rework would improve the cost estimation accuracy because less additional expenses have to be made due to unexpected rework. By increasing the cost estimation accuracy of the real estate development project during the concept design stage, the uncertainty with regards of the feasibility of the project is decreased.

III - Discussion & Conclusion

9. Discussion

This chapter gives an overview of the main findings of this research and the scientific contributions, after which these findings will be put into context within the literature used in the theoretical framework and introduction of this thesis. Subsequently, the research methods of this research will be evaluated. Finally, the limitations of this research will be elaborated on, after which the recommendations for future research will be discussed.

9.1 Discussion and reflection

9.1.1 Main findings and research contributions

The main finding of this study is that the developed artifact consisting of 1) AI powered generative design tooling, and 2) the concept design evaluation matrix, enables the project and or concept developer to (respectively) reduce the lack of knowledge during the concept design process and decrease the unstructured character of the concept design evaluation and decision-making process, thereby decreasing the overall uncertainty about the design task. This decreases the uncertainty with regards to the feasibility of the real estate development project by increasing the initial cost estimation accuracy and decreasing the chance of rework during the project development process.

This research contributes to the scientific knowledge because it reframes the evaluation and decision-making process of the concept design stage within real estate site planning with the use of new concept design software. It adds a concept design evaluation method to the available evaluation and decision-making scientific literature in the form of the developed artifact. This fills the development gap discussed in subchapter 1.3. Furthermore, the research gives new insights into the practice of real estate site planning and concept design process in the Netherlands; it further investigates the relatively new AI powered generative design technology and places it within the generative design spectrum; and finally it lays a foundation for further research into this area.

9.1.2 Reflection with regard to the theoretical framework

Overall, the findings from the literature correspond to the findings in this research. Opera (2010) states that uncertainty is an integral component of the real estate development process that needs to be considered in determining the value and therefore thus the feasibility of the project. By developing the concept design evaluation framework, the project developer can steer on decreasing this uncertainty during the real estate development project.

According to Bulloch & Sullivan (2012), Unplanned rework during later stages of the real estate development process is likely to be time consuming, very expensive and has a negative influence on the profit and thus feasibility of the project. They state that because developers have to make educated guesses during the concept development process due to a lack of knowledge, this can lead to rework in case the educated guesses turn out to be wrong later on in the development process. The developed artifact enables the project developer to make more educated decisions based on additional objective information compared to the current concept development process. This decreases the uncertainty related to the design task and is expected to decrease the chance of rework according to the expert panel. This increases the accuracy of the initial cost estimation, leading to a more reliable feasibility estimation.

As discussed in sub-chapter 1.3, there are a number of evaluation and decision-making methods focused on concept design evaluation and decision-making in general product development or product development in the engineering field, However, there are no scientific concept development evaluation and decision-making methods for the use of AI powered

generative design tooling during the real estate site planning process as part of the real estate development process. This research has a scientific contribution because it fills this development gap. The developed artifact allows the project developer to use a scientific concept design evaluation and decision-making tool in the form of the concept design evaluation matrix during the real estate site planning process, that allows him/her to steer on less uncertainty with regards to the design tasks and thereby (in)directly increasing the accuracy of the cost estimation of the project. This subsequently decreases the uncertainty with regards of the feasibility of the project.

9.1.2 Reflection with regard to the research method

Qualitative exploratory research has been used as input for the Design Research methodology of this research. Exploratory research aims at understanding the topic being researched, at the initial stages of the research process (Sreejesh, et al., 2015). The process of evaluating existing studies on related topics, discussing the problem with experts, and analysing the situation helped the researcher further specify the problem in chapter 5. This information has been used as input for the Design Cycle as part of the Design Research methodology as described in sub-chapter 2.1.

9.1.2.1 Validity

As discussed in sub-chapter 2.4, validity refers to the truthfulness and accuracy of the scientific findings. The study is valid if it demonstrates what actually exists. The internal validity of this research refers to the degree to which the findings in this study are a truthful reflection of reality instead of being the effect of external influences. In order to increase the internal validity of this research, interview protocols have been used during both the initial interviews as the verification interviews. A trial interview has been conducted prior to the practical case analysis interviews. In order to increase the quality and the validity of the interviews, the feedback of the interviewee has been processed.
Furthermore, before the concept design evaluation matrix has been developed, the researcher distributed a questionnaire to a wide group of real estate development professionals across multiple companies within the Dura Vermeer group, and another real estate development company (n=35), in order to assess the importance of the design parameters for the feasibility of the project during the concept design process.

In order to increase the external validity of this research, it is important that the findings of this study can be generalized to a certain extent. The findings of this study are partially based on the results of the practical data analysis. For this practical data analysis, the researcher studied the concept design process of the case project. In order to increase the external validity of this research, the researcher asked the interviewees to what extent they would consider the case project an average project within the scope of this research. (inner-city apartment development with a minimum of three building layers). All the interviewees indicated that the case project can be considered as an average project within this scope. Based on these findings, the results within this research can be generalised within the scope of this research.

9.1.2.2 Reliability

The reliability of the research refers to the consistency of the methods and results used by the researcher in this study. In order to increase the reliability of this research, multiple interview protocols have been formulated as discussed in the previous paragraph. Furthermore, the design specifications have been documented in chapter 7. This enables other researchers to repeat the study. The interview protocol and coding for this research can be found in Appendix B. The (environmental) data used during the verification and validation of the artifact that had to be imported into Spacemaker, and the verification and validation process have been documented in the case verification specifications (Appendix C) and case validation specifications (Appendix D).

9.1.2.3 Generalisability

As discussed in the validation paragraph of this sub-chapter, part of this research is based on the practical findings of the case project. In order to increase the generalisability of this research, the interviewees indicated that they consider the case project to be an average inner-city apartment development project with a minimum of three building layers.
Furthermore, the artifact, which consist out of the concept design evaluation framework and the AI powered generative design tooling, is designed according to the current capabilities of AI powered generative design tooling and is not limited to the use of Spacemaker.

9.2 Limitations and recommendations

- It is important that the interviewees understand what the researcher intents during the interviews and expert validation. Although the researcher focussed on explaining the differences between the current situation without the artifact and the situation using the artifact, it cannot be established to what extent the interviewees have understood this difference. During the verification, every effort was made to explain the expected differences between the current process and the process with the use of the artifact. This also applies to the validation of the research, as the expert panel has to assess in a fairly short period of one hour whether the artifact does what it was designed to do. A similar method was applied in the form of a presentation prior to the validation of the research.
- In order to increase the reliability of the results of this research, more interviews could have been conducted. It is tried to interview a diverse group of real estate development professionals, interviewing a concept developer, a board member, a senior project developer and a less experienced project developer, and lastly a senior development manager. However, all interviewees were male. Furthermore, 80% of the interviewees were employed at the same company. In future research, it is recommended to interview more interviewees, and a more diverse group of real estate development professionals.
- The artifact is validated by an expert panel. This limits the validation to a certain extent since the experts have to judge the artifact based on a presentation. They have not used the artifact. However, the expert panel consisted out of different real estate development professionals than the group that was interviewed for the problem investigation and the verification of the artifact, which increases the validity of the research. For further research it is recommended to implement the artifact, after the practical implementation can be validated by a group of professionals that has used it.
- Based on the verification and validation of the artifact, the concept design evaluation matrix can be further optimized. For future research it is recommended to investigate the suggested improvements, either before implementation, or after the current artifact has been implemented.
- Due to the scope of the research, the focus of the verification and validation of the artifact was mainly focused on a general level and specified on the noise pollution parameter, since based on the results of the research this is considered to be an important environmental parameter during the concept design and real estate development process. For future research it is recommended to focus more on the other design parameters of the concept design evaluation matrix during the verification and validation process. Furthermore, it should be repeated that AI powered generative design tool used: Spacemaker, does only take the rail and road noise pollution into account in the noise pollution analysis. Industrial noise, which played a large role in the case project development process, cannot be taken into account currently.
- It is assumed that the simulation and analysis capacities of the AI powered design tool Spacemaker are correct. Just as some of the interviewees and experts have mentioned, it should be investigated to what extent this assumption is correct and how

the software calculates for example the noise pollution on the façade. In future research it could be analysed to what extent the results differ from the results provided by a noise pollution advisor.

- The 3D models of the various concept designs (both from iteration 1 and 2) have been recreated on the basis of existing drawings and images. This affects the reliability of the data entered into the concept design evaluation matrix. For future research it is advised to use the exact same models and load them into the AI powered generative design software to increase the reliability of the results.
- The next step for the artifact would be to either update the concept design evaluation matrix based on the feedback from the verification and validation of this research or implement the artifact into the concept design process. Future research should show that the theoretical relationship of uncertainty and feasibility, and the influence of the artifact would contribute to the real estate development process in practice.
- The hypothetical labour cost increase (figure 56) is based on a lot of assumptions. The calculations from Appendix C-18 are based on an hour wage of 85 euros. The time spend during the process is also based on an estimation, since the project developers do not keep track of this. Their labour costs are part of the general costs of a project. This hypothetical calculation should therefore be seen as a hypothetical example to indicate the influence of rework on the cost estimation accuracy.

10. Conclusion

The real estate development process is becoming increasingly complex, which narrows the real estate developer's development space and therefore increases the uncertainty with regards to the feasibility of the project. In the current process, a lot of decisions are made based on educated guesses instead of objective knowledge, which if estimated wrong, could lead to rework, and jeopardize the feasibility of the project. By increasing the amount of objective knowledge during the early stages of the real estate development process; during the concept design process, the developer could potentially decrease the uncertainty with regards to the feasibility of the project.

With the use of recently developed AI powered generative design tooling for the concept design stage within the real estate development process, the (concept) developer could potentially decrease the uncertainty regarding the feasibility by increasing the amount of objective knowledge during the early stages of the project. However, there is currently no scientific method to help the (concept) developer evaluate the concept design with the use of this tooling and make decisions based on more objective design criteria.

The goal of this research was to develop an evaluation framework for the concept design process that can be used by real estate developers in the Netherlands, during the concept design stage of inner-city apartment buildings. This framework should help the (concept) developer to make more informed choices (based on additional objective information) earlier on in the design process to decrease the uncertainty with regards to the feasibility of the real estate development project. The framework will be developed considering the current visualisation and simulation abilities of AI powered generative design tooling.

Based on the problem statement, the aim of the research and the development gap, the following main development statement has been formulated:

''The lack of objective knowledge during the often poorly structured concept design evaluation and decision-making process increases the uncertainty regarding the feasibility of the project''

In order to find a solution for the development statement, several supporting theoretical and exploratory sub-questions have been formulated and answered. SQ1, SQ2 and SQ3 serve as input for SQ4, in order to develop a solution for the development statement.

10.1 Conclusion

10.1.1 Sub-question 1

SQ1: ''How is the current concept design stage of the real estate site planning process organised according to the literature, key-actors and case documentation?''

It can be concluded that the current concept design stage of the real estate site planning process according to the theoretical framework corresponds to the findings from the practical data collection in the Context chapter. The concept design stage is part of the real estate site planning process and the larger real estate development process. Each real estate development process has a different mix of location, market, timing, product, and price, which makes each real estate develop project unique. The process begins with a plot of land or an idea, although the practical data analysis indicates that it frequently begins with a plot of land. In general, the process ends when the building is constructed and in operation. The real estate site planning process ends just before the construction phase starts. When the developer has found a location and has the intention to investigate whether it could provide a financially feasible development business case, the concept design stage begins. First of all, the design

goals are specified according to the literature, considering information retrieved from market and location analysis and the preconditional framework of the project. Subsequently, the first concept designs are created. According to the literature, it starts with the specification of the design goals, after which the first concept designs are created. The boundaries set by these initial investigations and rules and regulations can be referred to as the developer's opportunity space (Carmona, et al, 2010) as depicted in figure 10. Within this space, the developer can try to create a feasible concept design.

The concept design process is iterative, involving ongoing assessment of the concept designs against the established design requirements and goals, followed by a decision for one of the designs. This process is repeated until a final concept design is selected. In this process, the (anticipated) financial feasibility is crucial. Due to a lack of knowledge during the concept design stage, many decisions made during the design process are based on educated guesses rather than based on objective knowledge. After a final concept design is selected, the design moves on to the next stage within the real estate development process (and site planning process) referred to as the Structure Design phase (SO). In this phase, the mass study is further developed technically. In contrast to what the literature and case documentation studies imply, the border between these two phases is less rigid according to the key-actor interviews. As more objective knowledge regarding the design task is collected throughout the SO phase, it occasionally happens that decions made based on initial assumptions during the concept design process tun out to be incorrect. This may result in unscheduled rework, more expenses, a longer lead time, and a less accurate initial feasibility estimation.

10.1.2 Sub-question 2

SQ2: ''Which design parameters are relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project according to the literature, key-actors and case documentation?''

It can be concluded that the results from theoretical framework and practical data analysis generally correspond with each other. The concept design evaluation and decision-making process is largely a subjective process. These subjective decisions are based on a combination of objective information and educated guesses. The developers try to keep the investment costs low up to the point that there is more certainty regarding the continuation of the development of the project, because there are many uncertainties in the early stages of the development process. In the current process, the information concerning the environmental parameters must be retrieved with the help of an advisor, and because it is currently not possible to do this analysis for every concept design in a relatively short time, this information is often retrieved after a final concept design is chosen, during the Structural Design phase. This means that at the time of the decision-making, these environmental parameters are mostly assessed based on educated guesses instead of objective knowledge.

The feasibility of the project is determined by calculating the expected residual (land) value / profit of the project. The possibility of rework and a less accurate cost estimation accuracy could have a negative influence on this residual (land) value. This uncertainty has a negative influence on the (expected) feasibility of the project. A schematic representation of the relationship between the gross development value, the total costs, and the gross residual value / profit, can be found in figure 34 below. It indicates the role that uncertainty plays in the determination of the reliability of these values.

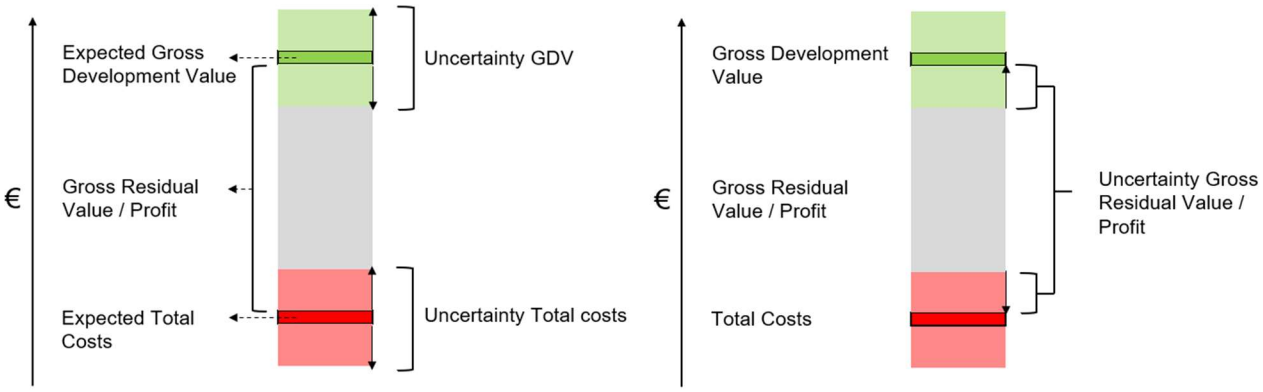


Figure 34: Uncertainty with regards to the feasibility of a real estate development project

The correctness of the input values is important for the reliability of the profit or residual land value estimation according to the literature, which is used to determine the feasibility of the real estate development project. A more thorough analysis should focus on the uncertainties associated with each of the factors that influence the financial outcome of the project. Corresponding to the findings from literature, the interviewees expect that additional objective knowledge as a result of more research would lead to less rework at a later stage of the real estate development process, which would increase the feasibility of the project. The documentation study revealed that the two major factors that jeopardized the feasibility of the project (due to rework which led to a longer lead-time and additional costs) where problems related to the environmental relationship of the building: the noise pollution on the façade and the building height that exceeded the mill biotope regulations.

It can therefore be concluded that especially environmental parameters could be relevant for the concept design evaluation to decrease the uncertainty with regards to the feasibility of the real estate project. The practical data collection revealed that especially the following environmental parameters play a role in the preconditional framework of a real estate development project: Noise pollution on the façade, sunlight hours on the façade, and daylight hours in the building. It can be concluded that all parameters that influence the costs and revenue of the development overall can be seen as important to decrease the uncertainty regarding the feasibility of the project, because the feasibility of the project is determined by calculating the expected residual (land) value. In addition, parameters that give more insight into whether the design fits within the boundaries of the developers' opportunity space are also suggested to be important for the concept design evaluation to decrease the uncertainty regarding the feasibility of the project. According to the literature, the included design parameters should enable the developer to steer the process into a logical, systematic procedure that aims at identifying the areas of risk and uncertainty associated with the particular project.

10.1.3 Sub-question 3

SQ3: "What is the suggested influence of the use of AI powered generative design during the concept design phase on the real estate site planning process according to the literature?"

A distinction can be made within the generative design concept in the form of two algorithmic methods that generate design solutions: 1) rule-based generative design algorithms and 2) the AI generative design method. These methods can be seen as the extremes within the spectrum of generative design. Recent advancements in cloud computing and AI (especially within the field of machine learning) have accelerated the possibilities within the generative design domain and allow for new ways to work with more complicated data sets and larger projects (Cousins, 2021). These advancements led to the recent developments within the field of rule-

based generative design approaches, that uses AI and cloud computing to boost the computational power of these rule-based generative design approaches (Landes, 2022). In practice, this rule-based approach is called ‘’AI powered generative design’’.
These tools use AI methods such as machine learning in combination with rule based generative design methods, and as the name states, are not quantified as AI generative design methods which can (once fully trained) generate designs on its own. Instead, they are quantified as AI powered generative design methods.
Cousins (2021) discusses that AI powered generative design tooling uses a large amount of numerical and contextual data to develop a series of optimized designs for real estate projects, neighbourhoods, and even entire city districts, based on pre-defined design objectives. This can alleviate the stress of difficult urban planning work, allowing city planners to consider a wider range of design solutions than is currently possible, allowing them to focus more on sub-characteristics such as daylight access, pavement space and traffic flows. McKnight (2017) states that the use of generative design reduces development time, increases the creativity of the designer and the efficiency of the development process. It is discussed that especially the simulation and testing as part of the generative design process is valuable for the efficiency increase. These simulation and testing (analysing) capacities of the software include categories such as (site/outdoor) area statistics and environmental parameters (wind, noise pollution, sunlight, daylight, view to area, view distance) that allow the project developer to get a better understanding of the performance of the concept design and its relationship with its surroundings (Landes, 2022).

10.1.4 Sub-question 4

SQ4: *‘‘How to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process, to decrease the uncertainty regarding the feasibility of the real estate project?’’*

The problem related to this research, specified in sub-chapter 5.1.3, is based on the answers to sub-questions 1, 2 and 3, and the additional information gathered in the problem investigation phase. The causal model in figure 36 visualises the defined problem within the scope of this research. Based on this problem description, the researcher was able to define development needs for the artifact in chapter 6 and specify the hypothetical causal network including the artifact, subsequently design the artifact in chapter 7, and finally validate this hypothetical causal relationship in chapter 8. By doing so, the researcher has found a way to decrease the lack of objective knowledge concerning the real estate development task, and structure the concept design evaluation and decision-making process to decrease the uncertainty regarding the feasibility of the real estate project. This provides a solution to the formulated development statement.

The use of part one of the developed artifact in the form of 1) AI powered generative design tooling allows the (concept) developer to reduce the lack of objective knowledge concerning the real estate development task by increasing the quantity of knowledge. On the one hand by increasing the knowledge regarding the design possibilities, on the other by increasing the quantity of knowledge on design categories that are already assessed during the concept design evaluation process, and by widening the scope of the objective knowledge by adding environmental parameters such as noise pollution on the façade.
Furthermore, part two of the artifact; 2) The concept design evaluation matrix, allows the (concept) developers and other stakeholders to indicate their preferred design parameters and compare different concept designs which enables them to steer the project in a desired direction, for example to minimize risk or optimize the concept design. The expert panel validated that the use of the artifact is expected to lead to less uncertainty during the concept development process, which would result in a decreased chance of rework and would allow the (concept) designer/developer to increase the cost estimation accuracy. Furthermore, the

decreased chance of rework would improve the cost estimation accuracy because less additional expenses have to be made due to unexpected rework. By increasing the cost estimation accuracy of the real estate development project during the concept design stage, the uncertainty with regards of the feasibility of the project can be decreased.

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Appendix A – Context | Additional information from the case documentation study

A-1 Memorandum of Principles | requirements for the case project development

Based on the Memorandum of Principles issued by the municipality of Rotterdam, the following guidelines have been created for the development of case project location. It is important to emphasise that not all principles were definitive requirements.

Spatial principles

- The new real estate must have a clear plinth in which there is room for small-scale activities. The building block is divided up to match the size of the industrial buildings along the Vierhavensstraat.
- The new real estate must strengthen the entrance to the park as much as possible, both spatially and programmatically.
- The realization of a staircase as access to the Dakpark and connection between Schiemond and Bospolder is part of the assignment.
- The monument is the end of the Strip. New real estate does not negate this and is subordinate to the national monument.
- For an integral development of the Tail, the starting point is to arrive at a plan that preserves the monumental values of the ensemble. Both the history and the architectural interpretation give added value to the development as a whole. If it turns out to be completely unfeasible from an architectural or financial point of view to include the Huidenclub in the development, a worthy alternative will have to be sought in consultation.
- The Tail will act as an intermediary between the M4H and the city districts by allowing buildings to fit into ‘‘the Rotterdam layer’’ with a ‘‘creation plinth’’ in part of the building block.
- When developing the plan, the aspects of flood defence, noise pollution and flora and fauna must be taken into account.
- During the real estate development, the height limitations of the mill biotope must be taken into account.

Building

The ambition is to realize high-quality residential buildings with associated facilities that match the atmosphere of the Dakpark with good transitions to Merwe-Vierhavens, Schiemond, Bospolder and Historisch Delfshaven. This high-quality level relates to the spatial image, the quality of the units, and the facilities. This included a varied façade, high-quality detailing, spacious and adaptive homes with good outdoor spaces, innovative living concepts, variation in storey heights, spacious entrances, attractive plinth functions, communal facilities, good facilities for bicycles and integrated parking solution.

Mass build-up

The new buildings have to be in line with the building block structure of Bospolder, with the monument as the icon at the end of the Strip. The spatial set-up is a closed block with a collective courtyard. The characteristic design of the Strip with a clear plinth layer is continued on the street side, which ensures unity. In terms of typology, the starting point is a plinth with activities (collective) facilities with the flexibility that they can also become homes.

Apartments will be built above this plinth. The block is made up of different clusters with a varying architectural image. This fits in well with the character of the buildings along both

Hudsonstraat and Pelgrimsstraat. The individual house / living unit is subordinate to the street wall.

The new real estate unmistakably forms one ensemble. On the street side, the building block is divided into at least three blocks. Due to noise, a physical cut is difficult, so the municipality proposes to interrupt the building blocks with recessed, transparent volumes. This breaks the long wall and offers a view to the green rear of the courtyard and the park. The building blocks have a height of approximately six and seven storeys, e.g., as a set-back or designed in a stepped volume.

The building block will also be cut up on the park side. In order to establish a connection with the park and to make the collective courtyard semi-accessible, the central building block is free between the openings. The buildings rise on the park side, following the slope of the park. The building height increases from five layers on the monument side to seven/eight layers on the park side. An accent is possible, but the building height for the entire real estate project is lower than the tower of the national monument.

Programme
The programmatic principles are:

- Creating more diversity in the housing supply in the Delfshaven area. Room for social climbers from the surrounding neighbourhoods.
- According to the ‘‘Quality policy for small homes’’ (Dutch: Kwaliteitsbeleid kleine woningen), no small homes (<50 m2 nett floor area) may be placed in the plan area.
- The focus should be on the following three target groups:
    - Families, also suitable for social climbers from the surrounding neighbourhoods.
    - Starters and settlers, 1- and 2- person households
    - The elderly, 1- and 2- person households older than 65 years.

On the side of the Vierhavensstraat, the proposal is to realize apartments above the plinth with the possibility for ground bound homes and facilities. For the houses on the park side, the proposal is to realize family-friendly houses in combination with apartments. Making maisonettes is interesting because this can be a suitable city residence for families. In addition, vertical linking offers added value because it means that substantially fewer galleries need to be realized for access.

Outdoor space and courtyard garden
All homes will have their own outdoor space in the form of a terrace, balcony, loggia, (roof) garden or front zone. For liveliness, it is desirable to orient outdoor spaces not only towards the inner garden, but also towards the park and, where possible, towards the street and the stairs from Vierhavensstraat to the park, in order to ensure as many ‘eyes on the street’ as possible.

The courtyard garden is designed as an attractive and noise-free place for all residents within the building block. The inner garden has a minimum size of 20 meters deep. Accessibility of the inner garden is an important design task in the elaboration of the plan. The courtyard garden connects to the slope of the Dakpark in a logical manner. Differences in height in the inner garden are gradually resolved and subtly designed.

The collective garden will be given a green design and must be attractive to look at, to stay in, to meet each other, to organize joint activities and to play.

Sustainability
It is precisely in this project, a building with its feet on the Dakpark, that we focus on nature-inclusive construction. This is a form of sustainable construction in which construction and layout is done in such a way that a building contributes to the local biodiversity and natural values. Nature-inclusive construction also contributes to the quality of the living environment, including the health of the residents, promoting social contacts, tempering the temperature in a city, and reducing air pollution in the city.

Parking solution
Parking takes place on site, in the building. The parking is not visible from the street, the park, and the courtyard. The parking standard as established in the Rotterdam Building Regulations (Dutch: Rotterdamse bouwverordening) must be met at the time of submission of the final building permit application. The current parking standard (Dutch: beleidsnorm parkeren 2018) offers opportunities to respond on the mobility transition, for example from own car ownership to car sharing. Parking for visitors takes place in the parking garage in the Strip.

In addition to the parking for cars, the bicycle shed must also be designed with care. Bicycle sheds are located on ground level, are spacious and in any case easily and where possible steplessly accessible from Pelgrimsstraat and Vierhavensstraat.

A-2 Noise requirements | Noise report case project land-use plan

Table A-2-1 shows the relevant preferred values and maximum permissible noise levels (with exemption) for the planned homes in the land-use plan Bospolder-Tussendijken as a result of the road traffic noise (including tram traffic noise), rail traffic noise and industrial noise displayed. If the preferred value is exceeded, research into noise pollution measures is necessary and/or exemption in the form of a higher limit value can be requested at the Board of Mayor and Aldermen
The noise load on the facades of the location may not exceed the maximum limit value stated in the noise nuisance law (Dutch: Wet geluidhinder (Wgh)).
Cumulation is applied in accordance with the noise nuisance law if the preferred value at a location is exceeded by multiple sound source types, for instance the exceedance of noise sources from road traffic, rail traffic and industry.

Sound sensitive destination	Preferred value [dB]			Maximum permissible noise exposure with exemption, in urban area [dB]		
	Road traffic	Rail traffic	Industry	Road traffic	Rail traffic	Industry
House	48	55	50	63	68	55[2]
House (replacement new building)	48	55	50	68	68	65
Other noise sensitive building	48	53	50	63	68	55

[2] 60 dB with application of the Seaport standard.

Table A-2-1: Limit values for noise exposure within the noise zone of a road, railway, or industrial estate, in urban areas (translated from Noise report case project)

Seaport standard
In accordance with article 60 of the noise nuisance law, in an area located within an existing zone of an industrial estate with activities that are seaport-related and that necessarily take place in the open air, a value can be determined for homes whose exposure is mainly determined by those activities of no more than 60 dB(A), if these dwellings are built in the context of a restructuring or planned densification of an existing residential area, or if the dwellings are built adjacent to the existing residential area and there is only a limited expansion of the existing residential area.
A lot of container storage and transhipment takes place in the Waalhaven and Eemhaven industrial estate. These activities are necessarily carried out in the open air. In Bospolder-Tussendijken there is a limited expansion of the existing residential area. The seaport standard therefore applies to the planned homes at the case project location.

Rotterdam exemption policy
The exemption policy only applies to new homes for which higher values must be determined and does not apply to other noise-sensitive destinations. One of the most important criteria of the municipal exemption policy is the creation of at least one low-noise façade and, if applicable, at least one low-noise outdoor space per home. In accordance with this policy, a façade is considered low noise if the noise accumulation of all (sub)sources subject to zoning restrictions within one source type does not exceed a certain value. In table A-2-2, the limit value for a low-noise façade is displayed per source type.

Sound source	Limit value 'low noise'	Explanation
Road traffic	53 dB	The assessment takes place for the total of all roads after deduction in accordance with article 110g Wgh
Rail traffic	55 dB	The assessment takes place for the total of all railways
Industry	50 dB(A)	The test takes place for the total of all industrial sites

Table A-2-2: Limit values for noise-free facades per source type in accordance with the Rotterdam exemption policy (translated from Noise report case project)

Traffic noise

At 56 locations, the preferred value (48 dB) is exceeded due to one or more roads. The maximum permissible noise levels due to an urban road for homes (63 dB) or for new build homes that replace existing homes (68 dB) are not exceeded. An investigation has been carried out into whether there are source, transfer or recipient measures are necessary. Source measures include a reduction in (freight) traffic, a reduction in speed and/or the application of quieter road surfaces. The study shows that reducing traffic and reducing speed is not an option due to the important traffic function of the roads. By replacing the existing road surface on a number of roads, such as Schiedamseweg, Mathenesserweg or Marconiplein, a noise reduction of 2 to 3 dB can be achieved. By replacing the tram rails on a number of roads, a reduction of up to 6 dB can be achieved. With these measures, the preferred limit value of 48 dB can be met at a limited number of locations, but at the other locations the noise exposure has not been reduced sufficiently to meet this value. The costs of replacing the road surface are not expected to outweigh the benefits, and quieter asphalt types also have a number of disadvantages, such as higher sensitivity to wear.

Transfer measures may include increasing the distance or shielding measures using for example a noise barrier. Increasing the distance is not an option because it often concerns existing buildings. Insofar as the development locations do not yet exist, increasing the distance is also not an option due to the limited available space. Shielding measures in the form of a noise barrier are not desirable or possible for urban planning reasons.

If source and/or transfer measures prove to be impossible or insufficient to limit the noise exposure to the preferred value, a good acoustic climate must be created by designing a acoustically favourable layout for the houses with a noise load higher than 53 dB (standard for the low-noise façade in accordance with the Rotterdam exemption policy). This includes the location of non-noise-sensitive living unit functions on the roadside, and the location of noise-sensitive areas such as bedrooms on the least heavily loaded facades. According to the 2012 Building Decree, the maximum permitted noise load due to a road in a residential area is 33 dB. Achieving an internal value of 33 dB in the intended homes is technically and financially feasible by implementing sound-proof façade facilities.

A-3 Insolation requirements | Dutch building decree

When drawing up spatial plans, both the insulation on the buildings and the effect of this insolation (in the form of shadows) on the nearby buildings play an important role. Newly constructed homes can cause shade on the public space or gardens of local residents. It must be prevented that the shadow increases too much. Some functions just need good sunlight, such as gardens, terraces or play areas.

There are no laws and regulations for insolation in the Netherlands. Most municipalities use the TNO standard. Other municipalities have their own policy. Insolation diagrams provide insight into the insolation of the facades and (extra) shadow on the environment.

TNO standard
TNO has a light and a strict standard:

- The light TNO standard: at least two possible sun hours per day in the period from 19 February to 21 October (for 8 months) in the middle of the windowsill inside the window.
- The strict TNO standard: at least 3 possible sun hours per day in the period 21 January to 22 November (for 10 months) in the middle of the windowsill inside the window.

These standards are only applicable to facades that can receive direct sunlight. After all, north facing facades never receive direct sunlight.

Insolation diagrams
Insolation diagrams provide insight into whether the insolation of new construction on the façade, garden, terrace, playground, etc. is sufficient. These diagrams also provide insight into the increase in shadow on the environment due to the new construction.
With a 3d model, the existing situation is compared with the future situation. The following days of the four seasons are normative for this simulation:

- December 22: the day when the sun is at its lowest
- June 21: the day when the sun is at its highest
- March 21 the day that the sun is at half, namely exactly between the position of December 22 and June 21 (summertime)
- September 23: the day that the sun is at half, namely exactly between the position of June 21 and December 22 (wintertime)

The following times are usually used: 9:00 AM, 12:00 PM, 3:00 PM, 6:00 PM. On December 21, 6:00 PM is irrelevant, because the sun has already set. In June, 8:00 PM is also relevant.

Land-use plan
If a land-use plan permits new buildings, an assessment must be made whether these buildings have an effect on the environment. This can be done with an insolation diagram in combination with the TNO standards and the shading effect on the gardens, terraces, etc. The usability of these places must not decrease unacceptably. The new building itself must also have an acceptable living environment as explained in the introduction of this sub-chapter. In the land-use plan, the manner in which the building masses and public space are allocated can prevent unacceptable shadowing from occurring. Competent authorities consider whether there is good spatial planning. If there is an increase in shade, it can still be a desirable development. There is a trade-off between different interests.

A-4 Regulations mill biotope | Dutch building decree

The conservation zone – mill biotope that has been included around the mill in the historic part of Delfshaven is relevant for the case project location. Only the provincial regulation for the zone between 100 and 400 m is relevant for this site since the zone between 0 and 100 m lies entirely outside the plan area. The area designation determines how hight the building may be without obstructing the wind and the view of the mill. The maximum building height for buildings and the maximum height planting within the designated areas follows from the formula 13,5 m plus the distance in meters from the buildings to the centre of the mill multiplied by 0.033. The outlet is the maximum building height of plants and buildings in relation to the NAP. The ground level on site must therefore also be considered. Figure A-4-1 gives a schematic representation of the mill biotope height regulations.

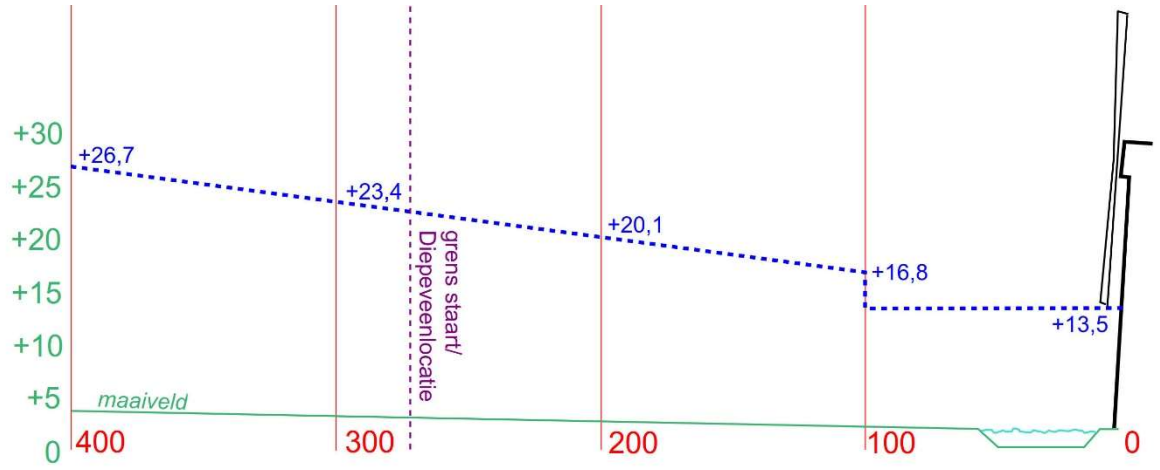


Figure A-4-1: Maximum height of buildings and plants within the mill biotope (blue broken line). (source: Building decree Bospolder – Tussendijken https://www.planviewer.nl/imro/files/NL.IMRO.0599.BP1095BospTussend-va01/t_NL.IMRO.0599.BP1095BospTussend-va01.html)

To guarantee free wind and a view of traditional windmills in the South Holland landscape, a mill protection zone has been established with a radius of 400 meters calculated from the centre of the mill. The following conditions apply within the zone relevant for the case project location:

a. Within a radius of 100 meters, calculated from the centre of the mill, no new buildings or plants may be developed higher than the lowest point of the vertically standing blade of the windmill.
b. Within an existing urban area, the following conditions apply within a radius of 100 to 400 meters from the centre of the mill: the maximum building height of buildings/plantings may not exceed 1/30 of the distance between the structure/plantings and the centre of the mill, calculated from the height of the lowest point of the vertically standing blade.
c. Outside the existing urban area, the following conditions apply within a radius of 100 to 400 meters from the centre of the mill: the maximum building height of buildings/plantings may not exceed 1/100 of the distance between the structure/plantings and the centre of the mill, calculated from the height of the lowest point of the vertically standing blade.

In derogation from the above-mentioned rules, the development of new buildings or plantings is possible if:

- There is a development in which free wind and the view of the mill are already limited by buildings, as long as the free wind and the mill are not further restricted

- It has been ensured that the impediment to the windage and the view of the mill is compensated by measures elsewhere in the mill protection zone.

Review
The mill biotope partly covers the plan area and the development location the case project. Only point ‘‘b’’ described in the paragraph above is relevant for the land-use plan Bospolder-Tussendijken, the mill is located within the existing urban area and the first 100 m of the biotope are outside the plan area. The mill stands on a scaffolding of 10 m, the distance between the lowest point of the vertically standing blade and the scaffolding is 0,9 m, the ground level on site is 2.6 m + NAP. The lowest point of the vertically standing blade is therefore at 13.5 m +NAP. The height limitation within the development location varies from approximately 22 m +NAP at the easternmost boundary of the development location to approximately 27 m + NAP, halfway through the development location. The westernmost half of the development location has no restrictions since it lies outside the biotope.

Case project
Three of the five buildings at the case project site fall within the mill biotope (blocks 1, 4 and 5). See figure A-4-1. Block 5, directly above the monumental complex, has a building height of approximately 15 metres, bringing the height relative to NAP to approximately 19 metres. There is no conflict with the rules of the mill biotope here. Block 1 (next to the monumental building on the Vierhavensstraat) and block 4 (to the west of block 5) have a building height of 26 and 23 meters respectively in relation to ground level. The heights relative to NAP are 28.6 and 25.8 meters respectively. At the location of the cut line in figure A-4-1 up to the 'end' of the mill biotope, the height of buildings may not exceed 25.5 m above NAP. This means that there is an excess of 3.1 and 0.3 meters respectively.

This has been discussed with the province. The Environmental Ordinance contains a derogation option for customization (Article 6.34). Based on this article, it is possible to deviate from the rules of the mill biotope, provided that the area of the exceedance does not exceed 100 m². By 'surface' is meant the vertical surface that blocks the wind in the direction of the mill, at the location of the cut line indicated in red in figure A-4-2. In the original plans, the buildings were slightly higher: 28.9 m above sea level for building 1 and 25.9 m above sea level for building 2. A technical installation was also planned for building 4. These heights exceeded 100 m². As a result of consultations with the province, the building height of the buildings has been reduced and the technical installation will be placed elsewhere. As a result, the wind blocking surface has been reduced to 99.9 m². On this basis, the province has indicated that it agrees to the application of Article 6.34 and that it deviates in connection with customization.

Figure A-4-2: Mill biotope contour lines on the case project (source: Building decree Bospolder – Tussendijken https://www.planviewer.nl/imro/files/NL.IMRO.0599.BP1095BospTussend-va01/t_NL.IMRO.0599.BP1095BospTussend-va01.html)

Area designation 'protection zone - mill biotope'

In principle, buildings up to 35 m high may be built on the case project location (calculated from the level/ground level, which varies locally from approximately 3.5 to 4 m + NAP), but the restrictions such as a result of the mill biotope. That is why the area designation 'protection zone - mill biotope' has been included on the image. Insofar as relevant, the rules from the Environmental Ordinance form the regulation of this area designation, including the option to deviate. A permit system has been included for planting within the mill biotope. The rules of the residential zoning, which are included at the location of the development site, include an explicit link with the regulation of the mill biotope. When building/developing the location, the rules of the mill biotope must therefore be observed. When there is a concrete construction plan, derogation may be granted in consultation with the province

A-5 Assessment guideline architect selection explanation

Part of the document selection request architects is further detailed in this appendix. For the assessment of the second concept design iteration, a jury consisting out of 8 professionals from both the municipality and the development combination Dura Vermeer – Dudok Real Estate gave a rating based on the following assessment guidelines and established criteria:

Assessment guideline	Percentage of total points awarded
Excellent The information provided by the Candidate shows a very high degree of completeness and appropriateness in relation to the criterion in question. The information is of excellent quality and is fully in line with the expectations of the Municipality. The information is reliable, transparent and complete and, where relevant, has a corresponding substantiation. The Tenderer convincingly demonstrates that he understands the Assignment and can realize all intended ambitions	**100%**
Good The information provided by the Candidate shows a good degree of completeness and appropriateness in relation to the criterion in question. The information is of good quality and is in accordance with the expectations of the Municipality. The information is reliable, transparent and complete. The Tenderer demonstrates that he thoroughly understands the Assignment and can realize the intended ambitions	**75%**
Amply sufficient The information provided by the Candidate shows a more than sufficient degree of completeness and appropriateness in relation to the criterion in question. The information is of more than sufficient quality and is (partly) in line with the expectations of the Municipality. The information is reliable, transparent and considered complete. The Tenderer demonstrates that it understands the Assignment and can (partially) realize the intended ambitions.	**50%**
Sufficient The information provided by the Candidate shows a sufficient degree of completeness and appropriateness in relation to the criterion in question. The information is of sufficient quality and partly meets the expectations of the Municipality. The information is considered partly complete. The Tenderer demonstrates that it partially understands the Assignment and can realize the intended ambitions.	**25%**
Insufficient/bad The information provided by the Candidate shows an insufficient degree of completeness and appropriateness in relation to the criterion in question. The information is of insufficient quality and does not or insufficiently meet the expectations of the Municipality. The information provided by the Tenderer shows that the information is missing or that there is little or no connection between what has been offered by the Tenderer and what has been requested by the Municipality. The Tenderer does not sufficiently understand the Assignment and is unable to achieve the intended ambitions sufficiently.	**0%**

Table A-5: Assessment Guideline for the case project architect selection (Concept design iteration 2)

A maximum of 100 points was used for the assessment of the entries. The assessment criteria with the weighting factors are shown below:

- Vision on design (40%)
- Vision on process (25%)
- Construction cost design (25%)
- Fee proposal (10%)

Elaboration by architects:
The architects were asked to elaborate their designs in a (compact) vision presentation or a concise structure design. The description of the elaboration as requested is given below:

1. Plan. (Contains: approach process in design team / collaboration with (young) architects e.g., for facade design / landscape architect involvement)
2. Urban planning vision:
    - Reflection on urban planning frameworks
    - Own vision / interpretation on the location
    - Relationship with the immediate surroundings: Dakpark, Schiemond, Bospolder-Tussendijken, Delfshaven
    - Relationship with the landscape.
3. Architecture vision:
    - New construction: structure, house plans, visual language, materials, detailing etc. based on sketches, own reference, and references from e.g., potential architects to work with.
    - Restoration / transformation existing: how to deal with the National monumental ensemble. How can the existing be enhanced with any new additions?
4. Vision on sustainability aspects to be applied
5. Global architectural sketch design including counting sheet
6. Vision on collaboration between architect and developer and contractor:
    - How to deal with standardisation?
    - How to deal with the influence of pressure on construction costs?
    - Role of the architect as director of the design team?
7. Fee statement
8. Final presentation

Points of attention:
The development collaboration listed a number of points for attention that they gave the architects in the elaboration of the documents:

- Urban design interpretation of the place
- Scale of the street
- Square and entrance of the district
- Connections to the Roof Park and connection heights
- Function and identity of the monumental ensemble
- Access to the parking garage via the Dakpark tunnel
- Location outside the dike / adjacent dike body
- Insolation / noise versus outdoor areas
- Integral integration of plants and greenery in the concept (including nature)

Reference is also made to the principles and points for attention in the Memorandum of Principles for the location.

Program:
As described in the Memorandum of Principles, the following principles apply for the program:

- 30 – 40% rental properties (minimum 30% middle segment, rent € --- to € --- with an average rent not higher than € --- per home). Homes are than a minimum of 60 m^2 and a maximum of 80 m^2.
- 60 – 70% owner-occupied homes (25% middle segment from €--- to €--- / 75% higher segment of € --- to € ---) These homes are a minimum of 60 m^2 to a maximum of 110 m^2 in a mix of apartments and city houses.
- Plinth facilities social / affordable workplaces / studio spaces / limited catering. Position these plinth facilities mainly in the monumental ensemble in accordance with the vision document of the Design Studio. For the Tail location, we mainly see residential functions in the plinth.
- Built parking.

The intended target groups are a mix of:

- Young and hopeful
- Urban dynamics
- Plan and run
- Carefree and active

Given the scope of this study, a further explanation of the target groups will not be discussed. The majority of the plan will focus on 1 or 2 person households in a mix of starters and seniors. In addition, the direct location at the park lends itself to good for families, who, for example, move on from Bospolder-Tussendijken.

Appendix B – Context | Key-actor interview documentation

B-1 Interview Protocol

Interview Protocol – Original (Dutch)

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: -

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

- Toestemming vragen om interview audio op te nemen.
- Introductie (leeftijd, functie, opleidingsniveau, werkervaring)

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?
    1. Wanneer worden de eerste conceptontwerpen gemaakt?

Conceptontwikkeling

2. Hoe ziet het conceptontwikkelingsproces binnen deze initiatieffase eruit?
3. In hoeverre is er enige consistentie in het aantal concept ontwerpen dat wordt gemaakt?
    1. In hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?
    2. Waarom gebeurt dat nu dan niet?
4. Tegen welke problemen/uitdagingen loop je op tijdens het conceptontwikkelingstraject?

Evaluatieproces

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.
Het woord "objectief" verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen?
6. Op basis van welke subjectieve/ objectieve parameter?
    1. Subjectieve parameters: In hoeverre zijn deze parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?
    2. Objectieve parameters: In hoeverre zijn de objectieve parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?

7. In hoeverre is het concept evaluatieproces gestructureerd?
    1. Zo niet → In hoeverre denk je dat enige vorm van structuur van toegevoegde waarde zou kunnen zijn? → Waarom?

Haalbaarheid

8. In hoeverre wordt de haalbaarheid van een project getoetst op het moment dat je een concept ontwerp kiest?
9. Hoe zou je deze onzekerheid met betrekking tot de haalbaarheid van een project tijdens de conceptfase kunnen verminderen denk je?
10. *(Als je deze info (over de genoemde parameters) eerder hebt, verwacht je dat dit de onzekerheid met betrekking tot de haalbaarheid van het project verminderd?)*
    1. *Waarom gebeurt dit nu niet?*

Case project

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit?
12. Hoe zag de conceptontwikkelingsfase binnen de initiatieffase eruit?
    1. Hoe is de keuze voor het uiteindelijke (concept) ontwerp tot stand gekomen?
13. In hoeverre zou je het concept ontwikkelingsproces van het case project als normaal kunnen omschrijven? (Bestemmingsplan wat niet definitief was, geluidshinder, etc)
14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?
    1. (Als ze problemen noemen→) Kwamen deze problemen naar voren voor- of nadat er een concept gekozen was?
    2. Wat was het gevolg hiervan op de haalbaarheid van het project?
    3. Puur reflecterend op dit proces, denk je dat deze problemen voorkomen hadden kunnen worden?
    4. Komen dit soort problemen vaker voor binnen bij andere projecten?

Interview Protocol – Translation

Note: This is the translated version of the original interview protocol which is written in Dutch. Because Dutch is the native language of both the interviewees and the interviewer, the interviews were conducted in Dutch.

Subject: This research mainly focuses on the concept development phase within inner-city real estate development. The documentation study shows that this phase is part of the Initiative phase within Dura Vermeer's real estate development process.

Interviewer: Menno Smit

Interviewee: -

Privacy: The interviewees agreed that the audio of the interview was recorded. The interview will be processed anonymously. The interviewee has the option to skip questions if he/she is not comfortable answering the question asked.

Setting:
The interviews were conducted 1 on 1, physically in a familiar environment for the interviewee. 60 minutes is allotted for each interview.

Introduction questions

- Ask permission to record interview audio
- Introduction (age, role, education level, work experience)

Real estate development in general

1. How would you describe the initiative phase of an inner-city real estate development process?
    1. When are the first concept designs made?

Concept development

2. What does the concept development process look like from within this initiative phase?
3. To what extent is there any consistency in the number of concept designs that are made?
    1. To what extent would you find it of added value if you could choose from more concept designs?
    2. Why isn't that happening in the current process?
4. What problems/challenges do you encounter during the concept development process?

Evaluation process

Subjective is a term that refers to one's personal opinions of feelings about a particular subject. The word ''objective'' refers to factual, data-based information that has not been informed by bias.

5. How is the choice made between different concept designs?
6. Based on which subjective/objective parameters?
    1. Subjective parameters: To what extent are these parameters assessable, and is that desirable for the concept development process?
    2. Objective parameters: To what extent are the objective parameters assessable, and is this desirable for the concept development process?
7. To what extent is the concept evaluation process structured?
    1. If not → To what extent do you think some form of structure could be of added value? → Why?

Feasibility

8. To what extent is the feasibility of a project tested when you choose a concept design?
9. How do you think you could reduce this uncertainty regarding the feasibility of a project during the concept phase?
10. (If you have this info (on the mentioned parameters) earlier in the process, do you expect it to reduce the uncertainty regarding the feasibility of the project?)
    1. Why isn't this happening currently?

Case project

11. What did the initiative phase of the case project's real estate development process look like?
12. What did the concept development phase within the initiative phase look like?
    1. How did the choice for the final (concept) design come about?
13. To what extent would you describe the concept development process of the case project as normal? (Land-use plan that was not definitive, noise nuisance, etc.)
14. Did you encounter any problems during the concept development?
    1. (If they mention problems) → Did these problems arise before or after a concept design was chosen?
    2. What was the effect of this on the feasibility of the project
    3. Purely reflecting on this process, do you think these problems could have been prevented?
    4. Are these kinds of problems common in other projects?

B-2 Interview #1

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: #1

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

Senior ontwikkelaar, 43 jaar inmiddels. Vanaf 2015 werkzaam bij Dura Vermeer dus een jaar of 7 bijna alweer en eigenlijk altijd wel in ontwikkeling gezeten. Ik ben begonnen bij een wooncorporatie als ontwikkelaar, eerst bij een kleinere, daarna bij een middelgrote corporatie. Dat heb Ik denk ik bij elkaar 12 jaar gedaan toen ben ik hier gekomen. Dat is inmiddels wel binnen 20 jaar ervaring met ontwikkeling vanaf eerste initiatief tot start bouw. Ik heb hts-bouwkunde gedaan en vervolgens een kopstudie een masteropleiding Real Estate Management.

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?

Dat is natuurlijk lastig want elk proces is weer totaal anders, wat je altijd hebt is een locatie of een pand waarmee iets moet gaan gebeuren. Vervolgens ga je dan een plan maken, je hebt verschillende stakeholders die daar een rol in spelen. Verder hangt het er nog van af of je zelf de grond zelf al in bezit hebt of niet? Moet je een bieding doen? Dus ja initiatieffase kan ook gewoon uit van alles bestaan en de vraag is ook van wanneer je hem laat beginnen? Laat je hem beginnen met een stukje grondverwerving dat je eerst een plan maakt met als doel om de grond te kopen of heb je de grond en ga je een plan maken om het verder zelf te ontwikkelen.
De initiatieffase uit de Flow heb ik niet helemaal scherp voor me waar deze volgens de definities eindigt, maar volgens mij eindigt hij met een investeringsbesluit hebt, en dan uiteindelijk is het in 9 van de 10 bij ons wel zo dat de initiatieffase wordt ingezet in een acquisitie dus dat betekent dat je als doel hebt om de grond te verwerven. Je maakt een plan en daarvoor ga ik je ook een IA (investeringsaanvraag) maken omdat je grond wil verwerven en omdat je dus een bieding wil doen op een stuk grond

En is dit het algemene proces wat je nu beschrijft of specifiek voor een bepaalde soort ontwikkeling zoals binnenstedelijke appartementen?

Nee je kan natuurlijk ook voor grondgebonden woningen een bieding doen of een bestaand pand kopen dat kan van alles zijn.

Geldt voor die voorbeelden een ander proces?

Dat in elk proces zitten verschillende stapjes in onze flow ook of is zijn er misschien heel verschillende documenten die je moet maken, verschillende boxers die je moet aftikken. Kijk is er een bestemmingsplan of niet? Dat is natuurlijk een hele belangrijke vraag. Zijn de stedenbouwkundige randvoorwaarden waar je aan moet voldoen? Zijn er gemeentelijke randvoorwaarden waar je aan moet voldoen? Het is nooit zo dat je heel blanco begint, het is altijd zo dat je de eerste stap is dat je heel goed in kaart brengt wat zijn die randvoorwaarden voor deze plek, wat zijn de randvoorwaarden voor de bieding, en binnen dat kader ga je kijken wat dan de mogelijkheden zijn en dan begint je ontwerp en je creatieve proces.

En voor de duidelijkheid, waar speelt dit proces zich af binnen het vastgoedontwikkelingsproces?

In de initiatieffase, maar ook het ontwerpproces is heel erg verschillend. Kijk de ene keer krijg je bijna een kant en klaar plan waar je een bieding op moet doen, de andere keer krijg je een soort blanco sheet waar je alleen een heel grof bestemmingsplan hebt, soms heb je geen eens een bestemmingsplan maar alleen wat uitgangspunten van de gemeente. Dus ja de ene initiatieffase is de andere niet.

<u>Conceptontwikkeling</u>

2. Oké je geeft aan dat het proces heel divers is, maar als je dan een algemeen conceptontwikkelingsproces zou moeten omschrijven, hoe ziet dat er dan globaal uit van het moment dat je voor gaat tekenen, tot het moment dat er een keuze wordt gemaakt?

Dat is niet heel hard omlijnd, kijk je hebt dus je uitgangspunten dus een stuk grond, vervolgens heb je je randvoorwaarden die ga je in kaart brengen en dan begint je ontwerpproces. Dus even afhankelijk van of het een blanco sheet is of al heel erg ingekleurd, stel dat het een beetje In het midden zit; je hebt wat uitgangspunten van de gemeente en soms een bestemmingsplan. Nou als we bijvoorbeeld de locatie van het case project pakken dan heeft de gemeente gewoon een stedenbouwkundig plan meegegeven en referentiebeelden en dan ga je er zelf over nadenken van wat vinden we ervan? Vinden dat we binnen deze kaders een goed plan kunnen maken? Dan haak je vaak een ontwerper aan en/of intern gaan we ideeën maken, dat is dan die Design Studio (de conceptontwikkelaars) oké vinden we nou een stedenbouwkundige opzet en de volume opbouw goed? Die gaan dan een analyse opmaken, vaak heb je best wat andere inzichten nog dan de gemeente heeft en denkt je van nou het kan beter, dus dan maakt ie een paar modelletjes waar je ook volumes in kan tellen, woningen in kan tellen en dan ga je kijken van nou oké, spreekt dit ons aan? Vinden we dit beter? Past dit binnen de randvoorwaarden? Zo niet, vinden we het risico acceptabel dat we hier toch mee doorgaan en dan ga je eerst een berekening maken over het aantal woningen wat hier ongeveer uit komt, gaat het een beetje een dekkende casus opleveren? Nou meestal is dat natuurlijk niet in één keer raak, dus dan zeg je van nou het moet nog een beetje bijgesteld worden en dan ga je nog een keer zo'n sessie in. Dat herhaalt zich een paar keer totdat je op een gegeven moment denkt van nou ja dit is wel een plan en een opzet waarvan je denkt dit kan wel wat worden. Dan heb je, of al een architect of stedenbouwkundige aangehaakt die die meedoet met onze Design Studio (ID), of je doet eerst dit proces en dan zeg je tegen een architect; dit zijn onze uitgangspunten, kan je dit architectonisch een slag verder brengen? en dan krijg je zo'n zelfde rondje, dan gaat de architect er naar kijken, die gaat wat ontwerpen en dan zeg je met zijn allen weer van nou, rekenen, kijken, dit kan beter of anders, totdat je iets hebt waarvan je denkt; Dit is het, het is voldoende, hier gaan we de berekening op afmaken,

misschien dat er wat adviseurs ingeschakeld worden om een paar controles te doen, bijvoorbeeld op bouwbesluit, of op weet ik veel wat, parkeren of nou ja daar kan van alles zijn, verschillende elementen die je onderzocht wil hebben. Daarna heb je je fase afgerond en dan ga je de investeringsaanvraag verder afmaken en indienen.
Je hebt het over die die adviseurs die erbij betrekt, waar in het conceptontwikkelingsproces schakel je die in?

Dat is ook heel erg afhankelijk van wat je randvoorwaarden zijn, kijk op basis van je ervaring weet je of op basis van wat er in de randvoorwaarden staat weet je wat kritisch is op een bepaalde locatie, of hier hebben we niet zo'n goed gevoel bij, klopt het wel? Misschien vraagt de gemeente juist een heel uitdagend energieconcept, nou dan vraag je zo'n adviseur erbij dus ook dat is niet van tevoren heel duidelijk aan te geven van zo doen we dat altijd. De ene keer betrek je helemaal geen adviseurs erbij en de andere keer heb je er toch nog een paar nodig die meekijken

Gebeurd het dan ook wel eens dat dan achteraf blijkt dat je iets over het hoofd hebt gezien?

Ja natuurlijk

Hoe zou je dat kunnen voorkomen denk je?

Ja je doet er natuurlijk alles aan om niks over het hoofd te zien, enerzijds is dat je ervaring en anderzijds zijn er ook bepaalde checklists die je hebt. De Flow die bepaalt natuurlijk bepaalde kritische zaken die je moet afwerken, dus ja in dat opzicht heb je als bedrijf natuurlijk wel een bepaald lerend vermogen wat je in die documenten (Flow) probeert terug te laten komen, zodat je niet twee keer dezelfde fout maakt. Daarom is er ook het meerdere ogen principe: Je gaat ermee naar Utrecht (Design Studio) die kijken mee, dus ja daar probeer je zoveel mogelijk dingen te voorkomen.

Zou je verder kunnen toelichten wat er dan op zo'n moment in Utrecht (Design Studio) wordt gedaan, worden er bijvoorbeeld ook al geluid studies gedaan daar?

Geluidstudies doen ze in Utrecht niet, die kijken alleen vanuit de markt en vanuit stedenbouw mee. Uiteraard als dat bij een divisiedirecteur komt of iemand anders die in een brainstormsessie zit bij Utrecht, die hebben ook hele brede ervaring dus die kunnen ook dingen roepen van; houd met deze locatie vooral rekening met dit of dat

In hoeverre is het wenselijk en van toegevoegde waarde om een stukje objectieve toetsing al eerder in het conceptontwerpproces plaats te laten vinden, bijvoorbeeld bij de Design Studio?

Ja de vraag is of dat hun rol is, kijk hun rol is natuurlijk vooral meer een stukje creativiteit en stedenbouwkundig inzicht meebrengen. De zaken zoals geluid die jij nu noemt, die moet je meer als ontwikkelaar in de gaten houden, waar je verantwoordelijk voor bent en dat doe je gewoon ook in datzelfde proces dus op het moment dat je gaat ontwerpen en die randvoorwaarden in beeld hebt gebracht dan rolt automatisch de stap ook uit van wat zijn nou risico punten en wat zijn nog te onderzoeken zaken. Het ligt niet zozeer bij de Design Studio.

Oké, en als ontwikkelaar, waar in het ontwerpproces ga je zulk soort objectieve zaken als geluid dan onderzoeken? Doe je dat bijvoorbeeld nadat er een ontwerp uit is gekomen bij de Design Studio, tijdens of daarna?

Nou dat gaat een beetje parallel hè, dus wat ik zei je brengt je randvoorwaarden in beeld en dan weet je ongeveer wat je beperkingen zijn. En als je gaat ontwerpen neem je dat mee in je achterhoofd of je zegt van nou ja dit is het uitgangspunt, maar we moeten dit nog onderzoeken

bijvoorbeeld. Of juist tijdens de eerste ontwerpstudies van de Design Studio kom je erachter van hè oké als dit het gaat worden dan moeten we dat nog onderzoeken.
Het is niet zo'n heel dichtgetimmerd proces, het is meer dat je de flow hebt als ondersteuning en de checklists om te kijken of we alles een beetje in beeld hebben ja of nee.

Nee oké duidelijk, misschien moet ik hem iets anders verwoorden dan. Als het goed begrijp zeg je: Het is een beetje een afwisselend proces dus je hebt concert dan denk je ook daar moeten we wel beter naar kijken dan ga je dat onderzoeken.
Stel nou dat je een mogelijkheid hebt om direct een schatting te krijgen van de objectieve parameters die je wilt onderzoeken tijdens dit conceptontwerpproces, in hoeverre denk je dat dat van toegevoegde waarde zou kunnen zijn, ongeacht of dat bij de ontwikkelaar licht of bij de Design Studio.

Zeker!

Waarom gebeurt dat nu niet?

Uhm ja waarom gebeurt dat nu niet… Ja daar is bepaalde software voor nodig waarin je zulk soort analyses ook kan doen. Nu ontwerpen ze in de Design Studio met Sketchup, dat is volgens mij een redelijk eenzijdig programma dat vooral goed is in het ontwerpen. Als je meerdere dingen tegelijk wil meenemen, dan moet je ook wel de software hebben die dat kan. En je moet dan enorm wil gaan invoeren denk ik, maar goed daar ken ik de software niet genoeg voor. Kijk het bestemmingsplan zou je misschien willen koppelen ik weet niet of dat kan, maar het bestemmingsplan bestaat niet alleen uit een plankaart, die bestaat ook uit een regelboek van honderden pagina's waar een stukje interpretatie in zit. Ik weet dat die ontwikkelingen snel gaan maar ik heb geen idee hoe je zo'n bestemmingsplan in de software krijgt. Geluid bijvoorbeeld is ook een heel subjectief thema waarbij je hele geluidsmodellen hebt waarbij geluidsadviseurs soms dagen aan het rekenen zijn. Ja, het zou super zijn als dat allemaal in een model zit, maar ik vraag me wel af hoe je het dan hoe zo'n model dan geladen wordt en of je dat als bedrijf allemaal in huis kan halen.

3. In hoeverre is er enige consistentie in het aantal concept ontwerpen dat wordt gemaakt?

Nee daar zit geen consistentie in, je jij gaat ontwerpen tot dat je iets hebt waarvan je denkt; Dit is het. De ene keer is dat na één slag al en de andere keer heb je daar 4 5 slagen voor nodig

3,1. In hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?

Ja ik denk zeker dat dat van toegevoegde waarde zou kunnen zijn

3,2. Waarom gebeurt dat nu niet?

Ja dat is weer een beetje hetzelfde verhaal als net he, we hebben die software niet tot onze beschikking. Sketchup is een eenzijdig iets, er is één iemand die zit aan de knop en maakt iets, en het is niet zo dat je met algoritmes meerdere ontwerpen uit komen. Er zit heel erg een menselijke factor in want de ontwerper bepaalt zelf in grote mate wat er nu uitkomt.

4. Zijn er standaard problemen/uitdagingen waar je in het huidige conceptontwerpproces tegenaan loopt?

Uhm nou, waar je nu wel tegen aan loopt he... hoe meer out of the box ideeën je hebt hoe beter het is. Soms zit je wel gewoon vast in een bepaald stramien of doordat je de randvoorwaarden van de gemeente gelezen hebt zit je al in een bepaald denkkader. Ik heb wel het idee dat wanneer je iets met parametrisch ontwerpen kan doen dat je een beetje out

of the box wordt geduwd. Dat er gewoon ontwerpen worden gemaakt, worden gegenereerd waar je misschien zelf niet zo snel aan gedacht had maar die wel hoog hadden kunnen scoren. In die zin loop je altijd wel tegen de beperkingen aan in zo'n ontwerptraject met de ontwerpers met wie je zit. Nou hebben wij toevallig hele goede conceptontwerpers, maar je bent wel heel afhankelijk van wie er aan je bureau staat en plannen voor je gaat maken. Samengevat, de kwaliteit van de ontwerper is wel heel belangrijk en maakt je heel kwetsbaar als bedrijf. Of juist heel goed, het is ook de kunst om het juiste team samen te stellen.
En daarnaast gaat het wegen van data nu heel langzaam, dat zou wel veel efficiënter kunnen. Ik denk dat er wel behoefte is aan een systeem waarin je je modellen veel makkelijker... soort van kan wegen op basis van data die het systeem zelf genereerd, en met elkaar kan vergelijken, in plaats van dat je zelf aan het rommelen en rekenen bent en vergelijkingen aan het maken bent.

Evaluatieproces

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.

Het woord "objectief" verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen (subjectief/ objectief)? Je gaf net al aan dat het maken van keuzes best wel een subjectief proces is.

Nou kijk, subjectief is hoe je ontwerpt. Omdat het een creatief proces is daarmee bij voorbaat heel subjectief zou je zeggen, maar hoe de beoordeling plaatsvindt is natuurlijk alweer iets minder subjectief ja ook daarin speelt smaak natuurlijk een grote, maar je gaat ook rekenen en op een gegeven moment uit dat rekenmodel, uit je harde analyse van waar zitten de risico's volgt natuurlijk wel een bepaalde waarde van oké, als we deze conceptontwerpen met elkaar vergelijken los van mooi of lelijk of smaak of voorkeur scoor het ene ontwerp beter op grondwaarden bijvoorbeeld en het andere veel minder. Als je een bieding moet doen is dat natuurlijk een hele belangrijke factor dus dan kan een heel lelijk plan wat wel super hoge grondwaarde genereert terwijl je toetsingscriteria vanuit de gemeente zijn alleen maar grondwaarden, ja dan is de keuze zeg maar op basis van objectiviteit snel gemaakt.

6,1. Die subjectieve toetsingscriteria, in hoeverre denk je dat die toetsbaar zijn en in hoeverre is dat überhaupt wenselijk?

Nou dat zit vaak ook al in de randvoorwaarden, kijk als een gemeente randvoorwaarden meegeeft dan beschrijven ze ook vaak referentie plannen een bepaalde beeldkwaliteit die kan je toch omschrijven in objectieve termen dus iets moet zwarte dakpannen hebben, iets moet robuust stedelijke uitstraling hebben, ik noem maar ff wat. Dat soort dingen kun je heel duidelijk toetsen dat zijn heel duidelijk beeldkwaliteitseisen.

En die subjectieve zaken zoals bijvoorbeeld gevoel, in hoeverre is het wenselijk om zulk soort parameters te toetsen?

Ja gevoel kan je natuurlijk moeilijk meetbaar maken. Kijk wanneer de gemeente een locatie tot de markt zet waar meerdere partijen op inschrijven dan probeert de gemeente die subjectiviteit er ook zoveel mogelijk uit te halen want door die subjectiviteit ontstaat er alleen maar discussie natuurlijk omdat het zo moeilijk meetbaar is. Dus de gemeente zal ook altijd zeggen oké of ik toets alleen op prijs, dat is het meest makkelijk dat is gewoon een getal, of ze toetsen op kwaliteit en dat is al een stuk moeilijker om te toetsen. Dat gaat er dan over in hoeverre je voldoet aan het beeldkwaliteitsplan bijvoorbeeld en dat gaat vaak op basis van

ervaring. En kwaliteit wordt dan vaak weer gemeten in duurzaamheid, maar goed dan ga je ook altijd weer naar bepaalde scores toe.
Die subjectiviteit wordt er altijd wel zoveel mogelijk uit gehaald. Maar goed dan nog heb je natuurlijk op een gegeven moment een plan of een ontwerp en ja dat spreekt mensen aan of niet en dan heb je ook wel eens ook al kunnen twee plannen compleet aan het beeldkwaliteitsplan voldoen, toch kan het ene plan mooier zijn dan het andere plan natuurlijk. En ja dat kan je niet vangen

6,2. Je noemt zojuist dat er bij kwaliteit naar objectieve parameters wordt gekeken, zou je kunnen beschrijven wat over het algemeen belangrijke objectieve parameters zijn voor de toetsing van binnenstedelijke conceptontwikkeling?

Uhm welke parameters voor kwaliteit belangrijk zijn... nou wat ik net zei over duurzaamheid, dat is natuurlijk ook een opkomend thema die wordt steeds belangrijker dus dan in hoeverre je plan hoge duurzaamheidsscore heeft. Dat kan BENG zijn, circulair, RPG-scores zijn belangrijk, natuurinclusiviteit. Dat is in hoeverre je ook nestkasten maakt voor bepaalde diersoorten waardoor je ook echt soorten aantrekt, maar goed dat is wat moeilijker te meten dan moet je echt de bewijslasten aanleveren
Wijzelf sturen meer op BVO's en GO's, maar dat is niet echt kwaliteit dat zijn meer harde randvoorwaarden, je programmatische uitgangspunten. Dus de gemeente kan zeggen, het moeten zoveel appartementen worden van ongeveer die grote of in huur- of koopsegment. Dan rolt er indirect wel vaak een oppervlakte uit.

Oké, misschien moet ik de vraag nog anders verwoorden, zou je iets kunnen toelichten over de parameters die belangrijk zijn voor de haalbaarheid van je project?

Ja oké precies, om dat goed te kunnen berekenen heb je inderdaad BVO's en GO's nodig, en dan de verhouding daartussen.

7. In hoeverre is het conceptevaluatie proces gestructureerd? Maak je nu gebruik van een soort evaluatieoverzicht in het conceptontwerpproces?

Nee want heel veel vertaalt zich dus in de grondwaarde, dus je gaat gegevens invoeren, als je een grondwaardeberekening maakt een BEO. Hoeveel woningen zijn het, hoeveel BVO's, hoeveel GO's. Vooral die GO's zijn altijd lastig in een conceptfase want dan weet je natuurlijk nog niet precies hoe de ontsluitingen precies worden. De ontsluitingsprincipes kan je nog wel redelijk in de conceptfase doen, maar dan nog is het lastig in te schatten of je trappenhuizen brandveilig zijn op de manier hoe je ze nu intekent, hoeveel verlies je aan algemene ruimtes daardoor, hoe dik worden je wanden. Al dat soort zaken bepalen uiteindelijk hoe je GO/BVO verhouding wordt. Maar goed op basis van je ervaring en de BVO's die uit het concept ontwerp komen kan je wel een inschatting maken hoe je GO's er dan uit komen. Je GO's leveren uiteindelijk geld op, die ga je inschatten op basis van marktadvies, en dan rolt er een grondprijs uit en ga je het ene plan met het andere plan vergelijken

Haalbaarheid

8. In hoeverre wordt de haalbaarheid van een conceptontwerp getoetst op het moment dat je een concept ontwerp kiest?

Ja dat doe je zelf dus met die BVO's

9. Misschien val ik ondertussen een beetje in herhaling, het is al enigszins ter sprake gekomen maar ik wil deze vraag toch nog graag een keer stellen: Hoe zou je de onzekerheid met

betrekking tot de haalbaarheid van het project kunnen verminderen tijdens die conceptontwikkelingsfase?

Ja hoe meer data checks hoe beter dan he, zou ik zeggen.

10. Als je deze info, deze checks die je noemt eerder hebt, in hoeverre verwacht je dat dit de onzekerheid met betrekking tot de haalbaarheid van het project verminderd?

Ja het is niet dat dit alle onzekerheid wegneemt, maar ik denk wel dat het zou helpen

Case project

Oké dankjewel, dat waren de algemene vragen. Dan heb ik nu nog wat vragen specifiek voor het case project. Ja je hebt net volgens mij de initiatieffase van het vastgoedontwikkelingsproces al beschreven aan de hand van dat project.

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit? Zou je dat toch nog kort toe kunnen lichten, met de partijen, hoe dat proces eruitzag?

Eerst was het alleen Dudok, die heeft toen de locatie aangekocht (het bestaande monument). Die wilde eerst het monument zelf ontwikkelen, dus een deel van het monument slopen... of eigenlijk ja heel technisch gezien bestaat het bestaande gebouw uit een monumentaal deel en een niet monumentaal deel, dus ze wilde het niet monumentale deel slopen, daarvoor hadden ze het pand aangekocht om daar nieuwbouw te plaatsen. Toen zei de gemeente; kijken jullie ook mee met de naastliggende braakliggende locatie dat het in één keer ontwikkeld kan worden, toen hebben ze een stedenbouwkundig bureau/architect gevraagd om daar verschillende concept studies voor te maken. Dat lag niet helemaal in lijn met wat de gemeente in gedachte had, en toen is Dura Vermeer erbij gekomen om zo tot een sterker concept ontwerp te komen. Dura Vermeer was namelijk inmiddels al aangehaakt als bouwer voor het monumentale pand. Op het moment dat we werden gevraagd als mede ontwikkelaar hebben we ons ingekocht in het pand, en zijn we samen opnieuw gaan kijken naar het plot. Inmiddels had de gemeente ook stedenbouwkundige randvoorwaarden opgesteld, die wilde ook wat meer het stuur in eigen handen hebben. Toen zijn wij (Dura Vermeer) met Dudok, middels onze eigen ontwerp studio (Design Studio) verschillende concept ontwerpen gaan maken. Nou die heb je ook gezien, uiteindelijk hebben we daar een ontwerp van gekozen en hebben we die in een uitvraag gedaan, in een boekje als het ware, in combinatie met de randvoorwaarden van de gemeente en daar hebben we 3 architecten voor benaderd. Die 3 architecten die zijn ook weer teruggekomen met in totaal 3 verschillende benaderingen van de opgave en daar was er één van waarvan we zeiden van nou ja die heeft het meest aansprekende ontwerp. Toen zijn we met die partij verdergegaan.

Oké en je zegt die partij had het meest aansprekende ontwerp, in hoeverre worden deze concept ontwerpen getoetst, wat voor toetsingscriteria heb je dan behandeld?

Ik kan het misschien nog wel even voor je nazoeken, maar toen hebben we ook echt punten verdeeld voor stedenbouw volgens mij, voor architectuur, en nog wat waarover we die architecten gingen beoordelen. Die was nog steeds redelijk subjectief moet ik zeggen, maar goed uiteindelijk is dat wel gebruikt om gewoon het beste plan te kiezen. Maar het grappige van dat soort processen is altijd wel op het moment dat in de presentaties hebt gehad, in dit geval 3, en je hebt plannen hebt, je dan gewoon weet van dat plan steekt er met kop en schouders bovenuit en is de winnaar. Ja en ga je beoordelen en degene die je het meeste aanspreek geef je de hoogste punten.

13. Over de hele breedte gezien van binnenstedelijke vastgoedontwikkeling, in hoeverre is het case project dan een normaal project?

Nou opzicht zijn we heel veel tegen gekomen bij het case project, maar ja dat heb je altijd wel bij binnenstedelijke gebiedsontwikkeling. Dus nee het is niet heel uitzonderlijk ofzo, zeker niet.

14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?

Uhm ja... een voorbeeld is dat we vlak bij een leiding zaten van stadsverwarming, en langs een waterkering in de vorm van een dijk. Dat zijn zaken die waren van tevoren niet goed in beeld. Bij stadsverwarming is het altijd nog maar de vraag hoe dicht mag je erop bouwen, dan moet je met zo'n instantie in overleg. Met het waterschap hebben we ook enorm veel discussies gehad omdat het strikt gezien helemaal niet mocht. Maar dan kan je een maatwerkoplossing maken en kom je er achter wat wel en niet kan. Kijk in dat opzicht is het ook weer een utopie, als je het echt keihard allemaal in zou voeren die data, dan komt er gewoon uit nee het kan niet. Maar op het moment dat je gaat praten kan wel weer veel, dat is tegelijkertijd ook weer het manco van hele objectieve benaderingen, die kunnen dingen uitsluiten waar in de praktijk toch wel weer mogelijkheden voor zijn.

Hoe zou je het gebruik van die objectieve data dan voor je zien?

Ja als inspiratiebron, als idee, maar niet zozeer leidend.

Ik heb een documentatiestudie uitgevoerd over dit project en daarbij kwam ik tot de ontdekking dat de geluidshinder in het gebied nog wel voor enige problemen heeft gezorgd. In hoeverre herken je dit en zou je dit kunnen toelichten?

Ja kijk geluid is sowieso hele complexe materie. Het is ingewikkeld omdat je met verschillende frequenties te maken hebt. Je hebt de bron, de geluidsveroorzaker, en hoe verder je daarvan af bent, hoe meer het geluid af neemt. Maar goed je kan ook rondom de bron maatregelen nemen. Eén van de bronnen is bijvoorbeeld een auto die over een weg rijdt, die veroorzaakt geluid. Hoe hard die autorijdt is heel erg bepalend voor je geluidsbelasting, zo ook het asfalt of de klinkers waar de auto over rijdt. Nou dat zijn al twee sturingsmiddelen waarmee je de geluidshinder zou kunnen verminderen. Je kan ook schermen plaatsen, maar goed in ons geval van het case project heb je wettelijk geluid, dat is bijvoorbeeld autolawaai en industrie, maar bij het case project hadden we een heel nieuw soort geluid: nest geluid. Dat is het geluid van schepen die aangemeerd liggen in de haven die veroorzaken een soort brom van de generatoren. Alleen dat geluid is niet opgenomen in het wettelijk geluid, daar is een uitspraak geweest van de rechter; die heeft gezegd dit valt niet binnen het wettelijk geluidsspectrum, maar er moet wel rekening mee gehouden worden met woningbouw of iets dergelijks, ik heb dat ook niet heel scherp voor me. In ieder geval was het voor ons een probleem, maar het was meer een politieke discussie omdat de gemeente ook kan zeggen; oké we gaan het bij de bron aanpakken. Maar dat betekent dat je effect hebt op het aantal schepen wat bijvoorbeeld in de haven mag liggen, of hoe lang ze mogen liggen, en dat wilde dat Havenbedrijf Rotterdam natuurlijk niet. Dus daar speelt zich politieke discussie af tussen gemeente en Havenbedrijf, maar tegelijkertijd heb je er op je projecten wel mee te maken, nou ga je dan meenemen of niet en in hoeverre ga je het meenemen? Zijn er weer verschillende wettelijke regelingen, ga je het in de ouderwetse omgevingswet meenemen of ga je anticiperen op de nieuwe wet en vervolgens wat voor belasting heeft het nou echt? Dan ga je bekijken van welke frequentie heeft het nou daadwerkelijk, nou blijkt het zo te zijn dat nest geluid bijvoorbeeld een lage frequentie heeft, dus dat betekent dat je het probleem eigenlijk alleen maar goed op kan lossen met massa, dus dat je echt stevige kozijnen en dik glas en dat soort zaken implementeren.
Nou kortom er zit een hele wereld achter die je ook niet zomaar even met wat bestaande data kan invoeren en je weet wat eruit komt zeg maar. Dat dat echt complexe zaken, we hadden de grootste geluidsexpert uit de markt, plus de belangrijkste experts bij de gemeente en DCMR

die zich over deze kwestie gebogen hebben en zelfs verschillende overleggen nodig hadden van oké waar gaan we nou precies mee rekenen en welke uitgangspunten houden we aan voor de berekeningen?

14,1. Wanneer zijn jullie ongeveer begonnen met die geluidsstudies, ten opzichte van het moment dat de daadwerkelijke keuze is gemaakt voor het winnende conceptontwerp.

Nou kijk die geluidsbelasting was altijd al wel een feit, dat wisten we al uit het stedenbouwkundig plan, dus daar hebben we in de stedenbouwkundige opzet ook al rekening mee gehouden dat je bijvoorbeeld langs de weg zoveel mogelijk blokken maakt die het geluid voor de achterliggende blokken tegenhouden en dat je zoveel mogelijk woningen maakt die enerzijds aan de kant van de weg zitten maar die ook nog een gevel aan de luwe zijde hebben. Dat doe je op basis van ervaring en op basis van de randvoorwaarden die je in het rapport ziet van de gemeente. Er is een geluidsbelasting op deze locatie van je wegverkeer en dan weet je van oh dan moeten we het zo ontwerpen dat je eigenlijk al binnen je plan een soort geluidsbuffer opneemt.

En in hoeverre zou je het zou het van toevoegen waarde vinden wanneer je op dat punt, tijdens je conceptontwerpproces al meer objectieve informatie zou hebben daarover?

Ja dat zou wel van toegevoegde waarde zijn geweest. Je hebt dat soort informatie ook vaak wel al deels in je bestemmingsplan

14. Dan had ik nog een vraag over de molenbiotoop, in de documentatiestudie kwam naar voren dat dat ook nog wel voor problemen heeft gezorgd. In hoeverre herken je dat en kun je daar iets over toelichten?

Ja klopt, maar dat is er wel eentje die bijvoorbeeld makkelijker kan vangen. Je hebt verschillende ringen met een maximale bouwhoogte binnen een straal van de molen. De goede bron is eigenlijk het bestemmingsplan, alleen de gemeente had in haar randvoorwaarden opgenomen dat je dus bepaalde cirkels hebt en binnen die cirkel mag je tot zoveel meter bouwen. Dus wij hadden die hoogtes gewoon overgenomen en waren daar mee aan het ontwerpen gegaan. Toen kwamen we erachter dat in bestemmingsplan staat dat het geen 25m ten opzichte van het maaiveld, maar 25 m ten opzichte van NAP en we liggen daar 3 m onder NAP, dus dat betekent als je met 25 meter rekent, je met 3 meter eigenlijk gewoon een bouwlaag misrekend. Daar kwamen we heel laat achter, dat is eigenlijk het grootste probleem geweest bij het case project.
Als je die data ingevoerd had dan had je er wel achter gekomen, alleen als je dan weer de uitgangspunten van de gemeente gebruikt, waarvan je normaal zou zeggen daar mag je op vertrouwen. Maar goed kijk zo'n Nota van Uitgangspunten is meer een samenvatting van wat de gemeente allemaal belangrijk vindt, een bestemmingsplan is een juridisch keihard stuk.

B-3 Interview #2

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: #2

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

Zou je je eerst even voor kunnen stellen?

Mijn titel is senior ontwikkelmanager, 51 jaar. Ik werk 23 jaar bij dura Vermeer hou me bezig met vastgoedontwikkeling en dan met name In de hele initiatieffase van projecten. Dus dat betekent de dealmaking met corporaties, gemeentes, beleggers, het aankopen van gronden of panden en daarnaast mag ik voor het bedrijf een aantal grotere gebiedsontwikkelingen doen waarvoor wij ontwikkelen combinaties oprichten en waar ik dan de dagelijks bestuurder van de ontwikkelcombinatie mag zijn. Opleidingsniveau HBO +, 21 jaar relevante werkervaring binnen projectontwikkeling

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?

Het begint vaak met een locatie, je kan op heel veel verschillende manieren tot een locatie komen. Dat kan dat kan al simpelweg zijn door ergens rond te rijden en iets te zien en dat je denkt van wat gebeurt er op deze plek of wat zou er op deze plek anders kunnen hè Dat is dan eigenlijk vanuit de eigen intrinsieke motivatie dat je op zoek gaat naar, maar met name is het dat het aangeboden wordt. Dat is vanuit het netwerk, wordt er aangeboden door verschillende soorten makelaars. Zo kunnen initiatieven ontstaan, of omdat partijen elkaar opzoeken. Een partij kan bijvoorbeeld een positie krijgen, maar deze is dusdanig groot dat die partij de ontwikkeling graag samen met een andere partij doet. Dus ja daar zijn echt verschillende wegen die in dit geval naar een initiatief leiden.
Een initiatief nemen we dan mee hier in dit huis, iemand brengt dat mee In het kansen overleg. Het kansen overleg is en het overleg waar wij iedere week onze nieuwe leads bespreken en dat kan zijn dus zoals ik net zei tot aan prijsvragen, tenders die binnenkomen of die we zien een aanbestedingsplatform, die bespreken we en die bespreken wij hoe ja hoe kansrijk is die? Past de ontwikkelingsmogelijkheid bij ons en hoe kansrijk is die. Past die bij ons dat gaat dan echt om het product, de plek, de opdrachtgever, mogelijk wij zelf, hoeveel moet er geïnvesteerd worden? Wat is de tijdshorizon? Want wij hebben het liefste iets waar we ons

geld insteken wat tussen de 3 en de 5 jaar er eigenlijk wel weer uit moet zijn, maar we kijken ook wel eens ook die grens van 5 jaar heen maar liever houden we dat zo kort mogelijk. Dan kijken we met name nog naar capaciteit en dat is dan capaciteit in enerzijds wellicht het maken van de aanbieding hè, tot aan hebben we ook straks capaciteit in betreffende waardenstroom om het project voor te bereiden en te realiseren.

Hoe wordt er tijdens het kansenoverleg bepaald of een project interessant is, de moeite waard is om uit te gaan werken?

We hebben geen vinkjes lijst. Dus wij zitten met een aantal mensen bij elkaar die dit vak uitoefenen, dan heb ik het over directie en een aantal ontwikkelmanagers. Dan gaat het met name over de kennis van het gebied, over de kennis van het product, de aansluiting met de waardenstroom. Iemand heeft natuurlijk wel de kans al opgepakt en daar een korte analyse over gemaakt, over een aantal zaken en daar gaan we dan op sturen en vaak is het ook keuzes maken want er komen iedere week zo tussen de 10 en de 15 kansen voorbij en die kun je nooit allemaal doen.

Wat neem je dan mee naar zo'n kansenoverleg? Wat is de status van het voorstel voor zover dat er is?

Ja meestal hebben we al wel in ordergrote wat we op die grondpositie kwijt neer kunnen zetten, we moeten natuurlijk wel de potentie al zien en het moet ook wel bij ons passen. Als het een kans is van 10 woningen, dan weet je al van joh daar zijn we het bedrijf niet voor. Het zit in het volume, het zit In het product, het zit in hoeveel voorbereiding heeft het nodig, hoeveel investeringen heeft het nodig, wanneer komt het tot wasdom hè dus wanneer zou het mogelijk in voorbereiding en in uitvoering komen, wat is het verkooprisico wat erop zit, en ja zo kun je ja eigenlijk een hele hoop van die zaken uit gaan splitsen en niet op alles is altijd een antwoord hè. Met name de kans van slagen met tenders en prijsvragen is van belang, hoeveel partijen doen er mee, wie zijn onze concurrenten

<u>Conceptontwikkeling</u>

2. Hoe ziet het conceptontwerpproces van binnen deze initiatieffase eruit?

Dat is helemaal afhankelijk natuurlijk van de uitvraag. Kijk op het moment dat er een pand moet worden aangekocht, ja dan moeten we ze wel gaan kijken van ja hoe gaan we die herontwikkeling hè, dus die gaat echt en daar komt daar komt iets nieuws op. Kijk je moet natuurlijk altijd weten hoe je het gebied kan laden en wat daar natuurlijk ook belangrijk bij is, is wat is de visie van de gemeente, wat is de status van het bestemmingsplan of in ieder geval wat de huidige bestemming laat ik het zo zeggen daarboven komt weer wat zijn de provinciale visies op gebieden dus die zijn ook allemaal van invloed van is het een kansrijke positie, en zo ja is het een kansrijke positie waarmee, met welk product, omdat dat ook vaak gedefinieerd wordt omdat men natuurlijk leefbare wijken wil en diversiteit. Dus verschillende producten voor verschillende doelgroepen die maken hoe je gebied kan laden
Waar we dan maar gaan kijken is en dat doen we in samenspraak met onze ID afdeling want die kunnen enerzijds kunnen die massa's intekenen in gebieden, maar anderzijds hebben we daar onze analisten die samen met ons gaan kijken, of die in ieder geval een voorzet maken of een advies geven over; nou dit is de plek, dit zijn de voorzieningen daar in de buurt, wij denken dat in deze plek een aantal doelgroepen zich zouden willen gaan vestigen en dat kunnen we dan bijvoorbeeld jonge gezinnen met kinderen zijn of een combinatie van gezinnen met doorstromers, wat ouderen of empty nest-ers. Daar hoort weer een bepaald product bij; grondgebonden, twee onder een kap, appartementen, stadsappartementen, stadswoningen, nou daar komt iets uit en met die wetenschap ga je dan weer proberen te kijken van en hoe zou je dan het gebied het beste op die volumes in kunnen vullen. Met daar dan ook natuurlijk

de randvoorwaarden vanuit gemeentelijk of provinciaal beleid wat erop is hè dus dat moet bijvoorbeeld 30% sociale woningen in zitten er moet 40% middelhuur in zitten en 30% duurder nou dan weet je oké nou en welke doelgroepen horen daar dan bij, welke producten horen daar dan bij en zo ga je hem dan invullen.

(5) Hoe bepaal je dan in hoeverre een kans of plan succesvol of juist niet?

Dat doe je op basis van aantallen en verdeling binnen het kavel kijk en dat is binnenstedelijk weer heel anders dan wanneer je de weilanden pakt. Ja dat heeft met een aantal parameters dan te maken. Kijk bij die doelgroepen horen producten, en bij die producten horen weer vierkante meters. Die doelgroep heeft enerzijds behoefte aan een bepaald aantal vierkante meters, en ze kunnen ze betalen. Wij zijn van twee dingen afhankelijk dat zijn BVO's die maken we, en GBO 's die verkopen we. De verhouding BVO/GBO, maakt niet uit voor welke ontwikkeling, die moet altijd zo gunstig mogelijk zijn en de GBO's ja die komen eigenlijk gewoon voort uit de portemonnee en de doelgroep dus dat zijn eigenlijk een soort ja vaste gegevens. Het gaat er dan nog niet eens zozeer uit of iets mooi is of niet mooi is. Ga je het gebied weer invullen en dat is dan puur om te kijken van hoeveel woningen erop kunnen, er zijn een aantal parameters belangrijk maar die komen ook veelal voort uit kavelpaspoort of anderzijds voorgeschreven vanuit de gemeente waarin je dus zoveel procent water terug moet brengen en je wil aan de andere kant tegengaan van hittestress, natuur inclusiviteit, er moet voldoende groen in zitten en zo ga je naar een naar een optimum kijken van hoe kan ik zo min mogelijk openbare ruimte aanleggen en hoe kan ik zoveel mogelijk vierkante meters uitgeven passend ook weer bij wat wij uit de doelgroep analyse hebben gehaald.

3. In hoeverre is er enige consistentie in het aantal concept ontwerpen dat wordt gemaakt?

Nee dat weet je bij ontwerpers eigenlijk nooit dus dat moet je dan echt gewoon zelf sturen als ontwikkelaar. Als je ontwerpers de vrijheid geeft, daar zijn het ook ontwerpers voor gelukkig, dan kunnen ze helemaal losgaan en dan kunnen ze er 5 voor je maken, misschien 10, misschien 15 maar je moet daar gewoon zelf ook gericht in sturen en duidelijk aangeven wat jij wil als ontwikkelaar. En met name ook belangrijk om aan te geven in welke fase je zit, dus wil je alleen maar kijken of iets haalbaar is en of het zinvol of zinloos is om deze casus niet verder te onderzoeken dan moet je echt even beperken tot weinig onderzoek daarin ja wat is grosso modo, kunnen we daar 200 woningen, 250 woningen kwijt, of 300 woningen? Dan gaat het niet meer om de laatste woning. Ben je twee stappen verder, dan wil je eigenlijk meer specifiek gaan weten van oké we hebben er zoveel want die doelgroep, we hebben straks zoveel woningen hè want dan moeten we bijvoorbeeld echt een bieding gaan doen op die grond dus dan moeten we wel veel specifieker weten of het 190, 200 of 210 zijn.

3,1. In hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?

Hoe verder we in de lead komen en ook hoe verder we in de prijsvraag komen dan wordt het natuurlijk wel van belang met name als er getoetst wordt ook door de opdrachtgever of anderzijds de partijen die jouw tender gaan beoordelen dat we met allerlei eisen die vooraf zijn gesteld of die wij onszelf stellen op het moment dat het mijn eigen ontwikkeling is, dat het ook allemaal klopt. Bijvoorbeeld je wil zoveel mogelijk uitgeefbare grond, tuinen, tuinen op ja gunstige ligging hebben omdat je daar; a: meer voor kan vragen, en b; omdat het ook prettiger is voor je bewoners. Daarnaast wil je zo min mogelijk verkeer bijvoorbeeld langs je huis hebben of zo min mogelijk openbaar/verhard gebied aanleggen. Je wil zo veel mogelijk gebruik maken van zicht, ja zo kun je heel veel dingen verzinnen die je graag in een verkaveling terug zou willen zien, of in een stedenbouwkundig ontwerp. Wat voor jou het gevoel geeft van; joh dit is commercieel voor mijn doelgroep gewoon de beste oplossing.
Dus als je een aantal keuzes hebt en waarbij je die parameters zeg maar hebt ingevoerd, dat is natuurlijk wel prettig. Meerdere modellen is altijd beter dan één model. Maar ik vind niet

direct hoe meer ontwerpen hoe beter, want tussen 10 modellen kun je nog kiezen... maar tussen 50 modellen kun je niet meer kiezen. Je mag wel 50 modellen maken maar dan moet je daar eigenlijk de 10 beste uit halen

3,2 Waarom gebeurt dat gebeurt nu niet?

Omdat wij nu mensen achter een machine hebben zitten die dat zelf aan het uittekenen zijn en die vraag je niet om 50 modellen te tekenen.
Dat is nog wel leuk om te vertellen, wat die wat die conceptontwerpers nou doen is kijken naar referentieprojecten en die iedere keer zeg maar inpakken in een nieuwe situatie. We hebben als bedrijf natuurlijk al heel veel projecten mogen maken de afgelopen 167 jaar dus dat pakken we ook oude plannen, en veelal kunnen we wel vrij snel zien hoe een gebied ongeveer ingericht zou kunnen worden. Maar dat haalt het natuurlijk niet bij heel specifiek op die plot het opnieuw laden van een project, maar het is wel een eerste indicatie.

Komt het dan wel eens voor dat een project met terugwerkende kracht geen positief rendement oplevert, en zo ja, zou je kunnen toelichten wat daar de oorzaak over het algemeen van is?

Ja dat gebeurt zeker wel eens en de oorzaak kan van alles zijn. Dat kan zijn dat je nu inkoopt op de top van de markt en op het moment dat je in uitvoering gaat dat bijvoorbeeld de bouwprijzen heel hoog zijn of de verkoopprijzen heel laag zijn, dat kan echt van alles zijn. Vroeger zeiden we wel eens heel gekscherend; als ze ergens gaan schieten om bijvoorbeeld de olie, dan veranderen de prijzen van de ene maand op de andere maand. Dat komt nu natuurlijk wel heel dichtbij met Oekraïne, maar je ziet het nu ook gebeuren. Dat zijn externe factoren, daar kun je je niet op voorbereiden.

<u>Evaluatieproces</u>

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.

Het woord “objectief” verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen?

Alles gaat op gevoel, en ja daar zijn al die objectieve parameters wel belangrijk voor, maar uiteindelijk gaan die parameters ons iets brengen; een gevoel, willen we dit wel of willen we dit niet. Dus het is altijd een combinatie van.

6,1. In hoeverre zijn deze subjectieve parameters toetsbaar denk je, en gewenst?

Niet.

6,2. En in hoeverre zijn de objectieve parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?

Ja dat is zeker gewenst voor het proces, dat is onderdeel van onze professie. Als ik van onze marktonderzoekers een lijst heb gekregen en die stellen voor deze doelgroepen en daar zit dit product bij, daar zitten deze verkoopprijs zitten daarbij, dan ga ik daar vanuit mijn professie weer verder mee om en dan gaat het niet om de laatste vierkante meter of die woning nou 107 109 111 m² moet zijn en of die nou 450.000 of 360.000 euro moet zijn, maar uiteindelijk moet ik dat allemaal wel in ook in mijn exploitatie moet ik dat opnemen. Ja en vanuit mijn professie ga ik daar natuurlijk wel met al die getallen mee om, die zijn natuurlijk niet spijkerhard.

6. Je schetste net een situatie waarin je wel heel veel conceptontwerpen hebt en dat je daar bij wijze van de 10 besten uit zou kiezen, op basis van welke parameters zou je die dan kiezen?

Op mijn gevoel, met achterliggend dat ik een exploitatie heb gemaakt naar de verschillende modellen heb gekeken en die harde cijfers wel de geïnterpreteerd heb en ook enerzijds op gevoel heb ingevoerd. Dus het is een combinatie van, want een commercieel gevoel kun je niet in een parameter stoppen. Kijk en een marktonderzoeker die gaat gewoon kijken van joh hoeveel mensen wonen er ergens in een wijk en hoeveel verhuis geneigdheid is er etc. ik hoor die plek altijd beter te kennen dan die marktonderzoeker maar die doet dat puur op basis van informatie die vrij beschikbaar is of die aangekocht wordt en ik moet het commerciële gevoel bij de locatie hebben. Dus het zou in theorie zelfs zo voor kunnen komen dat er twee of drie doelgroepen voorgesteld worden en dat ik er bij eentje eigenlijk niet eens ben, dat ik denk van nou in deze stad of in deze omgeving zie ik dat niet zo snel gebeuren. Dan ga je natuurlijk het gesprek met elkaar aan, maar dat is enerzijds gewoon de harde cijfers of gewoon kille cijfers en aan de andere kant is het voor jou wat speelt er In de stad en wat speelt er binnen een college van de stad.

7. Het is al wel even besproken, maar kan je nog kort toelichten in hoeverre het concept evaluatieproces gestructureerd is?

Nee, de structuur die bestaat daaruit dat jij als ontwikkelaar/ontwikkelmanager je werk doet en dat er gecommuniceerd wordt met een directie, in de werkmaatschappij geïnformeerd wordt, gespard wordt en ook geïnformeerd en gespard wordt met de divisie directie. De structuur zit daarin daar zit daar zit een directeur en daar spar je mee, dan heb ik met name erover van dat begint in eerste instantie een keer vinden jullie dit ook als divisie directie zinvol of zinloos om verder te onderzoeken en met name dat je steeds verder in het traject gaat richting een investeringsaanvraag hè, dus de aankoop van grond, de aankoop van panden, het aangaan van ontwikkelcombinatie, ja dan wordt dat steeds intensiever waardoor die investeringsaanvraag als die er uiteindelijk komt ook al een paar keer op hoofdlijnen is voorgesproken binnen de volledige divisie directie en dat dat ook niet als een verrassing zeg maar binnenkomt. Dat is eigenlijk de structuur.

En de structuur op conceptontwerp niveau? Dus als we even een stukje inzoomen, je hebt meerdere concept ontwerpen gemaakt voor een stuk grond. Dan geef je net aan dat je input krijgt van bepaalde parameters, die geven een bepaald gevoel. In hoeverre is dat proces van parameters vormen, toetsen, etc. gestructureerd?

Die harde cijfers die komen vanuit onze afdeling ID. Ik geef natuurlijk wel aan wat ik in zo'n ontwerp wil hebben. Ik geef aan bijvoorbeeld; het is voor die doelgroep, dus deze producten moeten erin, er moet een optimale bezonning, nou alles wat ik daarin wil hebben. Daar kunnen 1,2,3,4,5 modellen uit komen.
Wat we ook nog doen, we hebben iedere dinsdag inspiring Tuesday en daarin zitten een aantal mensen in Utrecht, dan mag je langs om geïnspireerd te worden. Daar kun je dus jouw lopend onderzoek presenteren en ja die schieten dan vanuit de heup, vanuit hun kennis en ervaring op jouw proces. Maar dat is dus ook gevoel, commercieel gevoel, en gevoel bij het project.
Maar ik denk dat ik nu beter weet waar jij heen wilt, dat wat jij bedoeld is in een vervolgfase denk ik. Kijk of iets zinvol of zinloos is en hoeveel producten wij ergens in een gebied kunnen laden en wat dan de opbrengst is zowel voor bouw als voor vastgoedontwikkeling, dan hoeft het concept nog niet zo specifiek te zijn. Hebben we zeg maar het gebied onder controle en we gaan met name in grotere ontwikkelingen dus grotere gebouwen grotere volumes, gaan we daar en de structuur op zetten, maar dan ben je alweer een stap verder in je proces. Dan is het zeer zinvol om te gaan kijken van nou wat past er nou binnen het bestemmingsplan, binnen de mogelijkheden, kan ik daar misschien nog meer vierkante meters maken, kan ik daar nog een betere verhouding BVO/GBO krijgen, ja dan wel.

En waar in het ontwikkelproces gebeurt dit dan als je een gemiddeld binnenstedelijk project in gedachten neemt?

Dan zou ik dat ook na de investeringsaanvraag gaan doen want dan hebben we dus de investeringsaanvraag gedaan naar die grond toe en we hebben een ontwikkelcombinatie gevormd nou vervolgens weten we vanuit de massa die we daarop hebben neergezet van joh we kunnen ongeveer dat maken en dan in de verdere uitwerking dan gaan we echt die gebouwen helemaal goed in de structuur zetten dan ga je hem optimaliseren. Het heeft niet zoveel zin vind ik om al helemaal aan de voorkant van het project om te bepalen of iets zinvol of zinloos is om hem dan wel al heel gericht zover uit te werken.
Je weet vanuit je professie ongeveer wel wat er moet komen en hoe het moet staan en dat een gebouw nog kan draaien ofzo, er zal nooit een volslagen nieuw ontwerp uitkomen. En dat er gespeeld wordt in de gevel in gevelmaterialen in en in stijgpunten, maar wel binnen die massa 's

Conceptontwikkeling

4. Zijn er standaard problemen/uitdagingen waar je in het huidige conceptontwerpproces tegenaan loopt?

Die massa's moeten ook altijd bouwbaar zijn en nou heb ik het dan niet zozeer over grondgebonden woningbouw maar met name gestapelde woningbouw en met name ook op de wat complexe locaties waar je te maken hebt met veel bestaande situatie daaromheen: geluid, bezonning, wind, ondergrondse infrastructuur. Op het moment dat je dat aan de voorkant voordat je gaat ontwerpen met een architect niet helemaal uitgeknobbeld hebt en niet de structuur goed hebt gezet dan gaat het verkeerd en waarom zeg ik dat, wij denken in het bouwen van beneden naar boven en van binnen naar buiten en een architect die leeft voor de mooie omgeving en om een handtekening in het gebied achter te laten en dan komen de oplossingen. Als we ergens tegenaan lopen komen we altijd meer vanuit van buiten naar binnen, dus eigenlijk wil de architect de buitenkant graag behouden, dat is zijn handtekening en dat gaan we dan technisch proberen aan de binnenkant weer op te lossen en dat levert niet altijd de goedkoopste of de beste bouwbare structuur op. Dus mijn tip is dan altijd in dit soort situaties altijd eerst een structuurontwerp maken, zorgen dat je een bouwbaar gebouw hebt en dat je je bouwsystemathiek ook weet en vervolgens met die input de architect aansturen,

Oké en in de en een periode daarvoor, dat je het echt nog alleen over massa's hebt?

Dan zoek je zaken op hoofdlijnen uit en je moet voor jezelf ook altijd wetenschap blijven houden dat er dan dingen veranderen dus masterplan op basis van volumes die gemaakt worden daar weet iedereen van; we gaan straks nog dieper de onderzoeken in, maar precies zo zoals ze het nu getekend hebben in een masterplan wordt het nooit. Dus ja echt een probleem ja er komt altijd wel weer iets om de hoek wat we of wat iemand niet heeft voorzien, of niet heeft bedacht, of wat niet gedocumenteerd, maar dat hoort ook een beetje bij het vak.

In hoeverre heb jij bepaalde ideeën over hoe je deze uitdagingen op zou kunnen lossen?

Iedere locatie en ieder project is uniek. Je komt natuurlijk door de jaren heen heel veel dezelfde dingen tegen, maar ik kom nog steeds na 20 jaar vastgoedontwikkeling weer nieuwe zaken tegen die ik iedere project niet gezien heb. Het is heel divers en het is iedere keer anders en je taak is om zoveel mogelijk dingen te onderzoeken en om risico's uit te sluiten maar ook wet- en regelgeving verandert iedere keer weer door de jaren heen.
Wet- en regelgeving is ook niet overal hetzelfde hoe dat gemeentes omgaan met bijvoorbeeld met geluid, dat kan verschillen.

Haalbaarheid

8. In hoeverre wordt de haalbaarheid van een project getoetst op het moment dat je een concept ontwerp kiest?

Als er een gezond vastgoedontwikkelingsrendement uitkomt en een gezond bouw rendement uitkomt en die zijn vastgesteld door onze divisie bouw en vastgoed. Wij moeten ook een investeringsaanvraag doen in de business case en daarom zijn deze parameters zo van belangrijk, want op het moment dat we de vooropgestelde winstpercentages niet halen vooraf, mogen we de investering ook niet doen.

9. Hoe zou je deze onzekerheid met betrekking tot de haalbaarheid van een project tijdens de conceptfase kunnen verminderen denk je?

Door goed je vooronderzoek uit te voeren. Dat begint al natuurlijk met de beschikbare geluidskaart om die in te voeren in je model en alles zo goed mogelijk uit te zoeken. Je hebt natuurlijk je eigen kennis, maar met name ook beschikbare gegevens zijn belangrijk en stop die vooral in je model. Dat geldt niet alleen voor geluid maar ook voor de ondergrond, wetende vanuit klikmeldingen waar alle kabels etc. zitten zodat je daar geen gebouw op gaat positioneren. Dus ook met geluidskaarten wetende dat je dus niet willens en wetens zoveel bewust geluidsgevoelige verblijfsruimtes vol in het geluid zet.

Waar zou je het gebruik van dit soort analyses positioneren in het conceptontwikkelingsproces?

Kijk je moet natuurlijk wel zelf de wetenschap hebben van joh op wat voor locatie zit ik, dus op het moment dat ik echt gewoon over een rijksweg heen wil bouwen dan moeten er natuurlijk bij jou allerlei alarmbellen afgaan, of als ik hier naast de luchthaven wil bouwen dan moeten er allerlei seinen weer op rood gaan van hé let op, dit moet ik al in een eerder stadium onderzoeken. Koop ik ergens in the middle of nowhere een weiland aan dan hoef ik nou dit soort zaken niet te kijken. Dus op het moment dat je dus ziet van joh ik kan hier mogelijk op een zeer geluidsgevoelige belaste locatie zitten ja trek het dan alsjeblieft al wat eerder naar voren want je moet niet in een vervolg stadium, kijk normaal gesproken zou ik zeggen van hij komt pas op het moment dat je echt de positie onder controle hebt hè, dus dat we een bieding gaan doen of hebben we gedaan, maar zit je hier in extreem belast geluidsgebied, ja trek dan wat onderzoek vooral alsjeblieft naar voren.

Case project

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit?

Ik kan het alleen maar toelichten vanuit mijn perspectief. Ik heb daar twee of 3 gesprekken heb ik daarover gehad en ik ben benaderd door directeur van Dudok, die waren voornemens om die locatie te verwerven en ze waren voornemens om de locatie van het case project dus het bestaande gebouw om dat te verwerven maar wij hebben nog een vermeende claim bij de gemeente Rotterdam naar aanleiding van het realiseren van het Dakpark van de Big Shops, om het zogeheten toen nog Noordgebouw en het Zuidgebouw die daar dus aan beide koppen nog gerealiseerd moeten worden om die te doen, en ja zo werd één en één werd drie. Zo van als jullie daar nog naast het bestaande monumentale pand nog wat zouden kunnen doen en wij hebben deze, is het dan niet handig om het bij elkaar te brengen.

12. Hoe zag de conceptontwikkelingsfase binnen de initiatieffase eruit?

Ik heb voornamelijk de eerste initiële gesprekken gevoerd en toen is dat al vrij snel de waardenstroom ingegaan en heb ik me er niet meer heel veel mee bemoeit. De totstandkoming van de ontwikkelcombinatie en de conceptontwerpen ben ik niet bij betrokken geweest.

13. In hoeverre zou je het concept ontwikkelingsproces van het case project als normaal kunnen omschrijven, gekeken naar de locatie, omgevingsfactoren etc.?

Dat is wel gewoon gebruikelijk. Ook daar moeten mensen wonen, je hebt een parkeereis van de gemeente dat is ook altijd een hele belangrijke. Je hebt daar een stadsontsluitingsweg dus je hebt te maken met geluid. De tram komt daar ook langs dus je hebt daar eigenlijk de reguliere, binnenstedelijke uitdagingen. Een aantal he, je hebt ze nooit allemaal tegelijk. Vlak bij de havens dus je hebt ook te maken met nestgeluid

14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?

Ja dat nestgeluid, daar zijn wel een aantal problemen door ontstaan heb ik begrepen, maar dat is nou ook weer een mooi voorbeeld van kennis en ervaring. Als je dat een keer eerder tegen bent gekomen weet je dat je daar rekening mee moet houden van hé, dat is een risicofactor.

14,3. Puur reflecterend op dit proces, denk je dat deze problemen voorkomen hadden kunnen worden?

Nee voorkomen kun je het niet, naja ja je kan voorkomen dat je heel veel nieuwe modellen moet gaan maken door dat natuurlijk mee te nemen en wetende wat daar de invloed van is om ervoor te zorgen dat in je model en de positionering van je gebouw en de opbouw van je gebouw dat je daar natuurlijk zo min mogelijk last van hebt, zowel qua comfort als in geld voor de uiteindelijk te treffen maatregelen.

14,4. Komen dit soort problemen vaker voor binnen de conceptontwikkelingsfase, dus echt op massastudieniveau, bij andere projecten en wat is dan het gevolg van de haalbaarheid van het project?

Als je het dan specifiek in dit geval hebt over dat geluid; je gaat het geluid op die massa die je hebt neergezet toetsen en dan gebeurt het wel inderdaad dat daaruit komt dat er te veel woningen boven een bepaalde grens komen wat technisch lastig of te kostbaar is om op te lossen met het gevolg dat je dat op andere manier moet doen.

B-4 Interview #3

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: #3

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

Zou je je eerst even voor kunnen stellen?

Ik ben projectontwikkelaar bij Dura Vermeer. 25 jaar, ik heb een bouwkundige achtergrond HBO. Ik werk nu 5 jaar bij Dura Vermeer, waarvan nu 3 jaar ontwikkelaar waarvan nu sinds januari medior ontwikkelaar, hiervoor junior.
Vastgoedontwikkeling algemeen

Oké dankjewel, dan nu wat vragen over vastgoedontwikkeling in het algemeen.

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?

In die initiatieffase kijk je echt natuurlijk echt naar de hoofdlijn dus wat kan ik op één plek en hoe maak ik dat haalbaar en daarbij kijk je met name gewoon echt naar het grove telmodel zeg maar. Je kijkt nog niet van hoe gaat het gebouw er daadwerkelijk uitzien maar je kijkt gewoon van wat zijn de aantallen, wat zijn de kenmerken van de locatie dat is natuurlijk ook gewoon belangrijk hè. Dus hoe hoog kan ik er bouwen of wat moet ik doen om daar iets te kunnen bouwen, dus ik het bestemmingsplan aanpassen wel of niet. Dus je kijkt daar eigenlijk naar de kaders die daar zijn vanuit de omgeving en als die kaders toereikend zijn hè dus je kan er iets mee, dan vervolgens kijk je van nou hoe kan ik een plan maken wat enerzijds haalbaar is en anderzijds past binnen die kaders maar echt op de hoofdlijn, echt grof.

En waar eindigt dan die initiatieffase mee?

Vaak met een structuurplan, hè dus dan heb je een telmodelletje gewoon een Excel zoveel woningen, met die GVO's ongeveer en zoveel BVO's en dat ook in een structuurplannetje verwerkt in een soort masterstudie waarbij je wel eenheden zeg maar ziet.

1,2. Wanneer worden de eerste conceptontwikkelingen gemaakt?

Dat zit ook echt wel helemaal aan de voorkant, waar wat ik net eigenlijk benoemde die kaders en dat structuurplan zeg maar wat uitvloeit uit de kaders en de haalbaarheid van je businesscase zeg maar, nou het product wat je dan hebt is gewoon een structuurplan zeg maar met een exploitatiemodel en dat soort dingen en je conceptfase dat loopt eigenlijk door uiteindelijk nog naar initiatieffase met je initiatieffase ga je vervolgens door naar je schetsontwerp, voorlopig ontwerp, definitief ontwerp. En de conceptfase loopt wat mij betreft door ja tot half VO (voorlopig ontwerp) eigenlijk.
Kijk een concept begint natuurlijk eigenlijk bij de vraag; wat is kansrijk op deze plek? Welk product ga ik hier bedenken? Wat voor project gaan we hier maken en waarom gaan we dat maken? Dat loopt dus ook door van zowel initiatief, omdat je daar kijkt van ja wat kunnen we op die plek bijvoorbeeld woningen concept, maar het loopt ook door tot en met eigenlijk je architectuur hè, dus wat past op die plek en hoe gaan we het product straks In de markt zetten? hoe moet het eruit zien? voor wie is het? Dus ik zie de conceptfase eigenlijk overkoepelend boven de fases eigenlijk die wij hebben in de Flow. Daarom zit hij ook niet echt in de flow natuurlijk de conceptfase, hij zit er wel in maar komt of verschillende plekken steeds een beetje terug hè. Het wordt steeds verfijnder, je concept wordt ook steeds verfijnder.

Oké, maar echt die massastudies waar zou je die plaatsen in het proces?

In de initiatiefase. En tuurlijk schaaf je dat altijd wel een beetje bij hè, want naarmate je verder gaat ontwerpen kom je erachter dat, nou kijk bijvoorbeeld een structuurplan dan kijk je veel minder nog bijvoorbeeld naar je ontsluitingsprincipe. Natuurlijk probeer je er rekening mee te houden maar bijvoorbeeld het plan waarmee ik nu bezig ben nou daarvan is een initiatieffase die is vorig jaar afgerond zoiets, nou basis daarvan is een soort nou overzichtje gemaakt van: We willen zoveel GBO's, zoveel BVO's, zoveel eenheden, op basis van deze massa. Nou vervolgens kom je er nu een beetje achter nu je het structuurplan gaat opstellen van ja leuk dat we dat toen bedacht hebben maar die ontsluiting die moet anders waardoor je die massa en die aantallen in die GBO's en die BVO's echt wel anders gaan uitpakken. Dus uiteindelijk schaaf je het continue bijna natuurlijk naarmate je ontwerpproces verder doorloopt. Dat heb je enerzijds gewoon door een verandering en inzicht en dat je steeds slimmere dingen gaat bedenken, anderzijds ook door gewoon wisselende wet- en regelgeving.

<u>Conceptontwikkeling</u>

2. Hoe ziet het conceptontwerpproces van binnen deze initiatieffase eruit?

Kijk de projecten die ik tot nu toe heb gedaan, stap ik in zeg maar in de initiatieffase en dan wat later In de initiatieffase, dus de haalbaarheid die staat dan niet meer echt ter discussie want het is al best wel een project. Het heeft al een bepaalde vastigheid zeg maar, waarbij we denken van nou dit is kansrijk hier gaan wee verder en voor mij is de conceptfase echt het begin en ik denk waar jij op doelt met de conceptfase dat zit nog een stukje eerder hè, dus dat je echt gaat kijken van: Waarom kiezen we voor die plek en waarom gaan we starten met een initiatiefase? Waarom is die interessant? En dat heb ik zelf nog nooit echt doorlopen, dus ik weet ook niet of ik daar goed antwoord op kan geven
Naja kijk we hebben natuurlijk de Design Studio, wat zij doen dat zijn natuurlijk echt twee dingen; ze kijken enerzijds naar de markt hè, dus wat is interessant op die plek en dat heeft dan puur gewoon te maken met de buurt en de omgeving en op basis daarvan beredeneren ze van; dat is daar interessant en dan vervolgens heb je ook gewoon echt het concept en dat gaat veel meer over welk product past daarbij en wat voor woning, of wat voor kantoren, of wat maar functie wil je daar toepassen? Die zitten dus veel meer eigenlijk op de hoofdlijn nog voordat je eigenlijk gaat beginnen met je initiatief. Kijk in je initiatieffase hè je telmodelletje wat

je gaat maken, dat is eigenlijk een product dat al wat verder is dan dat je nadenkt van we willen daar woningen maken of we willen daar kantoren maken, of daar een hotel bouwen.
Dat doen we nu bijvoorbeeld bij Diepenveen, daar hebben je het bestaande pand, dat is wel echt de conceptfase maar daar ga je wel een beetje voortborduren op het concept wat we al bedacht hebben met de nieuwbouw, maar daarbij kijken we nu voor de bestaande bouw van wat kunnen we daar mee doen en dan kijk je heel erg naar wat ik zeg dus enerzijds van; wat wil je daar? wat past binnen het gebied, zowel qua producten als qua doelgroepen? Nou dan ga je allerlei verschillende scenario's laat je dan door ID uitwerken, verschillende telmodelletjes, verschillende producten, functies en vervolgens ga je een beetje kneden met elkaar om te kijken van nou wat past er nou het beste en daarna ga je eraan rekenen.

3. In hoeverre is er enige consistentie in het aantal concept ontwerpen dat wordt gemaakt?

Geen idee, weet ik niet. Wat ik zeg ik heb dat nu bij het case project gedaan, en dan krijg je gewoon een aantal conceptontwerpen, maar dat wilden we ook een beetje kleinschalig doen omdat we wilden er niet te veel tijd, geld, en moeite in stoppen omdat we sowieso niet wisten wat kan daar op die locatie, en we vinden er zelf ook wel wat van. Dudok, de ontwikkelpartner die vindt daar ook wel iets van en die kijkt er ook iets anders naar. Dus daar hebben we een handjevol conceptontwerpen, 4/5 uitgewerkt. Maar het heeft ook wel te maken met de grootte van je opgave, kijk hoe groter de opgaven en ook met de kaders die er natuurlijk zijn. Als je gewoon een blanco vel hebt dan kan je natuurlijk veel meer varianten maken dan dat je bepaalde kaders hebt waar je rekening mee moet houden, dat aan de ene kant en aan de andere kant ook gewoon de grote. Kijk als jij een heel klein plotje hebt nou dan is het logisch dat je daar veel minder variatie op kan bedenken, dan een hele grote plot met 100 soorten verkavelingen of nou 4 of 5 torens, hele hoge torens of wat lagere kleinere torens enzovoort. Ik kan me voorstellen dat ook heel gewoon te maken heeft met de grootte van de opgave en de kaders die er op dat moment zijn

3,1. In hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?

Nou ja, dat is de vraag altijd he. Kijk enerzijds is het heel fijn om heel veel varianten te hebben hè, want dan weet je zeker dat één van die varianten de optimale is, aan de andere kant geeft dat ook wel weer heel veel werk in de zin van nou kijk a; die variant die moeten gemaakt worden, maar goed stel wij doen dat niet zelf maar laten we dat door ID doen, dan is dat even niet het probleem. B; omdat een ander dat dus doet en dat daar veel tijd in gaat zitten kost het veel geld en c is dan uiteindelijk dan nog dat je al die varianten moet gaan beoordelen en op basis waarvan ga je dat dan beoordelen en wat neem je dan wel en wat neem je dan niet mee? Dus ga je in het begin alleen bijvoorbeeld kijken naar, die producten vind ik interessant en die niet? Ja dan kan je wel vrij snel een schifting doen. Dan blijft er gewoon een handje vol over ten opzichte van een hele bulk die je eerst hebt, of ga je het veel uitgebreider doen? Ga je kijken naar weet ik veel aantal vierkante meters die je in het ene modelletje hebt zitten dan ga je dat gelijk ook kwantificeren, dus dat gaat zoveel kosten en zoveel opleveren? Dus ja het heeft zeker denk ik wel zin om veel varianten te hebben, maar het moet wel behapbaar blijven in de beoordeling van die verschillende varianten. Bij een handjevol varianten is het heel behapbaar om een schifting te maken van dit is goed en dit is minder goed, dit is kansrijk dit is minder kansrijk, waarbij heel veel varianten is dat natuurlijk veel meer werk. Ja dat wil niet zeggen dat het daardoor per definitie verkeerd is, maar dat wil wel zeggen dat je daardoor een andere tijdbesteding krijgt en daardoor ook een andere kostenverdeling.

4. Zijn er standaard problemen/uitdagingen waar je in het huidige conceptontwerpproces tegenaan loopt?

Nee zou ik zo 1 2 3 niet weten. Als ik even nadenk... Nou ik vind het, kijk bijvoorbeeld bij Diepenveen, je vraagt aan ID van kunnen jullie wat variantjes uitwerken en dan krijg je een

paar dagen later krijg je wat variantjes, met een staatje erbij en vervolgens zeg je van nou dat willen we een beetje anders, dat we een beetje anders. Nou en vervolgens gaan ze dat weer aanpassen, gaat weer wat tijd overheen en op zich is dat prima, maar het fijnste is natuurlijk dat je zelf aan die knoppen zou kunnen zitten en althans dat vind ik het fijnst. Ik heb nu bij het plan waarmee ik nu bezig ben, daar zijn heel veel kaders vanuit de omgeving die verwerkt moeten worden die echt wel maatgevend gewoon zijn voor het gebouwtje wat je daar kan gaan bouwen wel of niet. Wij laten het structuurplan dan nu uitwerken door een architect en we zijn nu al weken bezig om die architect goed op te lijnen en te zeggen van nou; heb je daaraan gedacht, heb je daar aan gedacht, heb je daar aan gedacht? Dan heb ik het echt nog over het concept niveau. Ik zou het zelf veel fijner vinden als je zelf gewoon... kijk want hoe je normaal vaak werkt als ontwikkelaar is dat je gewoon één telmodelletje hebt in Excel, maar dat is gewoon rekenkundig. Uiteindelijk wil je ook die vertaalslag gewoon maken natuurlijk naar gewoon een massastudie waarbij de eenheden wat kan schuiven. Dat vind ik onwijs interessant dat je gewoon zelf de haalbaarheid kan toetsen en kan spelen met het model zodat je daar in het geval van project waarmee ik dan nu bezig ben en architect niet meer nodig hebt. Dus het gewoon zelf aan de knoppen zitten, zelf zien wat er gebeurt wanneer je wat aanpast. Daarbij kan je veel sneller denk ik je structuurplan afronden, dus in je initiatiefase, en heb je ook veel sneller ook eigenlijk de optimale oplossing.
Dat gaat nog wel even voorbij aan of ik een toekomst zie in het inladen van al die kaders in een model en dan de computer het laten bepalen. Ik voel er zelf meer voor dat je gewoon zelf de overview houdt, dat je zelf rekening houdt met alle kaders, wet- en regelgeving, omgevingselementen, dat je dat soort dingen zelf even in je hoofd houdt en op basis daarvan iets slims bedenkt, met een tool waarmee je gelijk een telmodel en een massamodel hebt zeg maar.

Evaluatieproces

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.

Het woord "objectief" verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen?

Nou kijk dat bestaat natuurlijk uit een harde en een zachte kant. De harde kant daar kan je een voorstelling bij maken dus dat is gewoon van wat kan er überhaupt op de plek? Dan heb je te maken met een bepaalde bouwhoogte bijvoorbeeld, of een bepaald volume of bebouwingspercentage, dat is echt de harde kant. Dat zorgt ervoor dat de ene variant geschikt is en de andere variant sowieso al niet geschikt is hè, de andere kant heb je natuurlijk ook gewoon je de haalbaarheid van je businesscase; hoeveel meters moeten we bouwen, hoeveel opbrengsten moet ik ophalen om een businesscase te hebben? Dus daar kijk je naar en aan de zachte kant heb je natuurlijk ook gewoon de visie die je hebt voor de plek en hoe dat weer matcht eigenlijk met de omgeving en nou goed dat is natuurlijk gewoon de visie. Dus de zachte kant die gaat veel meer over wat is mooi, welke massa 's en welke compositie zeg maar van die massa 's vinden wij het meest geschikt en dat is natuurlijk veel minder hard dan daadwerkelijke harde parameters.

Je maakt onderscheid tussen een zachte en een harde kant, zou je dit kunnen vertalen naar subjectief en objectief?

Ja

6,1. Op basis van welke subjectieve parameters en in hoeverre zijn deze parameters toetsbaar denk je? Is dat ook gewenst?

Ik denk niet dat die toetsbaar zijn want uiteindelijk heeft dat ook gewoon te maken met smaken en met visie. Kijk ik vind iets als ontwikkelaar iets belangrijk en een andere ontwikkelaar die kan iets anders weer belangrijk vinden. Het heeft te maken met beleving, het heeft te maken met voorstelling. Kijk een goed voorbeeld bijvoorbeeld, als je weer die bestaande bouw van het monument bijvoorbeeld erbij haalt dan zei bijvoorbeeld een ontwikkelaar van Dudok van ja ik wil niet die gebouwen losknippen, dus een bestaand ensemble van gebouwen en ID had één variantje waarin de massa's zijn opgeknipt en dat je een soort doorloopt hebt, zodat je de ene kant van het plangebied verbindt met de andere kant van het plangebied. Waarbij ik juist denk van nou de doorwaadbaarheid van het plan dat is goed voor de beleving straks van de plek, daardoor is het fijn en krijg je reuring, reuring is sowieso fijn, sociale veiligheid en ga zo maar door. Waarbij zijn beleving juist is; nee steegje is niet fijn, daar gaan mensen zitten pissen, daar gaan zwervers slapen, naja je kan je een voorstelling bij maken van wat hij daarmee bedoelt, dus het heeft ook heel erg gewoon te maken met je eigen belevingswereld en jouw redenatie van wat is een goede plek. Het toetsbaar maken daarvan is onwijs lastig want mijn definitie van een goede plek die kan anders zijn dan een definitie van iemand anders van een goede plek.
Of je moet als vakgroep ontwikkeling binnen Dura Vermeer of binnen een andere club, moet je een gezamenlijke definitie gaan bepalen van wat vinden wij een goede ontwikkeling ja en dan wordt hij misschien wel toetsbaar.

6,2. En in hoeverre zijn de objectieve parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?

Die zijn onwijs toetsbaar, je hebt gewoon de maximale bouwhoogte of minimale bouwhoogte, het aantal bouwlagen, breedte/lengte van het gebouw, wel of geen verdiepte parkeergarage. Dat zijn allemaal dingen die je gewoon hard kan invoeren, bij dat soort dingen zijn het gewoon harde cijfers of een ja/nee. Minimale vierkante meters, maximale vierkante meters, dat is heel makkelijk toetsbaar.

7. In hoeverre is het concept evaluatieproces gestructureerd?

Ja voor zover ik dat nu meemaak en heb meegemaakt is dat niet gestructureerd, dat doe jezelf al dan geef je een andere vorm bij ieder project weer anders zeg maar aan, heeft ook te maken met wie je samenwerkt. Kijk als je samenwerkt met een andere ontwikkelaar die is dan ook weer gewend het op een bepaalde manier te doen. Kijk het is niet dat je een moment zeg maar hebt van nou evalueren, we gaan alle modellen naast elkaar zetten en we gaan de pro's en de con's tegen elkaar uitzetten, nee want je ziet verschillende modellen en op voorhand denk je al van nou dit is niet zo geweldig dus dat schuif je dan al een beetje opzij want dat is sowieso al niet zo kansrijk, vervolgens heb je het met elkaar erover.

Hoe beslis je dat dan, dat een ontwerp niet kansrijk is?

Deels op gevoel, maar stel je hebt vijf varianten en één variant heeft 2000 m² GBO minder dan die andere, nou dan heb je op voorhand al gelijk zoiets van nou dat is minder kansrijk. Het is niet dat je er dan helemaal niks meer mee doet hè. Kijk daarna gaat natuurlijk wel de echte beoordeling lopen van zo'n concept, want dat betekent natuurlijk niet gelijk dat het helemaal niks is als er minder meters in zitten. Kijk als daardoor beter verkoopbaar is en je kan je verkoopopbrengsten optimaliseren ja. Aan de andere kant heb je ook weer minder bouwkosten dus dat is ook weer een voordeel. Dus je kan hem altijd twee kanten op redeneren. Op basis van onderbuik heb je vaak al wel een bepaalde voorkeur voor modellen en vervolgens heb je het wel met elkaar daarover, dat kan dan zijn met een ontwikkel collega, of vaak met ontwikkelcombinaties of met de architect of met ID hè, dat je even gewoon gaat uitdiepen met

elkaar van nou wat vinden we met elkaar en op basis daarvan komen weer nieuwe ideeën vaak hè en dan nou bepaalde varianten die parkeer je dan, die laten we even voor wat het is en die andere die ga je weer optimaliseren en bijschaven. Met ID doe je vaak wel gewoon even een brainstorm zeg maar inplannen waarbij je gewoon gaat kijken van; dit zijn de modellen maar die vinden we dus sowieso al niks daar kijken we niet meer echt naar, die vinden we wel kansrijk en juist ook door het er met elkaar over te hebben en te sparren kom je ook weer tot nieuwe inzichten en wordt die variant die je als kansrijk ziet misschien nog wel kansrijker.

Haalbaarheid

Ja dat brengt ons bij het volgende onderwerp; haalbaarheid van concept ontwerpen.
8. In hoeverre wordt de haalbaarheid van een project getoetst op het moment dat je een concept ontwerp kiest?

Die wordt zeker al op hoofdlijn, dus heel grof wordt die getoetst. Mede ook omdat je verder gaat met investeren dus je moet wel zeker weten met elkaar van; we denken dat het kansrijk is wat we aan het doen zijn of we denken dat het niet kansrijk is. Bijvoorbeeld voor Diepenveen hebben we dus verschillende varianten bekeken voor die bestaande bouwen en op basis daarvan wilden we ook kijken van vinden we het interessant genoeg om hier een vervolg aan te geven of niet, dus zien we genoeg opbrengst potentie en genoeg haalbaarheid voor dit plan om een architect te gaan betrekken of een adviseur erbij bij te halen die gaat kijken naar bepaalde thema's. Dus je kijkt er echt wel naar, maar dat is echt gewoon op een heel grof niveau. Dus dat is gewoon niet meer dan een simpel sigarendoos berekeningetje van nou dit kan dat variantje gaan opleveren en dat zal het ongeveer gaan kosten, nou wat blijft er dan onderaan de streep over en hebben we dan een business case wel of niet? En naarmate je steeds verder gaat in je proces wordt dat steeds fijnmaziger, dan kan je de kosten beter in gaan schatten, je kan de opbrengsten beter gaan inschatten. Daar waar je eerst gewoon rekent met BVO's en GBO's en een kengetal hè dus zoveel € 1.000 per vierkante meter bouwkosten en zoveel € 1.000 opbrengsten even grof gezegd, en zoveel € 1.000 euro voor bijkomende kosten. Je kan hem steeds verder afpellen natuurlijk.

En in hoeverre kijk je bij die haalbaarheid dan ook al naar omgevingsfactoren?

Ja heel erg, maar ook daar ga je weer van grof naar fijn, maar je kijkt natuurlijk altijd wel even wat kan er op de plek? Dus je akkert altijd wel even het bestemmingsplan door en als het bestemmingsplan er nog niet is ja dan is het natuurlijk de vraag van; in hoeverre achten we het haalbare om een wijziging in het bestemmingsplan door te voeren?

Je hebt het over omgevingsfactoren, in hoeverre wordt er bij het bepalen van de haalbaarheid van je concept ontwerp ook al gekeken naar bijvoorbeeld de positionering van je gebouw ten opzichte van de geluidsbelasting?

Nou dat weet ik niet precies, maar als we bijvoorbeeld weer het case project pakken, kan ik me er wel een voorstelling bij maken dat ten aanzien van het verkeerslawaai en industrielawaai hè, dus de kaders die we wel al konden meten waarvan we wel al de grenswaarden wisten, dat er toen wel gekeken is naar de compositie van de blokken. Het is niet voor niks zeg maar dat gebouw twee, dat is een vrij uitgerekt gebouwtje, vrij slank, een galerijflat, dat heeft natuurlijk als voordeel dat je een geluidsbuffer hebt voor een geluidsluwe binnentuin tussen de blokken. Dus in de compositie van de blokken is ook echt wel gekeken naar een geluidsluw hof eigenlijk en ook natuurlijk gewoon met de oriëntatie van je woningen kijk je daar ook wel naar.

8,1. Hoe wordt dat getoetst?

Dat wordt getoetst gewoon met de informatie die in het bouwbesluit staat, hoeveel dB een woning binnen mag hebben en op basis daarvan weet je wel hoe je een woning moet oriënteren wel of niet. Kijk als je aan het spoor zit dan weet je ook dat je daar geen buitenruimte kan bedenken of een slaapkamer met een raam dat je open wil zetten, dat kan wel, maar dan moet je een voorziening weer treffen, een tweede gevel of iets dergelijks.

Maar je zegt steeds ''weet'', hoe weet je dat dan? Controleer je het?

Nou ja, dat je bedoelt de geluidsbelasting of je die weet, of dat je die controleert… Nou dat hangt er vanaf wat al voorhanden is. Als een bestemmingsplan er al ligt dan weet je de geluidsbelasting op een plek vaak. Je weet natuurlijk nog niet wat de geluidsbelasting op de daadwerkelijke gevel is van je ontwikkeling, ervan uitgaande dat die ontwikkeling nog niet geprojecteerd is in het bestemmingsplan. Als die wel geprojecteerd is in het bestemmingsplan dan weet je de geluidsbelasting, dus is het controleerbaar, dus dan weet je ook dat je daar rekening mee moet houden en hoe je je gebouw moet positioneren en moet inrichten zodat het past binnen die geluidseisen zeg maar. Als je een bestemmingsplan moet aanpassen zoals bij het case project het geval was en bij een ander project waar we recent aan hebben gewerkt, dan weet je dat niet, maar dan is het voorstelbaar dat als jij aan de weg zeg maar zit, dat je daar te maken hebt met een hoge geluidsbelasting en dat je daar een bepaalde voorzieningen voor moet treffen. Dus dat weet je dan, maar het is nog niet controleerbaar en je gaat het controleren door als jij een bepaalde zekerheid hebt bij de positionering van je bouwblokken, dan ga je onderzoek doen of je laat het doen bij het bestemmingsplan.

Waarom doe je het op dat moment, nadat de positie al is bepaald?

Omdat dat gewoon een adviseur is die je moet inschakelen, en je gaat niet voor iedere variant een geluidsonderzoek doen.

Stel nou dat je wel voor iedere variant zo'n onderzoek zou kunnen uitvoeren?

Dan zou dat ideaal zijn.

9. Hoe zou je deze onzekerheid met betrekking tot de haalbaarheid van een project tijdens de conceptfase kunnen verminderen denk je?

Dat vind ik wel een interessante vraag… kijk de onzekerheid over de haalbaarheid van het plan, die komt vaak door bepaalde ontwikkelingen waar je met name marktontwikkelingen denk ik vaak hè, dus stijgende bouwkosten, dalende opbrengsten, daar zit natuurlijk een heel deel van je onzekerheid.
Er kan een bepaalde onzekerheid zitten op het gebied van het proces wat je aan het lopen bent hè, dus krijgen we bezwaar op het plan dat we gaan indienen?
Kijk het helpt natuurlijk wel als je in het voortraject gewoon alles onder schot hebt. Maar de vraag is in hoeverre kan dat? Kijk in de ideale wereld heb je in de initiatieffase gelijk overal al grip op en overal een oplossing voor, maar goed dan zouden we zelf ook geen werk meer hebben als dat zou kunnen want wij zijn ervoor om oplossingen te bedenken en het plan juist haalbaar te maken en de onzekerheden weg te nemen of af te prijzen.
Ik vind het wel een lastige vraag. Kijk ja het helpt sowieso om zo snel mogelijk, zoveel mogelijk te weten voor zover je dingen kan weten.

<u>Case project</u>

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit?

Ik ben pas ingestapt bij wat is het, VO/ SO plus daar ergens. Echt initiatieffase heb ik niet meegekregen, het was met name Dudok daarbij in de lead, toen zijn wij uiteindelijk ook aangehaakt omdat ze een ontwikkelpartner zochten. Ik weet niet hoe dat verlopen is.

Oké, en de conceptontwikkelingsfase, heb je daar wel een beter beeld van?
12. Hoe zag de conceptontwikkelingsfase binnen de initiatieffase eruit?

Nou kijk de visie zeg maar die er lag voor het plan, daar weet ik wel wat van. De visie was natuurlijk gewoon een schakelpunt vormen voor de omliggende wijken, een soort scharnierpunt. Tegelijkertijd ook heel erg inspelen op de het makers district hè, de MH4 haven en daar ook een woonproduct voor bedenken, waarbij je dus echt de interactie krijgt tussen de creatieve sector en het wonen, waardoor je echt wel een bruisend milieu krijgt wat ook voor de omliggende wijken weer goed is. Dat was de visie die in het achterhoofd is meegenomen om een mooi plan te maken en die is grotendeels ontstaan denk ik, en dat lijkt me ook heel aannemelijk, door de omgeving gewoon.

13. In hoeverre zou je het concept ontwikkelingsproces van het case project als normaal kunnen omschrijven? (Bestemmingsplan wat niet definitief was, geluidshinder, etc)

Ja het hangt er natuurlijk vanaf hoe je het bekijkt, maar even in het algemeen is het een vrij standaard binnenstedelijke ontwikkeling denk ik. Het is niet super complex, kijk het grootste voordeel bij binnenstedelijk denk je natuurlijk al heel gauw aan op een kluitje, het is allemaal dicht op elkaar, bestaande bebouwing dat is allemaal moeilijk. Dat is bij het case project veel minder natuurlijk, je hebt daar alleen die winkelstrip, het Dakpark en verder is de afstand ten opzichte van de omgeving best groot weet je. Dat was echt wel een stukje braakliggende terrein, dus in die zin was het misschien wat eenvoudiger dan echt ingewikkelde binnenstedelijke opgave. Hefkwartier is een beetje een vergelijkbare ontwikkeling, ook een binnenstedelijke ontwikkeling. Als ik hem vergelijk met Pompenburg dan is ie veel eenvoudiger. Pompenburg is veel ingewikkelder en dat heeft te maken met dat daar veel meer omgevingsfactoren zijn. Ik denk dat je de complexiteit van een binnenstedelijke opgave die kan je het beste meten aan de omgevingsfactoren die er spelen en bij het case project zijn die er, tijdens het ontwerpproces vonden we het een grote uitdaging, maar achteraf gezien was het ontwerp wel goed te tweaken zeg maar op de omgevingsfactoren die er waren.

14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?

Ja de molenbiotoop. Dat is een heel concreet voorbeeld van iets wat… Nou, we hadden het onder schot alleen, in de Nota van Uitgangspunten, dat is dus eigenlijk het kader die de gemeente meegeeft aan de ontwikkelaar voordat het bestemmingsplan er ligt zodat die de kaders heeft voor zijn ontwikkeling, daarin stonden twee dingen; in de tekst stond een bepaalde hoogte boven maaiveld en op de tekening stond boven en NAP of net andersom. De architect die had één van de twee overgenomen en was het niet opgevallen dat er dus een afwijking zat in een van de twee en het verschil op deze locatie tussen maaiveld en +NAP is 3,6, dus dat is gewoon een volledige bouwlaag. Het was de architect niet opgevallen, het was ons niet opgevallen, die had gewoon één van die maten overgenomen waardoor we puntje bij paaltje bij het VO erachter kwamen dat het niet kon. Toen hebben we een laagje ergens eraf gehaald en ergens anders weer een laagje erop geplaatst, dus dan compenseer je het wel weer, maar dan ga je wel terug naar de tekentafel. Hetzelfde met het hoogheemraadschap, ook een concreet voorbeeld waarbij we het gebouw opeens wat moesten verzetten. Kijk het gebouw bleef hetzelfde, maar hij moet wel even naar de tekentafel omdat je nou volledig de compositie van die blokken verandert dan natuurlijk iets.
Verder hadden we bedacht dat er een parkeerbak helemaal onder zou komen. In je haalbaarheidsfase/ initiatieffase, tijdens het SO was dat allemaal nog haalbaar geacht. Vervolgens, naarmate je plan vordert wordt de fijnmazigheid natuurlijk van je van je

businesscase ook steeds beter hè, en de grip die je erop hebt, want je kan bouwkosten veel beter inschatten, je kan je opbrengsten veel beter inschatten, plus het moment van start bouwen/ start verkoop zeg maar dat komt steeds dichterbij. Dus de marktontwikkeling daar krijg je ook steeds maar grip zeg maar op. Stel je zou over drie jaar in verkoop gaan, dan kan je nu een bepaalde opbrengsten potentie opnemen, maar we weten allemaal niet wat dat over drie jaar is als je daadwerkelijk gaat verkopen en dus naarmate je proces vordert krijg je steeds meer grip en steeds meer controle en steeds meer gevoel bij de situatie die zich op dat moment voordoet. Enerzijds dus door het moment van start verkoop en start bouw wat dichterbij komt, dus het moment van inkoop en de zekerheid van je bouwkosten dat wordt steeds nauwkeuriger. Doordat die nauwkeurigheid toeneemt kom je er op een gegeven moment achter dat het niet meer haalbaar is wat je bedacht had, simpelweg doordat bijvoorbeeld de bouwkosten hoger blijken dan dat we beoogd hadden. Nou en terug bij het case project, hadden we er een parkeerbak onder zitten en daardoor bleken we zoveel opbrengsten mis te lopen omdat je daardoor geen programma meer op de begane grond kon maken dat we ons toen op een gegeven moment af zijn gaan vragen of we dat niet anders konden doen. Toen hebben we gekozen voor een veel kleinere parkeerbak, waardoor je opbrengsten toevoegt zeg maar. Het gebeurt dus wel eens dat je in je conceptfase, in je initiatieffase en je SO-fase denkt van; wat we hebben is haalbaar, op basis daarvan staan ook echt alle seinen op groen en het is ook echt aannemelijk dat het haalbaar is, maar er kan zich altijd een ontwikkeling voordoen waardoor het niet meer haalbaar is. Dan moet je gaan bijschaven; laagje ergens er bovenop of een laagje eraf, parkeerbak halveren.

14,1. Kwamen deze problemen naar voren voor- of nadat er een concept gekozen was?

Ja dat is voor mij natuurlijk moeilijk te bepalen want toen was ik er nog niet, dus ik beredeneer hem dan even vanaf het moment dat ik aanhaakte bij SO en welke stukken er toen al lagen. Toen ik me ging verdiepen zeg maar in het plan, maar toen was het wel duidelijk… kijk die molenbiotoop die was bij de Nota van Uitgangspunten al duidelijk, dus het eerste moment dat je echt met de gemeente gaat zitten. Kijk een NvU dat komt vaak wel een beetje tegelijk op met je conceptfase, bij het case project ging dat ook een beetje gelijk op, dus wij waren bezig met onze conceptfase en in gesprek met de gemeente, de gemeente die ging bezig met die NvU en bijvoorbeeld die molenbiotoop die is daarin opgenomen. Dat nest geluid zeg maar, de geluidsbelasting op je gevel, dat was ook nog wel een probleempje maar dat weet je ook van tevoren. Kijk enerzijds wisten we dat we gewoon aan een drukke weg zitten, anderzijds is er een havengebied dus dat was ook vrij snel inzichtelijk en daardoor hebben we daar ook goede afspraken over kunnen maken met het partijen, waaronder de gemeente.
Maar bij het hoogheemraadschap, dat is gewoon eigenlijk te laat gewoon aan bod gekomen. Wij zijn toen in overleg gegaan met het hoogheemraadschap om het te hebben in eerste instantie over voorzieningen die wij tijdens de bouw moeten treffen, omdat we buitendijks aan het bouwen zijn nabij een waterkering en toen werd de vraag gesteld van; ho eens even, hoe kan het dat ik dit hele plan nog niet ken, want jullie slaan een paar lokketjes over. Ik moet eerst het plan nog even beoordelen. Dat was echt te laat eigenlijk om dat gesprek nog met elkaar toe te voeren en dat komt mede doordat wet- en regelgeving ten aanzien van zo'n waterkering die is heel stroperig. Het is niet duidelijk, zeg maar ook voor een gemeente, is het niet duidelijk waar rekening mee gehouden moet worden dus dat heeft er gewoon voor gezorgd dat het gewoon eigenlijk te laat, of nou niet te laat hé want het is nog allemaal wel binnen de planning, dus té laat was er niet, maar wel laat. Je had het eerder willen weten idealiter.
En de complexiteit van het nest geluid is dat er gewoon heel weinig duidelijk was toen we bezig waren met het plan. Wij wisten dat het er was, we wisten dat we voorzieningen moesten treffen, maar we wisten niet welke voorzieningen omdat we ook niet wisten hoe nest geluid gemeten zou worden. Dat was toentertijd nog niet bekend en de gemeente was wel bezig met de onderzoeken daarvoor; wat zijn grenswaarde? Dat was nog even de vraag, ook omdat het nieuw is in de wet- en regelgeving. Ik weet geeneens of het nu al in de wet- en regelgeving zit, maar goed de gemeente had de ambitie om het wel mee te nemen in het plan en dat maakt het wel moeilijk omdat je natuurlijk wel een ontwerpproces gewoon hebt, waarbij je

ontwerpkeuzes moet maken, waarin je wel voorzieningen treft voor het nest geluid, waarbij je dus in eerste instantie nog niet weet of die voorzieningen wel nodig zijn. Dus wat we gedaan hebben is dat we het een beetje afgepeld hebben, je hebt bepaalde ontwerpkeuzes die je vroegtijdig in je ontwerpproces moet maken, nou die hebben we gewoon genomen zoals mechanische ventilatie. Je moet er natuurlijk gewoon voorzieningen voor treffen in je gebouw dus dat heeft ook echt wel invloed gehad op het ontwerp van je gebouw en de ruimtes in je woningen en je energieconcept. Dus die keuzen die hebben we relatief vroeg moeten maken, tijdens VO en nou ja glasdiktes en kierdichting van je kozijnen, ja dat kan later dus dat hebben we opgeknipt, ook in de afspraken met de gemeente. Daarbij hebben we in overleg met de gemeente ervoor gekozen hebben van nou de ontwerpkeuze voor de mechanische ventilatie en wtw (warmteterugwinning) die maken we tijdens het VO en die andere keuze die stellen we zo lang mogelijk uit als voor meer grip eigenlijk hebben op het nest geluid en die keuze, uiteindelijk is dat dan wel gewoon goed gedaan.

14,3. Puur reflecterend op dit proces, denk je dat deze problemen voorkomen hadden kunnen worden?

Ja dat zou kunnen door een bestemmingsplan bijvoorbeeld of een nota van uitgangspunten te koppelen aan een soort checklist hè, aan de andere kant is dat ook weer een deel van ons werk om die check te doen vind ik. Maar tegelijkertijd stel je zou zo'n checklist maken, dat is natuurlijk ook mega foutgevoelig want hoe zorg je ervoor dat dat actueel is? Het maakt het natuurlijk ook gewoon onwijs lastig dat je gewoon te maken hebt met heel veel kaders die op heel veel verschillende plekken staan. Kijk je hebt dus een Nota van Uitgangspunten die wordt in het voortraject vastgesteld, nou die geldt dan nog en vervolgens is er nou twee jaar daarna is er ook een bestemmingsplan. Nou als je een bestemmingsplan en een nota van uitgangspunten hebt zou je zeggen dat die hetzelfde moeten zijn, nou wil het nog wel eens dat daar wat afwijkingen tussen zitten. Waar houd je je dan aan? Daar moet je dan dus een gesprek over aangaan. Verder het hoogheemraadschap, die schrijft dingen in de Keur, nou de Keur die zit weer niet in de ruimtelijke plannen. Dus het is heel moeilijk denk ik om dat te structureren en als je het al gestructureerd hebt, hoe zorg je er dan voor dat dat actueel is en dat je zeker weet dat het klopt wat daar staat op dat moment? Kijk als je gewoon alle documenten naast elkaar hebt, wetenschap hebt van die documenten en de inhoud daarvan dan kan je veel actiever sturen en ben je denk ik ook veel meer bezig met die kaders, omdat je daadwerkelijk je erin moet verdiepen dan dat het een checklist zou zijn van nou oké, checklist zegt dat het erin zit dus dan zal het er wel in zitten. Het dwingt je echt, dat is meer wat ik bedoel te zeggen; juist die structuur die er nu niet is, die dwingt je als ontwikkelaar om je echt te verdiepen in een locatie en in de omgeving, waardoor als er iets wijzigt dat je ook gelijk weet van; oh nu moet ik even opletten, nu moet dat ook even aangepast worden, of nu moet ik in gesprek gaan met die afdeling van de gemeente of met dat instituut want die hebben nu dat bedacht en dat betekent dat voor mijn plan, dus daar moeten we iets mee.

Maar stel nou dat je het naast elkaar zou kunnen doen?

Nee dat werkt niet, je wordt er lui van denk ik. Want je hebt het druk, dus je je... naja niet allemaal, ik zal de ambitie dan hebben om er wel degelijk even te verdiepen in alles hè, waarom staat dat op de checklist en wat is daar de achtergrond van? Wat betekent dat nou? Enzovoort, maar tegelijkertijd heb je het druk, als je gaat denken van nou dat doe ik wel even als ik de tijd heb. Nou je hebt geen tijd, maar je ontwerpproces loopt. Het kan in theorie naast elkaar bestaan, maar in de praktijk zou het ook kunnen bestaan, maar ik denk dat het voor heel veel ontwikkelaars een soort moetje wordt weet je wel. Vaak zal het ook echt wel goed gaan, maar het gaat er juist om dat je net die ene keer hebt dat niet goed gaat en dan heb je gewoon echt een serieus probleem.

14,4. Komen dit soort problemen vaker voor binnen bij andere projecten?

Nou kijk dat je iets moet aanpassen, echt op massaniveau dat gebeurt niet zo heel vaak. Als het dan gebeurt dan heeft het vaak niet zozeer te maken denk ik met de omgevingsfactoren maar meer met je plannen haalbaar maken, dus dat zit dan weer meer aan je opbrengsten of kostenkant waarbij een bouwlaagje meer of minder misschien net het verschil zou kunnen maken, of net wat extra omzet en dan wil dat nog wel eens gebeuren maar dit heeft voor zover mijn ervaring is, ja gebeurt toch niet vaak doordat er iets vanuit de omgevingskaders over het hoofd gezien is.
Vaak is het natuurlijk wel zo en dat is wel interessant denk ik, dat je bewust afwijkt van iets in het bestemmingsplan. Een gemeente mag natuurlijk afwijken van het bestemmingsplan, binnen bepaalde marge mogen ze kruimelen en het wil nog wel zo zijn dat je daar de grenzen in opzoekt en dat dat dan nou linksom of rechtsom toch net even iets wat anders moet, dus dat ze willen afwijken maar dan moet het net even iets anders. Ja dan moet je wel terug, maar goed dat ga je ook niet oplossen met een bepaalde tool waarin je alle omgevingsfactoren kan inladen want daaruit heb je nog steeds die die afwijkingsbevoegdheid die een gemeente heeft en die is soms wel probeert op te zoeken.

B-5 Interview #4

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: #4

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

Zou je je eerst even voor kunnen stellen?

51 jaar. Ik werk inmiddels bijna 13 jaar bij Dudok. Ik heb hiervoor 15 jaar bij Vorm gewerkt. Ik ben bouwkundig opgeleid, HBO. 7 jaar lang ben ik werkvoorbereider geweest bij Vorm, toen was het normaal dat je na 8 tot 10 jaar uitvoerder werd en als je het dan heel goed deed kon je projectleider worden, dat was een beetje de kweekvijver die daar zo liep. Ik heb een half jaartje aan de uitvoering mogen ruiken en dat was helemaal niks voor mij. Toen ben ik gaan solliciteren bij een projectontwikkelaar waar ik op dat moment toevallig ook mee samenwerken voor een project en toen ik thuiskwam ging mijn vaste telefoon en werd ik gebeld door een directeur van vorm. Na een gesprek op kantoor ben ik binnen vorm overgestapt van bouw naar projectontwikkeling. Dat was toen nog een heel kleine afdeling. Ik heb daar nog een jaar of 8 gewerkt, toen ben ik overgestapt naar Dudok.

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?

Ja dat komt volgens mij redelijk met elkaar, dat zijn fases die bij alle projectontwikkelaars gebruikt worden. In de initiatieffase ga je in het prille begin met elkaar een beetje schetsen en kijken wat er kan, grof rekenen, is dat haalbaar? En kun je daar mee verder? Dan ga je naar VO. Zo maak je je stappen om tot realisatie te komen.
Maar de initiatieffase voor binnenstedelijke vastgoedontwikkeling, dat verschilt natuurlijk wel een klein beetje. Kijk wat je ziet, wij zijn in verhouding tot Dura een kleinere speler, Dura is natuurlijk veel groter. Wij zijn nu met 22 mensen waarvan de helft van de mensen ongeveer finance is en beleggen, dus onze beleggingsportefeuille. Bij Dura zie je natuurlijk veel meer dat die een bouw tak en een ontwikkel tak hebben. Dus wij zijn met een wat kleinere groep bezig met ontwikkelen, wij hebben geen aparte afdeling met concepten of iets dergelijks. Ik denk dat bij Dura er een afdeling is waar concepten worden gemaakt met conceptontwikkelaars in dienst. Die hebben wij niet. Als je bij ons in dienst bent dan wordt er

verwacht dat je ook echt alles bent, en kunt en doet. Daar ben je dan ook eindverantwoordelijk voor. Dat is een beetje het verschil tussen ons en de wat grotere ontwikkelaars.
Als je globaal bijvoorbeeld kijkt, we hebben een tender meegedaan met Dura Vermeer, niet gewonnen helaas. Maar wat je daar zag dat is gewoon een oud bedrijfsterrein en dat moet getransformeerd worden naar een heel groot woningbouwgebied in de regio. Nou wat je dan met elkaar doet is dat je eerst zelf als ontwikkelaars gaat kijken; hoe groot is dat terrein? Wat voor panden staan erop die behouden moeten blijven? Staan die er überhaupt op of mag alles weg? Hoe ziet de buurt eruit? Waar is behoefte aan? Dat zijn een aantal marktanalyses die we doen. Wat moeten we toevoegen? Wat voor type woningen? Of zijn het wel woningen, of moet je meer op ouderenzorg richten. Dus je gaat eigenlijk alle factoren afpellen om te kijken wat van invloed is op het gene wat jij voor ogen hebt, misschien komt er wel uit dat er behoefte is aan kontoren in plaats van woningen. Dat is op dit moment niet zo hoor, maar dat zou zomaar een uitkomst kunnen zijn. Dan ga je eigenlijk in gesprek met de gemeente om te kijken joh wat wil de gemeente? Dan ga je met elkaar bepalen van wat is nou eigenlijk het programma dat je voor ogen hebt op die locatie, wat voor programma heeft de gemeente voor ambitie? En daarvandaan ga je dan modellen maken, ik doe dat vaak nog met een schetsrol. Dat is de manier waarop ik het vroeger heb geleerd en ik het gewoon fijn vindt, maar ik zie gewoon dat iedereen dat tegenwoordig digitaal doet, wat ik ook gewoon super vindt. Je ziet steeds minder zelf schets erin en dat collega's dat op die manier doen. Dan ga je met elkaar kijken van joh wat zijn de mogelijkheden, en bij ons is het altijd zo; tekenen, rekenen. Dus ik wil continue gelijk aan het begin al bij de eerste schets, maken we een verkaveling en kijken we met elkaar wat voor programma kan erop of wat voor volume. Dan ga je nog niet kijken hoeveel woningen dat precies zijn, maar je gaat kijken hoeveel vierkante meter, hoeveel kuub kan ik erop kwijt. Dan ga ik berekenen wat voor programma zou het dan kunnen zijn, maak ik een hele korte berekening en je kijkt met elkaar is daar een haalbare businesscase op te maken? Wat moeten we voor die grond betalen? Is die grond van de gemeente of van een particulier en kunnen we die gewoon kopen? Kunnen we een bieding doen? Die processen zijn natuurlijk verschillend. Dus het is net afhankelijk welke afhankelijk je eigenlijk bent, want heb je een locatie die je uit de markt haalt omdat je langs fietst en aanbelt en zegt goh ik wil je pand kopen en diegene wil toevallig verkopen, of heb je op een tender ingeschreven bij de gemeente waarbij je mee moet doen aan de uitvraag, want dan zie je dat de gemeente vaak zelf al heel veel programma heeft bepaald wat ze op die locatie willen hebben en dan wordt het natuurlijk een uitvraag die al veel meer toegespitst op een bepaalde vraag van de gemeente. Dus het verschil tussen is de grond van de gemeente en heeft de gemeente al een heel programma uitgeschreven? Of is het een initiatief van jezelf en kom je zelf met voorbeeld ideeën en ga je bij de gemeente proberen dat voor elkaar te krijgen.
Even als voorbeeld in Schiedam hebben wij de glasfabriek gekocht, dat is een terrein van bijna 6 hectare en daar werd vroeger, ja de naam zegt het al, het was een fabriek waar glas werd geblazen. Die glasfabriek is dicht en daar gaan wij een woonwijk ontwikkelen. Maar die locatie hebben wij gewoon gekocht van de eigenaar van de glasfabriek. Dan ga je bij de gemeente aankloppen en zeg je gewoon van joh wij willen hier een ontwikkeling voor de grond, willen jullie dat ook. Ja heel graag zegt de gemeente dan. Nou wat voor programma hebben jullie voor ogen, wat willen wij als programma? Dan ga je samen proberen te komen tot een programma en dan zou een tool waarmee je dus alle factoren in kunt laden zou heel erg handig zijn. Die je daarin helpt en allerhande opties neerlegt in plaats van dat ik zelf 86 verschillende opties ga zitten tekenen met mijn schetsrol.

Conceptontwikkeling

2. Hoe ziet het conceptontwerpproces van binnen deze initiatieffase eruit?

Als je eenmaal een locatie hebt, ik ga er nu maar even vanuit dat wij zelf een locatie hebben, ik pak de glasfabriek. Die locatie hebben wij ondertussen verworven. Dan koop je hem terwijl de bestemming nog fabrieksterrein is, dus je koopt de locatie eigenlijk zeg maar als

fabrieksterrein en dan ga je het risico aan of je daar überhaupt straks wel woningen mag gaan maken want je hebt nog niks op papier van de gemeente waarin in het bestemmingsplan staat dat het mag, je hebt al wel polshoogte genomen wat ze willen. Maar elke vier jaar komt er een nieuw college en elke vier jaar ben je weer aan het afwachten of dit college dezelfde dingen door wil zetten als het vorige college, dus je hebt niet zo heel makkelijk dat je precies weet wat het wordt, het is een risico. Dat zie je ook eigenlijk met de verschillende fases binnen de projectontwikkeling, elke keer ga je het risico verminderen. Nu zijn we zover dat we een anterieure overeenkomt hebben getekend met de gemeente, dat is een voorovereenkomst waarin de gemeente aangeeft van joh ik ben onder de volgende voorwaarde bereid om het bestemmingsplan aan te passen naar dit en dit en dit programma globaal. Dan heb je dus al iets op papier staan van de gemeente, maar dat kregen we pas een jaar na aankoop van de locatie. Dat betekent natuurlijk wel dat de locatie in de tussentijd veel minder risico heeft gekregen en dus ook meer waard is geworden. Nu zijn we bezig om met de gemeente die Nota van Uitgangspunten om te zetten in een bestemmingsplan, dat bestemmingsplan wordt nu voorbereid om uiteindelijk eind van het jaar in procedure te brengen. Dan ga je uiteindelijk echt de procedure in om een bestemmingsplan te wijzigen naar wonen. Dat moeten dan 20% sociale huurwoningen zijn van max 750 euro, ik noem maar even iets. Dat moet zoveel procent middensegment huurwoningen zijn, zoveel procent midden koopwoningen zijn, het mag zoveel procent dure koop zijn. Er moet zoveel programma in wat winkels betreft of wat commerciële ruimtes betreft, zoveel parkeren meegenomen. Dat wordt allemaal in het bestemmingsplan uiteindelijk neergezet.
Kijk in het begin schets ik altijd even zelf, of schetsen we altijd even zelf, dat doet Dura ook, maar op een gegeven moment kies je er natuurlijk voor om een architect erbij te gaan betrekken en dan ga je de architect met een programma op pad sturen en die gaat voor je schetsen. Dan ga je naar die schetsen kijken en zeg je nou dit is niet wat ik wil, dit is meer wat ik wil.

3. In hoeverre is er enige consistentie in het aantal concept ontwerpen dat wordt gemaakt?

Weet ik niet, nee ik denk het niet. We hebben bijvoorbeeld als ik naar het case project kijk dat is wel een leuk voorbeeld, daar hadden we eerst gedacht om daar twee hoge torens neer te zetten. Nou toen zei de stedenbouwkundige van de gemeente; ik ben helemaal klaar met torens in Rotterdam, ik wil in dit gebied geen torens. Toen zijn we gaan kijken hoe kunnen we dan wel een ontwikkeling voor elkaar krijgen? Eigenlijk is het grappige dat we met het ontwerp nu net zo veel woningen maken als dat we toen in twee torens hadden willen maken, alleen nu is het een veel laagdrempeliger en kleinere ontwikkeling geworden.

3,1. In hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?

Ja fantastisch. Ik denk dat de mensen die conceptontwikkeling doen heel creatief zijn, maar je moet het van je eigen creatieve geest hebben. Wanneer er al meerdere voorbeelden liggen, kijk ik denk niet dat je een voorbeeld zo één op één zo gaat maken en zo gaat vertalen, maar het geeft wel nieuwe inzichten waardoor je misschien tot andere inzichten kunt komen dan dat je zelf had gekomen. Het is heel moeilijk om van schets af aan zomaar iets neer te leggen, als er eenmaal iets ligt is het veel makkelijker om daar commentaar op te hebben en het aan te passen, om er vervolgens iets beters van te maken. Dat is veel makkelijker, dus ik denk dat als jij allerhande voorstellen hebt liggen, dan wordt het natuurlijk makkelijker om vanuit die voorstellen vandaan uiteindelijk tot een ontwerp te komen, tot een verkaveling te komen. Dus ik denk dat het heel erg kan helpen.

3,2. Waarom gebeurt dat nu dan niet?

Er worden wel veel concept ontwerpen gemaakt, maar het liefst zou ik hebben dat je een model kan maken waar gewoon 80 verschillende verkavelingen uit komen, ik noem maar even

iets. Dat is gewoon tijd natuurlijk, als jij een architect vraagt om 80 verkavelingen te tekenen, ja dat kost heel veel tijd en dus ook heel veel geld. Je wil eigenlijk natuurlijk in een zo vroeg mogelijk stadium, met zo weinig mogelijk investering zo veel mogelijk opties weten.

4. Zijn er standaard problemen/uitdagingen waar je in het huidige conceptontwerpproces tegenaan loopt?

Ja capaciteit bij de gemeente is een hele belangrijke uitdaging waar je heel veel tegenaan loopt. Je merkt gewoon dat de gemeente eigenlijk te weinig mensen heeft en daardoor dus niet goed antwoord kunnen geven op jouw vragen en ze dus echt iemand dedicated op jouw project aan te stellen. Ja dan moeten ze er wel zijn, ze moeten de ruimte, tijd en mensen er voor hebben. Dat is denk ik wel een heel groot probleem. Doordat er zo weinig mensen zijn is de capaciteit van de mensen er niet, dan gaan ze dus concessies doen en mensen inhuren die misschien net wat minder ervaren zijn in een bepaald gebied. De capaciteit van die mensen is dan soms ook niet toereikend, iemand die misschien wat beter is in het één, ook iets moet gaan vinden van iets waar ze misschien minder goed in zijn. Dat maakt het complexer.
En ik denk omgevingsfactoren als het hoogheemraadschap en het waterschap. Een molenbiotoop, allemaal dingen die er omheen hangen, die niet heel belangrijk lijken. Dat is meer het punt denk ik. Er zijn heel veel omgevingsfactoren die helemaal niet belangrijk lijken, maar als je er van tevoren niet over nagedacht hebben kun je er naderhand jaren vertraging door oplopen.

Heb je een idee hoe dat opgelost zou kunnen worden, hoe dat verbeterd kan worden?

Ik heb er wel een mening over, maar als ik het op kon lossen dan had ik het al lang gedaan. Je ziet gewoon dat een hoogheemraadschap of een waterschap, dat is een beetje een ambtelijke organisatie waarbij je echt bij het goede poppetje moet zijn om iets voor elkaar te krijgen en totdat je er bent kom je alleen maar mensen tegen die ingehuurd zijn om tegen te zijn zeg ik altijd maar, dat is een beetje heel plat hoor zo moet je het niet opvatten, maar dat is wel wat er gebeurd. Heel vaak moet er een maatoplossing komen, in Rotterdam heb je nu last op meerdere plekken van nest geluid, dat is hier opgelost bij het case project, maar er zijn volop projecten die stilliggen vanwege nest geluid. Wie verzint dat?

Is dat nest geluid iets nieuws dan?

Nou het nieuwe eraan is dat de berekeningsmethode is aangepast en doordat deze is aangepast is het een probleem geworden. Vanuit de regelgeving is er een andere rekenmethode gekomen en daardoor komt het veel meer aan het daglicht en heeft het veel meer invloed op de ontwikkeling.
De vraag was nu in hoeverre je dat mee moest rekenen in het bouwbesluit met maatregelen die je moest treffen in de woning. Het werd eerst gezien als iets dat af en toe gebeurde, en nu is het zo dat ze zeggen ja maar die schepen liggen daar natuurlijk veel vaker. Hoe dichter je erbij ligt, hoe vaker het voor komt. Dat betekent dat je er veel meer rekening mee moet houden. Hij is zwaarder gaan wegen in de berekening.

Evaluatieproces

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.

Het woord "objectief" verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen?

Ja a: dat is niet wat je in je eentje besluit, dat is iets wat je met elkaar in overleg besluit, maar het belang van de ontwikkelaars is natuurlijk vaak anders dan het belang van de gemeente in dit geval. Wat wij in ieder geval vaak doen is dat we echt zoeken naar de variant waarin wij het programma gaan zetten waar we trots op kunnen zijn, dus waar we blij van worden en zeggen van joh hier kan ik mezelf mee associëren, als ik langs loop ben ik trots dat wij dit ontwikkeld hebben, in combinatie met het feit dat we er het meeste geld mee hebben verdiend. Ja heel simpel wij zijn een partij die graag geld willen verdienen en daar schamen we ons ook helemaal niet voor, maar dat willen we graag doen door mooie dingen voor mensen te maken. Die afweging, die balans zoek je. Dus je zoekt eigenlijk een verkaveling, een stedenbouwkundig ontwerp waarin je zegt van nou hier is de kwaliteit van hoog niveau, hier wil je als mens graag wonen, dit is wat je wil hebben, in verhouding met het feit dat het voldoende geld verdient. Evenals voorbeeld dan, je hebt een project, dan kan het soms best wel eens zo zijn dat je met acht woningen voor een project (dat is veel te klein, zulke kleine projecten bouwen we helemaal niet) meer geld verdient, dan met een project met tien woningen. Terwijl ook de kwaliteit van leven veel hoger is voor die acht woningen. Je kunt een heel rijtej met huizen neer zetten met vrij op naam (v.o.n.) prijzen voor een rijtjeshuis, of je kunt geschakelde twee-onder-een-kap woningen neer zetten en misschien is het verdienmodel voor die twee-kapper wel veel beter dan voor die rijwoning en het wonen in die woning is misschien ook wel veel plezieriger. Dus je moet echt heel goed kijken van joh, hoe is de mix tussen het programma… de afweging is eigenlijk de balans tussen programma en geld, en risico. Die sloeg ik nu even over, maar het kan ook best zo zijn dat de markt voor twee-kappers er momenteel helemaal niet is. Dan moet je op de rijwoningen inzetten. Dus dat heeft echt te maken met allerhande factoren, je zult moeten kijken hoe de markt in elkaar zit; wat is de vraag van de markt? Wat is het programma waar je zegt van joh dit past echt op deze plek en daar is de marktvraag naar, door de gemeente ook. En wat is gewoon functioneel gezien het meest optimaal?

6,1. In hoeverre zijn deze subjectieve parameters toetsbaar denk je en gewenst?

Objectieve parameters kun je makkelijk in je model implementeren, subjectieve parameters worden wat lastiger om in je model te krijgen.
De vraag is een beetje of je die tastbaar moet maken, ik kan me ook best voorstellen dat je gewoon een model gebruikt wat uitgaat van objectieve parameters en dat wij als project/conceptontwikkelaars, als mens, die subjectieve kant voor onszelf afwegen en aan de hand daarvan de keuze maken tussen de modellen. Van nou dat model is niet interessant, want daar is die parameter niet goed in meegewogen.
Wat is een subjectieve parameter in dit verhaal. Als je de molenbiotoop neemt, objectief kun je natuurlijk gewoon zien van joh dit is de hoogte waarin de wind aankomt, dus dat betekent dat je binnen die straal daar geen bebouwing mag hebben want die belemmerd de wint, dat is hartstikke objectief. Subjectief is bijvoorbeeld een verkaveling, willen mensen daar wel wonen op die manier? Is dit wel passend zoals jij wil dat het ontwerp inderdaad is.
Objectief kun je redelijk zwart/wit maken, subjectief natuurlijk niet. Het kan best zijn dat ik het een waanzinnig mooie verkaveling vindt, maar de stedenbouwkundige van de gemeente vindt het helemaal niks. Dat maakt het heel lastig om daar een score aan te hangen denk ik.

6,2. In hoeverre zijn de objectieve parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?

Ja een hoogheemraadschap geeft aan dat je niet in een dijklichaam mag bouwen, dan kun je precies meten vanuit de tekening waar je wel en geen heipalen mag slaan. Hetzelfde geld voor geluid, je kan precies zien hoeveel geluidbelasting er op een gevel komt en welke voorziening je dan moet nemen, moet je een dove gevel nemen? Daar kan ik veel meer mee, dat is veel meer oplosbaar.

Waar in het proces ga je naar zulke parameters kijken?

Je gaat natuurlijk afwegen, welke factoren zijn zo erg van invloed op de ontwikkeling dat het je ontwerp echt helemaal aanpast en welke zaken kun je gewoon implementeren in je plan, daar zit natuurlijk een verschil in. Je moet heel goed afwegen wat zijn de omgevingsfactoren, eigenlijk in een due diligence onderzoek. Voordat je een locatie aan gaat kopen ga je natuurlijk altijd kijken wat zijn de factoren die straks van invloed zijn op mijn ontwerp? Bestemmingsplan is vaak één, daar komt bij hindercontouren, voor hetzelfde geld zit er een natura 2000 gebied in een cirkel van twee kilometer binnen je project.

7. In hoeverre is het concept evaluatieproces gestructureerd?

Wij hebben checklists. Wij hebben gewoon een checklist die we langslopen, een ontwikkelaar bij ons die wat meer met conceptontwikkeling bezig is die gaat die hele checklist af. Die gaat het rijtje af.
A: een hele belangrijke misschien; er is een enorm woningbouwtekort op dit moment in Nederland, maar het grappige is dat de provincie heeft bepaalde gebieden toegewezen waar ze graag woningen willen toevoegen, maar ze hebben ook gebieden toegewezen waar helemaal niet zo veel woningen toegevoegd hoeven te worden. Dus wij kregen bijvoorbeeld een locatie in Oud-Bijerland aangeboden om daar woningen te bouwen, maar Oud Bijerland heeft helemaal niet genoeg woning contigent, dus dan moet je voor elke woning gaan strijden bij de gemeente om die woning te gaan maken. Daarom wordt daar dus minder ontwikkeld en zijn ontwikkelaars minder geïnteresseerd. Dus dat is een parameter; zijn er woningcontigenten toegewezen? Nou bijvoorbeeld in Rotterdam of hier in Dordrecht is dat enorm, er is een enorm te kort aan woningen. Hier in Dordrecht moeten we geloof ik 1000 woningen per jaar toevoegen, in Rotterdam 4000 woningen per jaar. Oud Bijerland 0, dus dat is natuurlijk echt wel een parameter waar je eerst naar kijkt.

Vervolgens ga je kijken ligt de locatie dicht bij het openbaar vervoer, of niet? Heb ik genoeg plek om parkeervoorzieningen te maken, of niet? Je gaat kijken naar wat er aan contouren omheen zitten, zitten er fabrieken voorbij die hindercontouren opleveren. Je gaat geen woning kopen net naast een fabriek bijvoorbeeld. Dat zijn omgevingsfactoren waar je mee te maken hebt, geluid van een spoor, ontploffingsgevaar van een spoor, een rijksweg die heel veel herrie maakt. Een contour bij de rivier waarbij je 25 meter uit de vaarlijnen moet blijven vanwege aanvaargevaar, als er een boot zomaar de kade op komt varen

Hoe beoordeel je deze zaken dan, gaat dat op gevoel of echt op objectieve data?

Je probeert het meeste op objectieve kennis te doen, maar soms mis je ook iets. Ik zal een voorbeeld geven, dat gebeurt ons nu niet zo makkelijk meer maar vroeger waren we met minder mensen en nu hebben we meer personeel. Maar we hebben een keer een locatie gekocht waar wij woningen wilde gaan neerzetten en daar dachten wij hele mooie dure woningen neer te zetten, maar toen bleek dat de gemeente voorbereidingen aan het treffen was om een woonwagenkamp aan de overkant neer te zetten. Dat werden iets minder dure woningen. Die factor heb je dan gewoon gemist, dat is niet zo handig. Ja je maakt daar fouten in, je kan ook inschattingen maken van ja dat geluid dat los ik denk ik wel op, ja tot dat de gemeente vast blijft houden, niet akkoord, ik wil het gewoon niet hebben.

Heb je dan bijvoorbeeld al wel het aantal dB in beeld?

Ja, die decibel kun je natuurlijk tegenhouden. Waar ik zelf moeite mee heb is dat is dat er als overheid wordt gezegd; wij willen dat er in die gevel geen te openen ramen zijn, want je mag daar geen geluidsoverlast hebben. Terwijl die bewoner misschien wel zegt van ja; ik vind die geluidsoverlast helemaal niet zo erg, als ik mijn raampje maar lekker open kan zetten. Dus wat ik zelf soms wel ingewikkeld vind is dat de regelgeving is die iets bepaald, terwijl iemand die

er uiteindelijk gaat wonen ja helemaal dus niet meer ze eigen keuze mag maken daarin. Je kan ook gewoon zeggen, plaats ramen die heel erg goed geluidsdicht zijn en laat die mensen zelf bepalen of ze het raampje open of dicht zetten te ja of te nee. Maar zo werkt dat hier niet.

Dan wil ik toch nog graag terugkomen op die checklist en de beoordeling daarvan, in hoeverre beoordeeld die checklist een concept ontwerp echt op objectieve data?

Nou het gaat bij ons ook op gevoel hoor, zeker ook wel maar, ik heb wel per fase een fasedocument. In het fasedocument staat eigenlijk die parameters in en daar moeten vinkjes achter staan. Voordat ik een go geef om te investeren in de volgende fase moet er een handtekening onder dat fasedocument staan omdat ik akkoord ga met het eerste ontwerp, uitgangspunten, financiële parameters en de planning. Dat moet aan het fasedocument vastzitten, daar zet ik een krabbel onder, daar zet de ontwikkelaar een krabbel onder en als die krabbel er staat kunnen we door naar het schetsontwerp en het voorlopig ontwerp, etc. Daardoor hebben we met elkaar wel elke keer een meetinstrument waarvan we weten, we hebben op basis van ‘’deze’’ keuzes gezegd, we gaan door naar de volgende fase.

Misschien val ik in herhaling, maar dat eerste ontwerp wat je noemt; in hoeverre wordt daar al objectief gekeken naar omgevingsfactoren?

Daar wordt al wel naar omgevingsfactoren gekeken ja. Heel simpel als jij denkt ergens een woonwijk te kunnen gaan creëren en Dupont staat ernaast of het spoor met hindercontouren en ontploffingsgevaar, ja dan moet je een ander ontwerp maken, of het helemaal niet doen.

En hoe wordt dat nu geanalyseerd, ‘’weet’’ je dat iets zo is, of toon je het echt aan?

Nee de ontwikkelaar zoekt er dus bij van dit is een spoor, dan moet hij of zij gaan zoeken wat rijdt er over dat spoor? Er loopt hier in Dordrecht bijvoorbeeld een spoorweg naar Geldermalsen, iedereen denkt dat is een spoor daar is niks mee aan de hand. Dat is een elektrisch treintje, alleen 1x peer week gaat er een trein met chloor naar Dupont overheen, nou dat is een enorm explosiegevaar. Dat zijn dingen die moet je weten voordat je een ontwikkeling gaat doen, die meet je echt van tevoren. Op basis daarvan bepaal je, goh dit betekent dat ik x aantal meter van het spoorgevaar explosiegevaar van gevaarlijke stoffen heb, daar kan ik dus niet slapen, er kunnen geen woningen komen. Je kan er misschien wel kantoren bouwen of een parkeergarage. Dat zijn wel factoren die je in de eerste fase al onderzoekt.
Ik maak onderscheid tussen factoren die verkoop belemmerend zijn, of niet. Je hebt gewoon belemmerende factoren, het kan ook zo zijn dat de grond mega vervuild is en dat wanneer je het wilt gaan saneren dat het veel meer kost dan dat je ooit op kan brengen met de woningen, ja dan is het ook niet interessant. Voor hetzelfde geld leg je er een leeflaag overheen, een folietje en kan je erop wonen. Dat zijn wel dingen die je van tevoren allemaal uitzoekt in de eerste fase.

8. In hoeverre wordt de haalbaarheid van een project getoetst op het moment dat je een concept ontwerp kiest?

Ja dat toetsen we ja, alleen het probleem is wel een klein beetje is; je toets het ontwerp, maar dat zijn heel veel aannames. Je gaat aannemen; even als voorbeeld: we hadden een woonwijk en daar hadden we een analyse laten maken want daar wilde we 500 woningen, aan het water. Toen is er analyse Ecorisk gemaakt en die zeiden van joh de opname van dit soort woningen in dit gebied zijn er maximaal 20 per jaar. Nou 500 woningen, 20 per jaar, dan mag je uitnodigen hoe lang we bezig gaan zijn. Ik heb gezegd hartstikke leuk onderzoek van Ecorisk, maar dit product is er nu op dit moment gewoon niet. Dus ja je kan wel zeggen dat die opname op basis van getallen uit het verleden 20 is, maar dit product is er gewoon niet. Dus ik heb uiteindelijk gezegd van nee we gaan gewoon die woningen ontwikkelen, we gaan het gewoon doen en we gaan ze verkopen. Ja binnen no-time alles uitverkocht. Dus ja je kan wel zeggen

we gaan objectief meten, vanuit het verleden bepalen hoe het in deze situatie is, maar subjectief gezien hebben we uiteindelijk bepaald om die woningen toch neer te zetten op basis van gevoel. We hebben het mega verkocht. Het hoeft dus niet zo te zijn dat de uitkomst van rapportage altijd leidend is of je doorgaat met een project, ja of nee. Je moet ook nog zelf blijven nadenken.

10. Hoe zou je deze onzekerheid met betrekking tot de haalbaarheid van een project tijdens de conceptfase kunnen verminderen denk je?

Ja daar is niet heel makkelijk antwoord voor te geven, maar ook dat zijn natuurlijk factoren die onzekerheid wegnemen. Door een heel goed due diligence onderzoek uit te voeren, dus door heel specifiek te weten wat de omgevingsfactoren zijn die van invloed zijn op je ontwikkeling. Dus ja het enige wat je kan doen is zo goed mogelijk in beeld brengen welke factoren invloed hebben op jouw project, en dat is de taak van de ontwikkelaar om dat uit te zoeken.
Kan ook zijn dat er een fabriek naast zit die helemaal geen overlast veroorzaakt, maar die zoiets heeft van ik wil helemaal geen woningen hiernaast hebben want als ik straks ga uitbreiden gaat dat mij in de weg zitten. Dat moet je van tevoren inschatten want die gaat vervolgens bezwaar maken tot aan de Raad van State als jij eenmaal wel die woningen gaat ontwikkelen. Zulke factoren moet je allemaal goed afwegen van tevoren en door die allemaal goed in beeld te brengen en af te wegen kun je je risico zo klein mogelijk maken. Dat is continue de uitdaging.

<u>Case project</u>

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit?

Wij waren met een aantal collega's aan het fietsen door Rotterdam en wij fietsten langs het gemetselde torentje (monumentale pand) en zagen dat grasveld erachter liggen. Dachten we goh dit is eigenlijk een mooie plek om een ontwikkeling voor elkaar te krijgen. En wij zijn eigenaar van het HAKA-gebouw, die staat in het M4H gebied. Dat gebouw willen we graag gaan ontwikkelen maar dat is heel lastig, want dat gebied komt nog niet heel erg tot ontwikkeling. Er zitten heel veel hindercontouren, maar dit is wel een soort stap van de binnenstad vandaan, naar dit gebied toe. Dus wij zijn eigenlijk gewoon met de fiets naar dat gebouwtje toegereden, hebben we aangebeld en gezegd dat we geïnteresseerde zijn in het pand. Hij wilde graag met pensioen, dus hij had wel behoefte aan een pensioenpotje. Dus we hebben uiteindelijk een deal met elkaar gemaakt en hebben we het monumentale pand gekocht.

Toen zijn we met de gemeente in gesprek gegaan, ik had al een keer gepeild bij de gemeente van goh willen jullie hier woningen? Dat ging toen echt alleen nog maar om het eigen terrein van het monument eigenlijk. Toen hebben wij eigenlijk een plan gemaakt met een architect, want zij waren vanaf het begin af aan al betrokken. De gemeente was heel positief en op een gegeven moment vroeg de gemeente aan ons van ja jullie zijn nu op je eigen plot aan het ontwikkelen, maar eigenlijk vraagt dit gebied om een grootschaligere ontwikkeling dus misschien is het wel goed om daar even met elkaar naar te kijken. Dus wij een groter ontwerp gemaakt voor het totale plangebied waar nu de nieuwbouw wordt gerealiseerd. Dura Vermeer heeft in het verleden de Big Shops en het Dakpark gerealiseerd en toen merkte we in de gesprekken met de gemeente eigenlijk van ja we zijn nu met jullie hiernaar aan het kijken, maar eigenlijk heeft Dura er ook wel een beetje recht op en ja hoe gaan we dat nou precies doen. Dus toen zijn we met Dura in gesprek gegaan van ja we kunnen het elkaar misschien heel moeilijk gaan maken, maar misschien kunnen we het ook gewoon samen op gaan pakken? Dat maakt het leven voor ons beide een stuk aangenamer. Toen zijn we naar de gemeente gegaan met de boodschap dat we de ontwikkeling samen op gaan pakken, nou toen was het pad geplaveid en konden we in gezamenlijkheid de ontwikkeling op gaan pakken.

Toen hebben we afgesproken om 50/50 eigenaar te worden van de locatie omdat ik geloof ik gelijkwaardigheid en het zou leuk zijn als we dan ooit andersom ook gelijkwaardig wat kunnen realiseren.

Zo zijn we gestart en gaan ontwikkelen, dat was allemaal nog voor het Didam-arrest, dat is een uitspraak van de Raad van State en dat ging over supermarkten die lagen in conflict met elkaar. Dat kwam erop neer dat de gemeente niet zomaar 1 op 1 een locatie aan een partij gunnen. Die moeten dat aan heel de markt aanbieden, dat zit nu een beetje in de weg want wij hebben dat 1 op 1 verworven, aan de andere kant geeft het Didam-arrest ook mogelijkheden want als jij als buurman de enige bent die het zo kan ontwikkelen en de ander kan het niet, dan mag de gemeente wel 1 op 1 gunnen. Dus daarom kon het gewoon doorgaan.

12. Hoe zag de conceptontwikkelingsfase binnen de initiatieffase eruit? a. Hoe is de keuze voor het uiteindelijke (concept) ontwerp tot stand gekomen?

Nou wij hadden natuurlijk met de eerste architect een ontwerp gemaakt, en keken of we daar twee torens neer konden zetten. Toen hadden we al gemerkt dat de gemeente dat niet wilde, die wilde veel meer laagdrempelig en lager. Toen zei de gemeente op een gegeven moment van ja het is onze grond ook en we kunnen dat niet zomaar 1 op 1 aan een architect gunnen, daar moet wel een architectenselectie op plaatsvinden. Nou toen hebben we erover gesproken of het nog wel nut had om die architect mee te laten doen want als ze natuurlijk al voorkennis hebben, schrijven andere architecten niet meer in. Dus toen hebben we netjes afgerekend en toen hebben we met de gemeente en Dura een architectenselectie gehouden waarin we uiteindelijk een architect hebben gekozen die het ontwerp heeft gemaakt. Dat is echt een proces geweest waarin wij drie architecten een ontwerp hebben laten maken, met uitgangspunten die wij van tevoren met elkaar gezamenlijk hebben geformuleerd. Die zijn ze komen presenteren aan ons allemaal en aan de hand daarvan hebben we met elkaar een keuze gemaakt welk ontwerp en welke architect wij de beste partij vonden om dit te ontwerpen.

Hoe is die keuze tot stand gekomen, op basis waarvan is die keuze gemaakt?

Nou één ontwerp was één groot monolithisch blok wat hier stond, heel gaaf gebaar, enorm robuust, groot blok. Dan ga je dus weer in de subjectieve discussie met elkaar van ja, het M4H gebied is natuurlijk een heel industrieel groot gebied, wat je wil is dat je een veel fijnmaziger woonmilieu gaat krijgen. Als je dan zo'n groot gebaar gaat maken, stempel je eigenlijk die industriële karakters door, terwijl je juist die liefelijkheid en aardigheid erin wilt krijgen. Aan de hand van dat soort parameters is er gekozen voor een ontwerp wat gewoon veel lievere kleine blokjes heeft. Dus daarvan was er al van de drie ontwerpen ééntje afgevallen, omdat die veel te kolossaal was. Vervolgens ga je kijken van ja hoe kunnen we nou zorgen dat je in zo'n gebied lekker kunt wonen? Nou daar hebben we een hele mooie binnenruimte hier in het ontwerp wat we gekozen hebben. Dit ontwerp sloot daar het best op aan omdat je een heel fijn, lekker binnen gebied kreeg waarin mensen aan de ene kant dicht bij de stad zitten, dicht bij de industrie, maar toch hun eigen rustige woonomgeving hebben in dit gebied. Zo is er uiteindelijk voor dit ontwerp gekozen.

Oké, maar dat is als ik het goed begrijp best wel gebaseerd op subjectieve factoren?

Ja, want de objectieve eigenschappen, daar voldeden ze allemaal aan want die konden ze van tevoren bekijken. Maar subjectief ga je dan kijken van ja dit is toch iets wat ik eigenlijk veel belangrijker vindt.

13. In hoeverre zou je het concept ontwikkelingsproces van het case project als normaal kunnen omschrijven? (Bestemmingsplan wat niet definitief was, geluidshinder, etc.)

Ik vind het een redelijk normaal binnenstedelijk project, voor Rotterdam is die wel wat bijzonderder want het zijn geen torens. Nou zijn er ook wel veel ontwikkelingen in Rotterdam die geen torens zijn hoor. Het is wel een redelijk snel proces geweest, nou weet ik dat Dura met de Grote Beer nog sneller is geweest met de ontwikkeling, maar in ontwikkeltermen is dit redelijk snel gegaan. Ik vind altijd dat onze doorlooptijden veel te lang zijn, ons ontwikkeltraject duurt te lang. Maar deze is in wezen binnen twee jaar ontwikkeld. De Grote Beer anderhalf jaar volgens mij. Meestal duurt het vijf jaar ofzo. Dus qua proces, qua snelheid is het wel sneller gegaan dan normaal, maar verder vind ik het een redelijk normaal proces.
De vraag is alleen van ja; is het goed dat ik het normaal vind dat de gemeente zo lang ergens over doet, als je het vergelijkt met andere projecten is dat heel normaal. In mijn beleving moet het gewoon nog sneller kunnen, dat zie je bij de Grote Beer. Als iedereen echt wil, de goede mensen aan tafel zitten en iedereen zit in de modes van we gaan het nu realiseren, dan kun je veel sneller ontwikkelen.

Hoe kan het dan dat deze ontwikkeling wel relatief snel is gegaan?

Omdat er voldoende aandacht was vanuit de gemeente vandaan, omdat er genoeg aandacht was vanuit ons en Dura en omdat de wethouder er wel baat bij had. Die moest 4000 woningen per jaar halen, de verkiezingen zaten eraan te komen. Hij zat een beetje op het randje of hij het wel of niet zou halen, dus het kwam goed uit om een beetje gas te geven op deze ontwikkeling. Heel subjectief, maar wel belangrijk.

Had het nog sneller gekund denk je?

Ja, ik denk dat het een jaar sneller had gekund, want wij zijn een jaar met de eerste architect bezig geweest, dat hebben we in de vuilnisbak gegooid en zijn we opnieuw begonnen met een nieuwe architect. Dus ja het had een jaar sneller gekund. De gemeente wilde uiteindelijk een ander proces, als ze dat een jaar eerder hadden gezegd hadden we een jaar eerder meerdere architecten op het project gezet en hadden we een jaar eerder van start gekund met bouwen.

14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?

Nou wat je ziet is dat wij eigenlijk als Dudok zijnde vooral bij de conceptfase en het voorlopig ontwerp de kar getrokken, daarna is die door projectontwikkelaars van Dura Vermeer overgenomen.
Dus daarin zie je dat het uit ontwikkelen meer vanuit Dura Vermeer is gekomen en minder vanuit ons.
Ik denk dat je doelt op zaken als de molenbiotoop en het nestgeluid, dat heeft Dura Vermeer dus ook getrokken. Daar ben ik wel continue sparringpartner voor geweest en heb mede de besluiten genomen, maar daar is Dura Vermeer meer de kartrekker in geweest, dus met de overleggen met het hoogheemraadschap etc. Die problemen komen naar voren in de uitontwikkeling

Om terug te komen op de objectieve toetsing van de modellen, je geeft aan dat de modellen voldoen omdat de architecten de eisen kende, maar in hoeverre weet je dan dat alle drie de architecten die objectieve parameters ook echt goed bekeken hebben? Ook dat nestgeluid bijvoorbeeld

Nee dat nestgeluid kwam naderhand, dat kwam in het proces naar voren terwijl we al bezig waren. Dat was er eentje die kregen we naderhand.

Gebeurd het nou ook wel eens dat er een keuze wordt gemaakt voor een concept ontwerp en achteraf blijkt dat het niet goed objectief is getoetst.

Hier bij ons niet, maar dat gebeurt wel zeker. Soms heb je wel zeker dat achteraf blijkt dat een partij toch niet goed genoeg heeft getoetst, of wij zelf misschien niet de goede parameters hebben meegegeven.

14,3. Puur reflecterend op dit proces, denk je dat deze problemen voorkomen hadden kunnen worden?

Nou voorkomen kunnen worden, alles is achteraf te voorkomen. De vraag is in hoeverre het verwijtbaar is dat het niet voorkomen is. Als je kijkt naar het hoogheemraadschap, er ligt gewoon een plek tot waar je mag bouwen, maar achteraf bleek dat er twee kaarten lagen waarbij de lijn net een stukje verschoven is op de ene kaart. Ja als je dan uitgaat van de ene kaart en het hoogheemraadschap komt met een andere kaart… wat is dan te voorkomen? Welke kaart is nou de echte kaart? Uiteindelijk moet je eruit komen met het hoogheemraadschap, nou dat is gelukt. Volgens mij is het blok en meter verschoven en zijn we eruit gekomen.
Natuurlijk denk ik dat je sommige problemen eerder had kunnen ontdekken, ja dat is altijd. Een molenbiotoop hebben we natuurlijk ook mee te maken gekregen, we wisten dat die biotoop er was. Maar, soms denk je bij jezelf; nou, de soep wordt niet zo heet gegeten als die opgediend wordt, dat lossen we nog wel even op. Vaak schat je dat goed in, maar soms schat je dat ook wel verkeerd in.

Het nadeel is, als je alles wil voorkomen, dan moet je jezelf heel specifiek gaan houden aan elk uitgangspunt, maar dan doe je jezelf eigenlijk heel erg tekort. Dat betekent namelijk dat je heel veel dingen die in het grijze vlak liggen overslaat en dan mis je ook heel veel dingen waarmee een project veel gaver, beter, hoger, meer woningen kan worden. Dat mis je allemaal omdat je je dan zo keurig aan de regeltjes houdt. Kijk ik zeg altijd je hebt groen, oranje en rood. Je moet niet in rood komen, het meeste moet in groen zitten, maar er zullen een aantal dingen in het oranje zitten en achteraf kun je dan zeggen ja dat had ik misschien wel of niet moeten doen, maar dat kun je alleen maar zeggen met de wetenschap van nu. Ik zou niet willen dat we alleen maar mensen hebben die alleen maar in het groene vlak bezig zijn en die zeggen; ‘’oranje doe ik niet want dat is te gevaarlijk’’, ja dan mis je gewoon heel veel in je projecten en dat is zonde. Dus je moet altijd het grijze of oranje vlak opzoeken, om uiteindelijk het maximale uit je project te krijgen.

B-6 Interview #5

Onderwerp: Dit onderzoek richt zich voornamelijk op de conceptontwikkelingsfase binnen binnenstedelijke vastgoedontwikkeling. Uit de documentatiestudie blijkt dat deze fase zich binnen het vastgoedontwikkelingsproces van Dura Vermeer bevindt in de Initiatieffase (Flow).

Interviewer: Menno Smit

Geïnterviewde: #5

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Introductievragen

Zou je je eerst even voor kunnen stellen?

Ik ben denk ik inmiddels 43 jaar, of 44 jaar, één van de twee hoop ik. Ik ben van huis uit architect, opgeleid aan de TU Delft. 2003 afgestudeerd. Voor Dura Vermeer werk ik als hoofd conceptontwikkeling. Dus wat wij doen is voor alle gebiedsontwikkelingen het juiste programma, de juiste identiteit en de juiste marktstrategie bedenken. Dat is wat hier gebeurd in de Design Studio. De studio is een soort bij elkaar raapsel van ontwerpers en marktonderzoekers. Daardoor weten we eigenlijk aan de voorkant wat de consument wil, wat voor woonproduct hij wil en dat tekenen of plotten we in zeg maar als een soort eerste stap in de richting van waar we met een gebied of gebouw naartoe willen. Vervolgens zoeken wij partners in de vorm van architecten stedenbouwkundigen, om het verder uit te werken tot een gewenst stedenbouwkundig ruimtelijk concept. Dat doen we eigenlijk van 30 tot 3000 woningen. Dat doen we voornamelijk voor de woningbouw. We maken wel levendige gebieden, we werken vanuit een vijf-generatie model, dus we werken eigenlijk voor de jongeren tot en met de ouderen. Daar hoort ook een stuk levendigheid bij, dus dat gaat over commerciële voorzieningen, dat kan ook over winkelen gaan, mobiliteit en parkeren gaan. Steeds meer zie je dat daar duurzaamheid ingrediënten bij komen. Sinds kort hebben we ook een bioloog in dienst. Om het gesprek zo breed mogelijk te kunnen voeren en aan de voorkant zo veel mogelijk te kunnen weten. Omdat ik denk dat het grootste deel van het geld wordt verdiend in de eerste 10 weken dat we er mee bezig zijn, want dan wordt 80 procent van het plan bedacht. Hoe meer kennis we dan hebben, hoe sterker we er dan op door kunnen borduren.

We zijn een beetje een vreemde eend in de bijt he, want Dura Vermeer is van origine een bouwbedrijf. 10 jaar geleden heeft het bouwbedrijf ingezien dat ontwikkeling ook een hele interessante tak van sport is om die in combinatie op te zetten. Daarom zijn we 7 jaar geleden ook deze studio begonnen, om eigenlijk een stukje kennis, niet vanuit de bouw maar puur vanuit de consument te brengen op het gebied van gebieds- en vastgoedontwikkeling. Bij mijn vorige werkgever deden we het ook al op die manier, en je ziet dat Dura Vermeer best wel snel heeft geschakeld. Dat is een stukje achtergrond.

Vastgoedontwikkeling algemeen

1. Hoe zou je de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces beschrijven?

Dat hangt echt per project af, soms is die initiatieffase van een vastgoedproject meer in een tendervorm, dus dan heeft de gemeente eigenlijk al heel veel voorbereidt tot en met de ruimtelijke envelop. Dan moet je eigenlijk alleen maar nadenken over hoe je het pandje in die ruimtelijke envelop op een goede manier kunt invullen. Dus dan moet je je voorstellen dat de stedenbouwkundige al de straat, wegen heeft uitgezocht en eigenlijk een soort 3D legoblokje heeft gemaakt waarbinnen je je woningen dan kunt maken. Dat is eigenlijk de makkelijke variant. Omgekeerd ook wel weer de moeilijke omdat je dan niet meer over identiteit of vrijheid praat, maar je praat dan over binnen welk percentage kan ik welk programma kwijt en hoe past het precies binnen het puzzeltje. Ontwikkelen wordt dan bijna meer wiskunde dan dat het echt gaat om gevoel. De andere variant is dat er eigenlijk gewoon helemaal niks is. Dat je een groter gebied hebt binnen de stad, bijvoorbeeld een industriegebied, waarbij je helemaal vanaf de voorkant af aan moet gaan nadenken van wat zijn de verbindingen door het gebied heen? Wie komen hier te wonen? Wat voor functies horen erbij? Wat wordt de hoogte? Hoe ga ik er voor zorgen dat die businesscase, het bedrag voor de grond wordt betaald? Wat mag juridisch? Wat zijn de ambities van de stad? Dat lijken twee totaal verschillende takken van sport, dat zijn het ook eigenlijk, maar ze resulteren in hetzelfde doel: een mooie stadswijk of woonwijk maken in een bepaald gebied. Het zijn twee polariteiten, en het case project zat een beetje in het midden. Het was niet één gebouw, je kon er nog straten doorheen maken, je kon er nog mee kneden, hoog / laag kon je nog bepalen, je kon al die facetten nog bepalen. Dus je had nog een bepaalde mate van vrijheid binnen het ruimtelijke kader. Zelfs het aantal woningen konden we geloof ik nog invullen.

Je ziet in toenemende mate dat steeds meer, zeker in de huidige woonvraag, dat de gemeente dingen reguleert, dus dat je steeds meer opgelegd wordt; er moet zoveel procent goedkope huur in moet, zoveel procent midden huur, zo'n stukje koop, zo'n stukje bijzonder programma. Dus dat wordt ook steeds meer een wiskundig spelletje om te komen tot misschien niet het juiste marktbeeld, maar de juiste programmamix.

Waar valt de conceptontwikkelingsfase binnen de initiatieffase van een binnenstedelijk vastgoedontwikkelingsproces?

Het conceptontwikkelingsstukje bepaalt dat jij de woonwijk krijgt waar jij verliefd op wordt, dus of dat nou een industrieel karakter krijgt, Little C bijvoorbeeld in Rotterdam, of dat het meer een groen-stedelijk karakter krijgt, of meer familiair, daar zit zeg maar het stukje conceptontwikkeling in. Dat heeft met alles te maken; hoe je de gebouwen met elkaar schakelt, hoe je de openbare ruimte organiseert, wat voor functie erbij hoort, het hangt heel erg af van wat voor type mens erbij hoort; misschien ben jij wel heel erg blauw en houd je erg van status en heb je niet zo'n behoefte aan gezelligheid, maar misschien heeft iemand anders wel weer heel erg behoefte aan die saamhorigheid en dat betekend dat je die openbare ruimte weer heel anders moet inrichten. Die zoektocht naar hoe je gemeenschappelijk in de stad leeft is eigenlijk het hele verhaal van de conceptontwikkeling, en daar heb je dus ook een enorme vrijheidsgraad in. Ik kan zeg maar van grondgebonden stadswijken tot hoogstedelijk in al die verschillende facetten verschillende woonmilieus creeren, ik kan ook gezellig hoogstedelijk bedenken, of statudgericht hoogstedelijk milieu, dat is eigenlijk een beetje zoeken naar wat is het juiste in marktperspectief wat je daar wilt bereiken, welke doelgroep bereik je daarmee.

Als je met een woningbouwcorporatie werkt, die hebben vaak hele ingewikkelde inschrijfmodellen. Mensen kiezen daar niet echt voor een woning maar die krijgen er één toegewezen. Dan moet je op een hele andere manier gaan schakelen hoe je die buurt maakt dan wanneer je het voor een koper doet. Een koper die kan kiezen, die kan denken ik woon liever in een buitenwijk, of ik woon liever in dat stukje want daar zit het cafe waar ik met mijn

vrienden kan afspreken. Dat is het spel wat we uiteindelijk spelen, dat gaat over identiteit maken.

Conceptontwikkeling

2. Hoe ziet het conceptontwikkelingsproces binnen deze initiatieffase eruit?

Dat kan ook op verschillende manieren, het hangt er een beetje vanaf of dat je het zelf doet of dat het een groepsproces is. Soms heb je een eigen plot, soms heb je vijf of zes stakeholders die in hetzelfde gebied zitten, dan krijg je het stukje dat je het met elkaar eens moet worden over welke identiteit geschikt is voor het gebied. Bijvoorbeeld binnen Schalkwijk hadden we negen eigenaren binnen hetzelfde gebeid, dan moet je stappen gaan zetten dat je met elkaar gelooft dat dit de toekomst is voor het gebied dat je gaat maken. Zit dan hun idee van de waarde erin? Ik denk uiteindelijk als je één gebied maakt wat groter is dan heb je meer waarde dan dat je alleen in je eigen plotje individueel optrekt. Dus je moet eerst met elkaar door één deur, van is dit nou de waarde die we kiezen? En dan pas gemeenschappelijk zeg maar in een proces van stedenbouwkundige plannen en allerlei andere dingen.
Als het alleen je eigen gebiedje is hoef je alleen maar aan te haken op de omgeving of iets ander neer te zetten. Dat onderzoeken wat je op een locatie wil zijn eigenlijk verschillende methodes voor; je kunt beginnen met een waardenspel, je kunt beginnen met tekenen dus verbeelden, je kunt beginnen met eerst inventariseren wat de wensen zijn, je kunt op allerlei manieren organiseren dat mensen op dezelfde manier naar een gebied gaan kijken. En beginnen met samen partners selecteren, dat helpt ook al heel erg in de keuze, met wie gaan we dat nou doen?

En stel nou Dura Vermeer heeft een stuk grond op het oog, kan je wat meer vertellen over hoe dat dan verder gaat?

Nou als we een stuk grond op het oog hebben moeten we het eerst aankopen. Dat is dan de eerste stap zeg maar. Dan gaan we eigenlijk door middel van projecties en de eerste teken en reken sessies doen we een bieding op basis van wat wij denken welk programma er mogelijk is op die locatie. Dan checken we het beleid van de gemeente, checken we het parkeerbeleid, checken we het feit; past het op die locatie? Dat is de methode hoe wij een grondbieding doen. Nou stel die grond kost 10 miljoen euro, dan kopen we die grond en hebben we een soort idee van het plan en een marktbeeld. Dan gaat pas het proces beginnen waarin we afstemmen met de gemeente, stappen zetten met de buren en eventuele andere grondeigenaren, totdat we echt tot een identiteit komen. Dan gaan we pas een plan maken eigenlijk.
Als je nu dat stuk grond hiervoor neemt, dan doen we onze marktanalyse en zien we dat er behoefte is naar grondgebonden woningen, appartementen 80 m^2, etc. Dan maken we wat tekeningen en zeggen we nou dit zou in de intentie ons marktprogramma zijn, onder waarde van deze grondimage, met een x rendement. Dus die tekening is voor ons, wat we zelf willen, daarin zou je natuurlijk allerlei verschillende scenario's kunnen onderzoeken. Wij onderzoeken er meestal een stuk of zes, van wat zou hier nou het best kunnen passen. Dat hangt een beetje van de snelheid af, soms moet je een bieding in een dag doen, dan heb je niet altijd de tijd om 700 verschillende varianten te bekijken. Dus in het aquisitieproces zit nog een stukje ervoor, van gaan we die grond nu kopen? En wat voor massa past er eigenlijk op. Dat heeft heel erg nauw samen te maken met de parkeerbalans, want dat bepaald eigenlijk elk stedenbouwkundig project momenteel.

3 / 3.1 Je geeft aan dat jullie meestal een stuk of 6 scenario's maken, in hoeverre zou je het van toegevoegde waarde vinden als je uit meer concept ontwerpen kon kiezen?

Nou, als die meerdere scenario's toerekenen naar een hoger grond bod, dan is het wel van toegevoegde waarde. Alleen maar scenario's ontwikkelen om scenario's te ontwikkelen heeft

niet zo heel veel zin. En we ontwikkelen scenario's altijd op basis van identiteit he, we hebben net in Breda een studie gedaan; nou je hebt een plot, we hebben een x aantal vierkante meters (25.000 vierkante meter), daar kan voor ons gevoel konden we acht verschillende varianten bedenken. De ene was een stedelijk milieu met grondgebonden woningen, de ander is één groot park met één toren, dus dat is heel extreem he. Wat wil je nou echt maken met elkaar om dat voor elkaar te krijgen, en in die bandbreedte zitten ook die scenario's.
Dus volgens mij, als je een model gekozen hebt, dus stel ik kies voor groen met een toren, dan is het volgens mij super interessant om 50 verschillende varianten te hebben, over hoe nou die toren het beste voor de zon en alle andere dingen gepositioneerd kan worden. Dan heb je een richting gekozen en wordt het volgens mij heel interessant om iets te hebben wat voor jou het optimum zoekt tussen ruimtelijke kwaliteit en programmadifferentiatie, of misschien alleen maar programmadifferentiatie, dus dan gaat het alleen maar over geld. Dat is een interessante stap denk ik, je hoort zelf al in het gesprek dat het bijna overal gaat om rekenen / tekenen, dus iets wat sneller voor jou rekent is altijd van toegevoegde waarde denk ik zelf.
Dus enerzijds correlatie parkeerbalans/ programma, anderzijds van hoeveel kan er op het plot in combinatie met de ruimtelijke kwaliteit dat is een hele belangrijke correlatie. Zo zijn er veel verschillende parameters die heel interessant zijn als je die aan de voorkant eruit kan krijgen. Als je die kunt kneden naar onze eigen waarden.

Waarom gebeurt dat nu dan niet?

Ja die studies gebeuren nu, maar die gebeuren nu met de hand. Dat doen we nu op basis van onze eigen kennis en kunde. En daar zit een facet achter he, we werken voor een bouwbedrijf, dat zeggen we ook altijd. Dus voor een deel weten wij hoe we kunnen bouwen. Dus je kunt wel een studietje doen op basis van BVO, GO en de verhouding, van dit past er ongeveer in, maar uiteindelijk zit ons verdienmodel ook in dat we weten dat alles recht boven elkaar staat en dat we die types ook gewoon heel snel kunnen bouwen. Die kennis, die bouwcomponent, het is heel interessant dat die kennis ook weer naar voren komt. Dat gaat over hele stomme dingen he, bijvoorbeeld over wat voor schachten erin zitten, of over wat voor duurzaamheidssystemen erin zitten, hoe hoog je kan gaan om tot een bepaalde bouwkosten cap te komen zeg maar. Dat zijn allemaal van die componentjes die je een beetje intuïtief weet, die je meeneemt naar die voorkant om die studies mee te doen.
Daar ben ik altijd een beetje naar aan het zoeken, hoe je dat nou moet integreren. Dat is dan ook wel de grap he, we doen elke acht jaar een nieuwe gebiedsontwikkeling, we doen er een aantal tegelijkertijd. Dus je ziet dat alles wat we bouwen, die kennis wordt weer meegenomen naar de volgende gebiedsontwikkeling. Dus naakt die marktkennis hebben we ook die fysieke kennis in huis.

4. Tegen welke problemen/uitdagingen loop je op tijdens het conceptontwikkelingstraject?

Capaciteit... En dat je soms te veel tijd in de verkeerde dingen steekt, want je doet best relatief veel acquisities die niet landen, dus het gaat vooral over tijd en capaciteit.
En wat ik heel erg interessant vind is dat je een aantal dingen niet weet, die je met een ander programma ofzo bijvoorbeeld wel zou kunnen weten; geluid, zonlicht, allemaal van die fysieke kenmerken die je nu op gevoel meeneemt, die je dan wat tastbaarder kunt uitzoeken. Groencapaciteit, biodiversiteit, dat zijn allemaal soort aannames die je nu gewoon niet precies weet.

Zou je daar wat meer over kunnen vertellen?

Nou bijvoorbeeld nemen we die locatie voor ons, je hebt hier een geluid belaste weg dicht op, dus automatisch maak je al iets dicht bij die weg, maar het hangt maar net van de nuance af hoeveel dB er op zo'n gevel staat en wat voor woningtype je toe kunt voegen. En of je een geluid belaste of andere vorm van gevel maakt. Dat heeft heel veel consequenties op je bod

en ook op je woningschakeling. Als je die woning net iets anders schakelt heb je al die dingen misschien niet nodig. Dan kun je gewoon eigenlijk een hoger bod uitbrengen en meer rendement trekken, omdat je minder voorzieningen hoeft in te rekenen.
Dat heeft ook een beetje iets te maken met een plaatselijke studie ergens langs de snelweg, toen hadden we een hele hoge toren, maar gaandeweg de studie kwamen we er eigenlijk achter dat wanneer we maar tot zes lagen zouden bouwen, we geen geluidbelasting hebben. Dus heel die toren konden we gewoon afknippen, want alles wat we aan investeringen moesten voor die gevelmaatregelen van die toren ging niet in ons rendement zitten. Dan konden we beter een zes lagen hoog blokje maken, want dan hoefden we al die geluidsvoorzieningen niet te doen.
Dan is het weer interessant, als je dat dan maakt, hebben die onderste woningen dan nog wel genoegdaglicht? Klopt dat nog een beetje met het gevoel dat je hebt? De vraag is hoe snel je die kennis in het voorproces moet weten, maar enige notie ervan, dus zeg maar ik weet zeker dat die woning beneden in ieder geval twee uur zonlicht heeft, een hele fysieke parameter, als je kan zeggen ja check, dan weet je dat je het goede model hebt gekozen en kun je daarna ook gewoon weer verder. Dat vind ik zeker de moeite waard om aan de voorkant te weten.

Want hoe gaat dat momenteel?

Momenteel doen we dat op intuïtie.

En waarom doen jullie dat nu dan zo?

Nou dat is puur omdat je, wil je het echt uitrekenen, één of twee weken verder bent, en daar is gewoon de tijd niet voor. De vraag is zeg maar als je een bieding doet, dan doe je dat op basis van 70% weten, en 30% ‘’het is een goede plek, we gaan eruit komen’’, omdat je weet dat je nog twee jaar bezig bent om te bestuderen hoe het daar werkt. Het is meer dat je echt die valkuilen, die wil je voorkomen denk ik zelf. Een valkuil is wanneer je echt met zware geluidsbelasting te maken hebt, sommige valkuilen zijn ook dat wij een plan hebben bedacht en dat de gemeente een heel ander beeld heeft bij het gebied, en dat krijg je niet uit programmatuur. Dus gesprekken voeren zeg maar, om het goed voor elkaar te krijgen. Want als we dit stuk grond hier voor ons weer nemen, ik denk dat ik daar meer op verdien als ik gewoon vijf grondgebonden woningen neerzet dan wanneer ik er een toren op zet. Maar het zou best zo kunnen zijn dat de gemeente gewoon zegt ‘’ik wil gewoon een toren’’. Dan kun je hoog of laag springen maar dan zitten we gewoon met een stuk grond, waar we lastig mee uitkomen.
Soms zijn die kaders heel duidelijk he, soms zijn er ook gewoon geen kaders, dan weten we het nog niet. Of je neemt een stuk risico he, dus je neemt een stuk grond wat nu bedrijventerrein is in de hoop dat je er woningen op kan bouwen.

De tak van sport die hier eigenlijk heel veel gebeurd is dat je het optimum moet zoeken tussen je BVO/GO verhoudingen, dus je maakt een blokje waarvan je zoveel mogelijk meters kunt verhuren, of verkopen, en waar zo min mogelijk schil eigenlijk omheen zit. Het zou interessant zijn als je daarop zou kunnen itereren. Dus dan heb je een plannetje getekend en denk je nou deze BVO/GO verhouding is 75%, dat doen we nu ook op ervaring vaak he, het is 69% vaak. Naarmate je daar scherper in wordt, wordt het bedrag wat je ervoor over hebt ook groter. Dat is iets wat in honderdduizend varianten uitgerekend zou kunnen worden zeg maar.
Wat ook interessant zou zijn is dat je kan kijken op een locatie waarvan wij denken dat je daar niet kunt wonen, dat je dat misschien wel kunt doen. Daar zitten ook weer kansen in. Ik had laatst een locatie in Zoetermeer, daar hebben we een hele discussie gehad over dat die woningen daar gewoon niet kunnen vanwege het geluid. Als je die data eerder hebt, tijdens zo’n gesprek bijvoorbeeld, kun je dat gesprek veel tastbaarder voeren. Als je dan kan zeggen kijk er is heel veel geluidbelasting op die gevel, dat gaat gewoon heel veel geld kosten, dat lukt niet. Dan haal je dat stukje van de discussie weg. Dat is natuurlijk ongelofelijk waardevol, dat je heel snel tussentijds inzichtelijk zou kunnen maken, waar zitten te pijnpunten?

Evaluatieproces

Subjectief is een term die verwijst naar iemands persoonlijke meningen of gevoelens over een bepaald onderwerp.

Het woord "objectief" verwijst naar feitelijke, op gegevens gebaseerde informatie die niet door vooringenomenheid is geïnformeerd.

5. Hoe wordt de keuze gemaakt tussen verschillende concept ontwerpen?

Dat kan op verschillende manieren ook weer, dat kan op de korte termijn intuïtief, je kunt het ook wetenschappelijk doen, semiwetenschappelijk. Laatste keer hebben we het met numeriek waarden gedaan, dat je aan de voorkant heel duidelijk stelt wat zijn de criteria waarop je de verschillende conceptmodellen beoordeeld, je kunt ze beoordelen op de flexibiliteit van je programma, past het bij het gebied? Kan je mobiliteit erin kwijt? Sluit het aan bij het marktbeeld dat we hebben? Die kun je allemaal een waarde geven, en uiteindelijk kom je dan uit hoop je, op een concept ontwerp met de hoogste score. En bewust doen we het ook altijd met het hard, want ergens is stedenbouw ook iets van gevoel. Interessant is als die van het hart en die numerieke samenkomen, dat je dan ook dezelfde keuze hebt. Dan kun je ook zeggen, zit er wel 20% groen in? Zitten er voldoende doorontwikkelingsmogelijkheden in? Dat is eigenlijk de manier hoe je die verschillende modellen SWOT.

Het hangt er een beetje ook vanaf of we het zelf doen, want als we het zelf doen weten we het natuurlijk het beste, dan maken we gewoon die keuze en hebben we het niet nodig, dan is het eigenlijk gewoon een ontwerpproces. Als we het met partners doen is het lekker om het tastbaar te maken, om eruit te krijgen; je kiest numeriek, deze keuze, omdat het dan ook gewoon heel helder is dat we het hier met z'n allen over eens zijn. Dus dan stap je zeg maar in een soort samenwerking.

Als je het zelf doet is het vaak subjectief, dan kijk je wel naar de bezonning maar neem je het intuïtief mee. Bij hoogbouw ga je niet aan de oostkant zitten omdat je weet dat de schaduw dan over het hele plan heen loopt. Dat zijn gewoon eenvoudige modellen, maar je kunt daar niet de marge in opzoeken. Misschien is acht lagen wel mogelijk, maar tien lagen kan niet, dat gesprek heb je nog niet in deze fase. Als je dat zou kunnen weten, en weet dat je twee lagen toe kan voegen is het wel een interessante strategie. Het hangt alleen vaak samen met die andere dingen he, parkeerbalans en toestanden, dus als je toevoegt moet er ook aan andere dingen toegevoegd worden. Het is wel een stukje van integraal denken. Ik denk dat je altijd intuïtief iets blijft doen.

6. Op basis van welke subjectieve/ objectieve parameter?

Wij toetsen eigenlijk de indicatieve bouwkosten, dus als we een beetje weten dat het ene gebouw lijkt op het andere gebouw dus wat we al een keer gemaakt hebben, dan zeggen we met een indexatie wat het over vijf jaar wordt. Afgelopen tijd zijn de bouwkosten natuurlijk gigantisch gestegen, dus het is nu wel complex om die indexatie te volgen. Maar dat is eigenlijk de methode waarop we het nu doen.

Subjectieve parameters: In hoeverre zijn deze parameters toetsbaar, en is dat gewenst voor je conceptontwikkelingsproces?

Ik koppel het heel erg aan een soort aankoopbeleid; dus stel je moet een nieuwe fiets uitzoeken. Dan zul je een deel op basis van onderzoek doen, hij heeft genoeg versnellingen, hij is licht, hij past binnen het budget, maar een deel is ook gewoon emotie; deze kleur past bij mijn image, dus die koop ik gewoon op basis van gut feeling. Dus dat is persoonlijk, dat zie je volgens mij ook bij ontwikkelaars in de aankoop. Er zijn een aantal dingen die ze gewoon

checken; het rendement, kansen binnen de ontwikkeling, dat is het stukje ‘’het kan’’. Er zit ook een stukje subjectief bij, van dit doen we op gevoel, we hebben het gevoel dat we het hier gaan maken de komende 2,3,4 jaar. Dat kun je nooit echt wetenschappelijk maken. Ik denk dat iedereen dat in zijn eigen koop/verkoop gebruik heeft, het is gewoon een soort ondernemers gut feeling zeg maar. Maar daarbij denk ik wel dat hoe meer je weet, hoe beter je je gut feeling kunt onderbouwen met feiten en gegevens.

Maar dat stukje wat jij net noemde over die SWOT, dat klonk wel redelijk subjectief toch?

Ja dat gaat meer over identiteiten, dus dan SWOT je eigenlijk op basis van data. Je kunt met elke plek honderd kanten op, dat kan van heel modern tot heel traditioneel, dat kan van heel groen tot heel strak, alles kan, maar dat stukje is het intuïtieve zeg maar; ‘’ik denk dat ik hiermee op dit moment, mijn consument het beste raak, en daarmee het beste marktsucces hebt’’. Maar het heeft wel allemaal uiteindelijk met de financiële parameter te maken, dat is wel iets wat je meeneemt. Ik kan wel dat beeld willen, maar ik kom eigenlijk financieel net niet uit daarmee, we moeten eigenlijk misschien een andere koers varen om met hetzelfde idee te komen. Dan is het wel handig denk ik om die rekengegevens te hebben. Dat je niet jezelf vastschroeft.
Ik denk dat in een samenwerking, dat je altijd iets subjectiefs hebt. Het zou zelfs zo kunnen zijn dat je tien verschillende ontwerpen hebt waarbij drie verschillende ontwerpers iets gemaakt hebben, dat jij subjectief het beste gevoel hebt bij een specifiek model omdat je die ontwerper gewoon mag. Dat is lastig onder woorden te brengen, maar omdat je weet dat wanneer je daarvoor kiest, je in het proces heel fijn kunt samenwerken met diegene. Dan hoef je het niet eens het mooiste ding te vinden. Die subjectieve kant zit in al zulk soort aspecten van het samenwerken. Dat kan wel lastig zijn om op te schrijven.

7. In hoeverre is het concept evaluatieproces gestructureerd?

Als je het hebt over grondaankoop is het gestructureerd, je moet een BEO indienen. Dat is een investeringsmodel dat je schrijft, daarin zijn al die fysieke; geld, financiën, volume, die toestanden en het beleid opgeschreven. Dat is redelijk gestructureerd, het conceptontwikkelingsproces is niet zo gestructureerd. Dat doen we eigenlijk een beetje afhankelijk van de vraag die er zit, dat komt ook doordat we ook heel veel verschillende vragen hebben; soms voor een eigen gebied, soms voor een collectief, soms voor een derden, soms is het heel groot, soms is het vervuild. Het is soms echt een beetje onzichtbaar waar nou de juiste randvoorwaarde in zit.
Dus misschien kun je dat keuzeproces wel structureren, alleen de input is elke keer net een beetje anders. Daar zou ik ook wel wat in zien. Ik was er een beetje van af, maar ik denk dat… Wil je de optimale ruimtelijke kwaliteit wil halen, is het interessant om daar over een keuzeproces te organiseren. Dan ga je namelijk ook zeggen van ik wil gewoon die optimale ruimtelijke kwaliteit maken, en dan kun je afwegen.

Hoe zie je dat dan voor je?

Nou normaliter is het een SWOT op kernwaarden, dus je kunt gewoon voor je zien dat je tien verschillende modellen hebt, en dat je het gesprek hebt over; wat vind ik nou belangrijk? Dat is eigenlijk het belangrijkste wat je moet doen he, en dat je die kernwaarden onder alle modellen gewoon de plusjes en de minnetjes ziet. Dat je op het eind ziet van nou ik vond dit zo belangrijk, en dat komt het beste in dat model naar voren. Dat maakt heel inzichtelijk hoe je waardes koppelt aan de ruimtelijke structuur.
Kijk in Groningen hadden we tien verschillende modellen. We hadden stadsblokken, grote binnenhoven, grondgebonden woningen, alleen maar torens. We hadden gezegd we hebben een paar hele belangrijke waarden; wij vinden het belangrijk dat mensen elkaar kunnen ontmoeten; we vinden het belangrijk dat er een duurzaam stadsdeel ontstaat dus pv panelen, toestanden etc., openbaar groen; we vinden het belangrijk dat er voldoende verbindingen zijn.

Dat rijtje hebben we over al die modellen gekeken of het er nou in zit, klopt het, en geven we het dan een 0, 1, 2, 3, 4, 5? Daarmee krijg je een soort totaalscore welk model eigenlijk het beste scoort. En die scoring is nog steeds subjectief he. Maar je maakt al wel een meer overwogen keuze, een overwogen keuze met elkaar want je hebt er een gesprek over. Ik denk dat je de parameters per opgave zou kunnen specificeren, subjectief.
Dat gevoel zou je misschien kwantificeerbaar kunnen maken in de hoeveelheid publieke ruimte

Haalbaarheid

8. In hoeverre wordt de haalbaarheid van een project getoetst op het moment dat je een concept ontwerp kiest?

Ja altijd, dat wat we tekenen, levert dat de waarde op. Daarmee vallen al vijf modellen af bij wijze van spreken. Het begint bij de vraag wat is het bedrag wat we willen matchen en wat hoort er ongeveer bij voor programma? Dat is de methode waarop we werken, anders is het gewoon niet de moeite waard om in te stappen.

Als ik het goed begrijp heb je het dan dus over de financiële haalbaarheid?

Ja, maar de financiële haalbaarheid is een breed gesprek he. Dat gaat over afzet, bouwbaarheid, bouwsnelheid, past het binnen ons investeringsvolume, etc. Dus niet alleen maar; kan ik er zoveel volume uit halen om de grond op te leveren.

En het stukje omgevingsfactoren etc. waar je het net ook over had?

Die worden nu zeg maar ingeschat. Dat zijn risico's die opgenomen moeten worden, dus als geluid een risico is dan wordt er een post voor opgenomen. Dus dat is inderdaad een financieel gesprek.

9. Hoe zou je deze onzekerheid met betrekking tot de haalbaarheid van een project tijdens de conceptfase kunnen verminderen denk je?

Ja die risico's beter inzichtelijk maken. De onzekerheid zit hem meer in het feit dat je denkt dat je meer programma in die gevaarlijke zones kunt schuiven, en dat je kunt aantonen dat het kan op basis van zo'n programma. Dan kun je ook bijvoorbeeld een hoger bod doen of iets anders en dan heb je het aantoonbaar gemaakt. Dan heb je wel meer informatie nodig om dat stukje van die risico's op te pakken. Dat vraagt, en daar zit volgens mij een heel moeilijk dingetje, om een model waarbij je beschikt over de gegevens en het betrouwbaar vindt wat er gebeurt in zo'n systeem zeg maar. Het zou best wel kunnen zijn dat de output die je krijgt, dat ik die niet geloof met mijn eigen rekenmodel zeg maar.

Nu vragen we een adviesbureau omdat we ervan uitgaan dat hij zijn kennis op orde heeft, en dan liggen de risico's ook daar. Misschien zou je nog in de conceptfase kunnen zeggen van ik heb indicatief dit, en dit klopt bij mijn indicatieve gevoel.
Maar de kans zit hem vooral in het feit dat je er of meer, of iets anders op kunt en dat je dingen niet uitsluit op basis van intuïtie. Je kunt meer het randje opzoeken.

Case project

11. Hoe zag de initiatieffase van het vastgoedontwikkelingsproces van het case project eruit?

Wij hadden die grond al heel lang in ons bezit, dat hebben we teruggegeven aan de gemeente. Het was ooit een commercieel vastgoedproject; de Kop en de Staart van dat winkelcentrum. In de tussentijd hebben wij eigenlijk een studie gedaan naar de andere kant voor woningbouw

(de Kop) en is de gemeente aan de slag gegaan met een studie voor deze kant (de Staart). De gemeente heeft daar een soort randvoorwaarden boek voor gemaakt, de Nota van Uitgangspunten, waarbij ze zeggen van nou dit zou ongeveer het volume en het programma kunnen zijn wat wij vinden passen. Daar hebben wij toen een alternatief model op ontwikkeld, hoe wij het voor ons zouden zien. Wij waren geen eigenaar, Dudok heeft het gekocht. Toen hadden we een soort dealmaking met die groep om het samen verder op te zetten. Toen hebben we gezegd op basis van deze twee modellen samen kunnen we een uitvraag formuleren richting een drietal bureaus met wie we een samenwerking aangaan. Randvoorwaarde van de gemeente was één bureau en een jonge architect zeg maar. Dus we hebben drie bureaus gezamenlijk bepaald, aangevraagd en gezegd van jullie krijgen allemaal een paar duizend euro om gewoon op basis van jullie intuïtie, ons programma te vertalen naar een haalbare stedenbouwkundige strategie met identiteit. Toen zijn er drie modellen uitgekomen, die hebben we gezamenlijk beoordeeld en een keuze gemaakt voor één architect die redelijk in de buurt is gebleven volgens mij bij het model wat hij ook ingediend heeft, stedenbouwkundig, en dat hebben we gewoon net zo lang door geoptimaliseerd tot we de juiste woningbouw, de juiste producten op de juiste plaats; koopwoningen, huurwoningen, sociale woningen.

12. Hoe zag de conceptontwikkelingsfase binnen de initiatieffase eruit?

Bij het case project hebben we heel emotioneel gekozen, er waren drie verschillende architecten modellen en daarbij hebben we er voor ééntje gekozen die een paar dingen deed waarvan we dachten dat komt eigenlijk het best in de buurt van het plan dat we willen maken; die Maakstraat, de manier hoe de verschillende openbare ruimtes met elkaar verbonden waren, dat soort dingen zaten er allemaal in. Er was een model wat veel mooier was, maar op basis van o.a. faseerbaarheid vonden we dat eigenlijk helemaal geen lekker product. Dan zie je toch dat je parameters gaat benoemen, waarmee je je keuze gaat motiveren.

Wordt er op zo'n moment niet meer gekeken naar die objectieve parameters, bezonning etc. waar je het net over had?

Nee, we gaan er gewoon vanuit dat dat er dan in zit. Maar dat zou ik liever aan de voorkant meegeven, dat we denken dat binnen deze configuratie het optimale resultaat zouden kunnen krijgen
Wat ik nog wel toe wil voegen is; we maken wel een vergelijkbare keuze he tussen die ontwerpen van de architect, zelfde programma, zelfde parkeerbalans, alles zit er eigenlijk al in omdat we dat zelf al ruimtelijk hebben uitgezocht. Ze kunnen wel een beetje afwijken, maar dat is wel waar onze businesscase op gebaseerd is.

13. In hoeverre zou je het concept ontwikkelingsproces van het case project als normaal kunnen omschrijven? (Bestemmingsplan wat niet definitief was, geluidshinder, etc)

Voor 90%, dus vrij normaal

14. Zijn jullie tegen problemen aangelopen tijdens de conceptontwikkeling?

Ik denk dat de problemen die van waarde zijn zeg maar; er zat een enorme parkeerbak bij, dus in hoeverre we de relatie met de omgeving konden opzoeken. Die parkeerbak onder het Dakpark stond voor de helft leeg, daar hadden we wel meer in kwijt gekund denk ik, dat hebben we uiteindelijk ook wel gedaan hoor maar dat had ik liever aan de voorkant al geweten. Maar dat is een moeilijke afhankelijkheid om met elkaar af te stemmen want dat gaat over heel veel risico's en gesprekken en geld, gemeentelijk beleid en ambtenaren. Dat zou iets kunnen zijn wat je sneller zou willen uitzoeken.

Ik denk dat de hoogte, daar had ik het wel eerder over willen hebben… over hoe je, met misschien iets meer hoogte misschien dezelfde licht, zon, schaduw had kunnen krijgen. Dat is wel interessant, dat had je kunnen optimaliseren binnen het huidige ruimtelijke model.
Die molenbiotoop en de geluidsbelasting aan de voorkant op de gevel dat waren interessante parameters geweest om iets meer over te weten denk ik zelf. Dat zijn dingen die nu onzeker waren.

ID	Subject	Question	Response	Open coding	Axial coding
#1	Real estate development	1	Every process is completely different, what you always have is a location or a building with which something has to be done. Then you make a plan, you have various stakeholders who play a role in it. It also depends on whether you already own the land yourself or not? do you have to make an offer? Important whether there is a land-use plan or not I think the initiative phase ends with an investment decision, and then in the end it is the case in 9 out of 10 with us that the initiative phase is used in an acquisition, so that means that your goal is to acquire the land. It is always the case that the first step is to map out very well what are the preconditions for this place, what are the preconditions for the bid, and within that framework you look at what the possibilities are and then your design begins and your creative process	Inconsitent process land ownership land-use plan Investment decision Preconditions framework	Inconsistent process Location Investment decision Preconditioning framework
#1	Concept design	2	The concept design process is not very clearly defined, so you have your starting points: a piece of land, then you have your preconditions that you map out and then your design process begins. So depending on whether it is a blank sheet or already very much colored, suppose it is a bit in the middle; you have some basic principles from the municipality and sometimes a zoning plan. Well, if we take the case project location, for example, then the municipality has simply provided an urban development plan and reference images and then you start thinking about it yourself, what do we think of it? Do we think we can make a good plan within these frameworks? then you often hire a designer and/or internally we will make ideas, that is the Design Studio (the concept developers at Dura Vermeer) okay, do we think the urban design and volume structure are good? They will then prepare an analysis, you often have quite a few other insights than the municipality has and you think well it could be better, so a few models are made in which you can also count volumes, count homes and then you consider; Does this appeal to us? Do we like this better? Does this fit within the preconditions? If not, do we consider the risk acceptable that we continue with this? and then you first make a calculation about the approximate number of homes that will result from this, will it provide a profitable case? Well usually that is of course not in one go, so then you determine what needs to be adjusted and then you go into such a session again. This repeats itself a few times until at a certain point you think, well, this is a plan and a setup that you think can turn out to be something. Then you either have already added an architect or urban planner who participates in our Design Studio (ID), or you first do this process and then you say to an architect; these are our starting points, can you take this a step further architecturally? and then you get the same cycle, the architect will look at it, he will design something and we determine and calculate, look, this can be done better or differently, until you have something that you think; This is it, it is enough, we are going to finish the calculation on this, maybe some advisers will be called in to do a few checks, for example on building decree, or parking, etc., various elements that you want to have explored. After that you have completed your phase and then you will further complete and submit the investment application. The moment you consult an advisor depends very much on what your preconditions are, look based on your experience you know or based on what the preconditions say you know what is critical in a certain location, or we don't have a good feeling here bye, is it right? Perhaps the municipality is asking for a very challenging energy concept, well then you ask for such an advisor, so that too cannot be clearly stated in advance, because that's how we always do it. Sometimes you don't involve advisors at all and other times you still need multiple. They don't do noise studies in Utrecht (Design Studio), they only look at it from the market and urban planning. Of course if that comes to a division director or someone else who is in a brainstorming session at Utrecht, they also have very broad experience, so they can also say things like; with this location, especially take this or that into account.	Inconsitent process Iterating process Multiple concept designs Concept design iterations Concept design analysis Preconditions Risk analysis Profitability analysis Advisors Appeal Personal experience developer Gut feeling Market analysis No noise study	Inconsistent process Concept design iterations Preconditioning framework Market analysis Feasibility Gut feeling
#1	Concept design	3	No, there is no consistency in the number of concept designs made. You continue designing until you have something that you think of; This is it. Sometimes that is after one iteration and the other time you need 4 or 5 iterations	Inconsistent few concept designs	Inconsistent Few concept designs
#1	Concept design	3,1	I definitely think this could be of added value	Valuable	Valuable
#1	Concept design	3,2	Yes, that's a bit the same story as before, we don't have that software at our disposal. Sketchup is a one-sided thing, there is one person who sits at the button and makes something, and it is not the case that you come up with multiple designs with algorithms. There is a very human factor in it because the designer determines to a large extent what comes out now.	Lack of software Human factor	Software Human factor

#1	Concept design	4	Sometimes you are simply stuck in a certain pattern or because you have read the preconditions of the municipality you are already in a certain frame of mind. The more out of the box ideas you have the better. I do feel that when you can do something with parametric design, you are pushed a bit out of the box. That designs that you may not have thought of are simply generated and would have scored high. In that sense, you always run into limitations in such a design process with the designers you work with. Well, we happen to have very good concept designers, but you are very dependent on who is at your desk and is going to make plans for you. In summary, the quality of the designer is very important and makes you very vulnerable as a company, or very good. it is also the art to put together the right team. In addition, weighing data is now very time consuming, which could be done much more efficiently in my opinion. I think there is a need for a system in which you can weigh your models much more easily... sort of based on data that the system generates itself, and compare it with each other, instead of messing around and calculating the numbers yourself, and making comparisons.	Inefficient concept design evaluation process Quality of designer important Out of the box thinking Time consuming	Inefficient design process Inefficient evaluation process Human factor
#1	Evaluation process	5	Well look, the way you design is subjective, because it is a creative process. You would say that it is very subjective in advance, but how the assessment takes place is of course a little less subjective. Yes, taste also plays a major role in this, but you also start calculating and at a given moment from that calculation model, from your hard analysis of where the risks are located, naturally follows a certain value from. If you then compare the concept designs with each other regardless of beautiful or ugly or taste or preference, one design scores better on land values for example, and the other much less. If you have to make a bid, that is of course a very important factor, so a very ugly plan that generates super high land value, while your assessment criterium from the municipality is only land values, yes then the choice is made quickly based on objectivity.	Subjective process objective calculations predetermined requirements	Subjectivity Objective calculations Preconditioning framework
#1	Evaluation process	6,1	That is often part of the preconditions, if a municipality provides preconditions, they often also describe reference plans and a certain visual quality that you can describe in objective terms. For example the building must have black roof tiles, a robust urban appearance, etc. You can test those kinds of things very clearly. These are very clear visual quality requirements. Feelings can of course be difficult to measure. When the municipality puts a location on the market for which several parties enroll, the municipality tries to extract as much subjectivity as possible, because that subjectivity only creates discussion. This is because it is so difficult to measure. The congregation will therefore always say; or I only test on price, that is easiest because that is just a number, or they test on quality and that is already a lot more difficult to test. That is about the extent to which you comply with the image quality plan, for example, and that is often based on experience. And quality is often measured in sustainability, but then you always go for certain scores. That subjectivity is always removed as much as possible. Anyway, even then you will of course have a plan or a design at some point and that either appeals to people or not. Even though two plans can completely comply with the image quality plan, one plan can be more beautiful than the other. And you can't catch that	Part of preconditions Feelings hard to measure Objectivity prerequisite Subjectivity determanative	Preconditioning framework Subjectivity determanative Objectivity condition Not measurable
#1	Evaluation process	6,2	What I just said about sustainability, that is of course also an emerging theme that is becoming increasingly important, so to what extent your plan has a high sustainability score. We ourselves focus more on BVOs and GBOs, but that is not really quality, those are more hard preconditions, your programmatic principles. So the municipality can say, it must be that many apartments of approximately that large or in the rental or purchase segment. In that case, a surface often rolls out indirectly. In order to properly calculate the feasibility of your project, you need GFAs and GOs, and then the ratio between them.	Sustainability emerging theme Programmatic principles Feasibility	Sustainability Programmatic principles Feasibility

#1	Evaluation process	7	A lot of data is translated into the land value, so you are going to enter data when you make a land value calculation, a BEO. How many houses is it? how many BVO's? how many GO's? Those GO's in particular are always difficult in a concept phase, because then you obviously don't know exactly how the building will be accessed. How many meters do you lose in common areas? how thick are your walls? All such things ultimately determine how your GO/GFA ratio will be. However, based on your experience and the GFAs that come from the concept design, you can estimate how your GOs will come out. Your GOs eventually yield money, which you estimate based on market advice, and then a land price rolls out and you compare one plan with another.	BEO calculation (Land value comparisson) Programmatic principles Market advice	Programmatic principles Financial feasibility Land price
#1	Feasibility	8	In order to properly calculate the feasibility of your project, you need GFAs and GOs, and then the ratio between them.	Financial feasibility	Financial feasibility
#1	Feasibility	9	The more data checks the better then hey, I'd say.	More data checks	More research
#1	Feasibility	10	It's not that this takes away all the uncertainty, but I think it would help	Possitive effect	Possitive effect
#1	Feasibility	10,1 (answer q4)	Weighing data is now very time consuming, which could be done much more efficiently in my opinion. I think there is a need for a system in which you can weigh your models much more easily... sort of based on data that the system generates itself, and compare it with each other, instead of messing around and calculating the numbers yourself, and making comparisons.	Time consuming Inefficient currently	Inefficient
#1	Case project	11	At first it was only Dudok, who then bought the location. From a very technical point of view, the existing building consists of a monumental part and a non-monumental part, so they wanted to demolish the non-monumental part, so they had bought the building to place new buildings there. Then the church said; Do you also take a look at the adjacent vacant location that it can be developed in one go, then they asked an urban design office/architect to make various concept studies for this. That was not entirely in line with what the municipality had in mind, and then Dura Vermeer joined in to come up with a stronger concept design. Dura Vermeer had already joined as builder for the monumental building. The moment we were asked to be co-developers, we bought into the building and we started looking at the plot again together. In the meantime, the municipality had also drawn up preconditions for urban development, which also wanted to be more in control.	Standard process Preconditions municipality	Standard process Preconditional framework
#1	Case project	12	We (Dura Vermeer) and Dudok started making various concept designs through our own design studio (Design Studio). In the end we chose a design for it and we put it out in a request, in a booklet as it were, in combination with the preconditions of the municipality and we approached 3 architects for this. Those 3 architects who also came back with a total of 3 different approaches to the assignment and there was one of which we said has the most appealing design. Then we continued with that party. We divided points for urban planning I think, for architecture, and something else, for the judgement of the designs of the different architects. That assessment was still fairly subjective I must say, but in the end it was used to simply choose the best plan. The funny thing about these kinds of processes is that after the presentations you just know which plan stands head and shoulders above the rest and is therefore the winner. Then you assess and give the one that appeals to you the most the highest points.	Multiple concept designs Multiple iterations Appealing Subjective assessment Gut feeling decision	Concept design iterations Subjectivity
#1	Case project	13	Well, we encountered a lot at the case project, but you always have that with urban area development. So no, it's not very exceptional or anything, certainly not.	Not exceptional	Standard

#1	Case project	14	An example is that we were close to a district heating pipe, and along a flood defense in the form of a dyke. These are things that were not well investigated beforehand. With district heating, the question is always how close you can build to it, then you have to consult with such an authority. We also had a lot of discussions with the water board because strictly spoken, it was not allowed at all. But then you can make a customized solution and find out what is and is not possible. Look in that respect it is also a utopia, if you were to enter all that data really hard, then it just comes out no it is not possible. But the moment you start talking, a lot is possible again, that is also the shortcoming of very objective approaches, which can rule out things that are possible in practice. I would see that objective data more as a source of inspiration. Sound is a very complex matter anyway because you have to deal with different frequencies and many different factors that influence it. In addition, you can also take measures around the source. Important factors are for example; how fast does a car go? What is the distance from the road? What is the car driving over (road material)? At the case project we had a new type of noise outside legal noise such as industrial noise and road noise, namely nest noise. That is the sound of ships moored in the harbor that cause a kind of hum from the generators. Only that sound is not included in the legal sound, there was a court decision; he said this does not fall within the legal noise spectrum, but housing construction or the like must be taken into account, I don't have that in mind either. In any case, it was a problem for us, but it was more of a political discussion, because the municipality could also have tackled the problem at the source, but some solutions are unfavorable for the Port of Rotterdam Authority and they obviously don't want that. So there is a political discussion going on between the municipality and the Port Authority. At the same time, you have to deal with it on your projects; Are you going to take it or not? And how much will you take it with you? Etc. Well, it turns out that nest noise has a low frequency, for example, so that means that you can really only solve the problem with mass, so that you implement really sturdy frames and thick glass and that sort of thing. The mill biotope was easier to catch. You have several rings with a maximum building height within a radius of the mill. The good source is actually the zoning plan, only the municipality had included in its preconditions that you have certain circles and within that circle you can build up to so many meters. So we just took those heights and started designing with them. Then we found out that the zoning plan states that it is not 25m in relation to the ground level, but 25m in relation to NAP and we are 3m below NAP there, so that means if you calculate with 25 meters, with 3 meters you actually just one storey miscalculated. We found out very late, that has actually been the biggest problem at the case project. If you had entered those data, you would have found out, only if you then again use the principles of the municipality, which you would normally say you can rely on... Anyway, look at such a Memorandum of Principles more a summary of what the municipality considers important, a zoning plan is a legally hard piece.	Insufficient investigation Customized solution after negotiatons Data can be deceiving (things are possible after negotiations) Data source of inspiration Sound complex problem Unclear regulations Political discussion Wrong information Overlooked	Knowledge Negotiations Data guidance Data quality Environmental constraints Human factor Rules and regulations
#1	Case project	14,1	That noise exposure has always been a fact, we already knew that from the urban development plan, so we had already taken that into account in the urban development plan. For example, we made as many blocks as possible along the road to block the noise for the blocks behind and made sure that the houses that are on the side of the road, also have a facade on the low-noise side of the building. You do this on the basis of experience and on the basis of the preconditions that you see in the report from the municipality. There is a noise load at this location from road traffic. Then you know that you have to design it in such a way that you already include a kind of sound buffer within your plan.	Noise Known from preconditions Experience based solution	Environmental constraints Human factor Knowledge

ID	Subject	Question	Response	Open coding	Axial coding
#2	Real estate development	1	It often starts with a location. You can arrive at a location in many different ways, that is simply by driving around somewhere and seeing something and thinking about what is happening in this place? or what could be done differently in this place? That is actually based on your own intrinsic motivation that you are looking for a location, but in general locations are offered, often from the network. Initiatives can arise in this way, or because parties seek each other out. For example, a party can be given a position, but it is so large that that party is happy to do the development together with another party. So there are really different paths leading to an initiative in this case. We then include an initiative in the opportunity consultation. The opportunity meeting is and the meeting where we discuss our new leads every week. These can be competitions, tenders that come in or that we find ourselves. Then we discuss how promising the lead is and to what extent it suits us. Does the lead suit us, it really concerns the product, the place, the client, possibly about ourselves, how much should be invested? what is the time horizon? We prefer to have something where we put our money in which should be out between 3 and 5 years, but we also sometimes look beyond the 5-year limit. We prefer to keep this as short as possible to limit the risk. Then we mainly look at capacity, and that is capacity in perhaps making the offer, on the one hand, up to capacity for the elaboration and possible realization of the project. We do not have a checklist. It mainly concerns the knowledge of the area, the knowledge of the product, the connection with the value stream. Someone has, of course, already picked up the opportunity and made a short analysis about it, about a number of things and we will then steer towards that and often it is also Making choices because every week between 10 and 15 opportunities pass by and those you can never do all of them. Usually we already know in order size what we can build on that ground position, we must of course already see the potential and it must also suit us. If it is a opportunity of 10 homes, then you already know that we are not right company for the job. It's in the volume, it's in the product, how much preparation does it need?, how much investment does it need?, when might it be in preparation and construction? what is the selling risk? so you can actually split up a whole lot of those things and not everything has an answer. The chance of success with tenders and competitions is particularly important, how many parties participate? who are our competitors?	Often starts with location Aquisation differs Opportunity meeting / decision Opportunity analysis Order size for ground plot known Risk analysis	Inconsistent process Location Investment decision Opportunity analysis
#2	Concept design	2	That depends entirely on the query. The moment a property has to be purchased, yes, then we have to look at how we are going to redevelop it. Of course you always have to know how to load the area and what is of course also important is the vision of the municipality. What is the current destination of the site according to the zoning plan? What are the provincial visions on areas? All of these also influence whether it is a promising position. If so, with which product?, because that is also often defined. The different products for different target groups determine the way in which you can divide an area. What we will then look at is how we can organize the area? We do this in consultation with our Design Studio, because on the one hand they can set up masses in areas, and on the other hand we have our analysts there who will take a look with us, or at least give a suggestion or give advice about the location: this is the place, these are the facilities in the area, we think that the following target groups would like to settle in this place and that we could be, for example, young families with children or a combination of families, some elderly or empty nesters. This again includes a certain product; ground-bound, semi-detached, apartments, city apartments, city houses. Well something comes out of that and with that knowledge you then try to look at how you could best fill in the area with those volumes. With that, of course, the preconditions from the municipality or provincial policy play a role. For example, the plot should contain 30% social housing, it must contain 40% medium rent and 30% more expensive, well then you know which target groups belong to that specification, which products belong to that and that is how you will fill the plot in.	Depends on query Market investigation Preconditions Product - target group relation	Inconsistent process Market analysis Preconditioning framework Concept designs
#2	Concept design	3	No, you never really know that with designers, you really just have to manage that yourself as a developer. If you give designers the freedom, that's what designers are happy for, then they can go wild. Then they can make 5 for you, maybe 10, maybe 15, but you just have to send in that yourself and clearly indicate what you want as a developer. It is especially important to indicate which phase you are in, so if you only want to see whether something is feasible and/or makes sense, you should really limit it to little research into it. So looking at what is roughly speaking, can we get 200 homes, 250 homes, or 300 homes there? It is not a matter of single houses. Are you two steps further, then you actually want to know more specifically about; ok we have so many homes, because that target group. Then, for example, we really have to make a bid on the land in question, so we have to know much more specifically whether it is 190, 200 or 210 homes.	Inconsistent initially less effort, fewer designs if feasible more detailed study	Inconsistent Few concept designs Uncertainty
#2	Concept design	3,1	The further we get into the lead and the further we get into the competition, it is of course important, especially if the client or, on the other hand, the parties that will assess your tender also check that we meet all kinds of requirements that have been set in advance. or that we set ourselves when it is my own development, that it is all right. For example, you want to have as much issuable land, gardens, as possible in a favorable location because there you; a: can ask for more, and b; because it is also more pleasant for your residents. In addition, you want to have as little traffic as possible past your house or to create as little public/paved area as possible. You want to make as much use as possible of the view, and like this you can come up with a lot of things that you would like to see in an allotment or in an urban design. Which gives you the feeling of; commercially this is simply the best solution for my target group. So if you have some choices where you entered those parameters, that's nice of course. Multiple models are always better than one model. But I don't think directly; the more designs, the better, because you can still choose between 10 models.. but you can no longer choose between 50 models. You can make 50 models, but then you actually have to get the 10 best out of them	Quantity becomes more important Optimal relationship profit - residential wellbeing Multiple models better Has to stay manageable.	Valuable Find optimum Manageable

#2	Concept design	3,2	Because we now have people sitting behind a machine who are drawing that themselves and you don't ask them to draw 50 models. What those concept designers are doing now is looking at reference projects and sticking them into a new situation every time. We can often see fairly quickly how an area could be arranged roughly, but that is of course not compared to reloading a project very specifically on that plot, but it is a first indication.	Limits quantity because people draw models First indication using refernce projects	Human factor
#2	Concept design	4	The masses must also always be buildable and I am not talking so much about ground-based housing, but in particular stacked housing, especially in complex locations where you have to deal with many existing situations around it: noise, insolation, wind, underground infrastructure. , etc. The moment you haven't figured that out completely before you start designing with an architect and haven't put the structure right, then things go wrong. We think in building from the bottom up and from the inside out and an architect who lives for the beautiful environment and to leave a signature in the area and then the solutions come. If we run into something we always come from the outside inwards, so the architect actually wants to keep the outside, that is his signature and we will then technically try to solve that on the inside again and that does not always deliver the cheapest or the best buildable structure. So my tip is always in these kinds of situations; always first make a structural design, ensure that you have a buildable building and that you have mapped out the building system, and then use that input to direct the architect. During concept development, you look at things in outline and you must always keep in mind that things will change. Everyone knows about the master plan that is made on the basis of volumes; we'll go deeper into the investigations later. It will never be exactly as it is drawn in a master plan at that time. Furthermore, there is always something around the corner that we or someone has not foreseen, or has not thought of, or which has not been documented, but that is also part of the profession.	Bad preperation results in bad outcome Architects: outside in Developer: inside out Buildable structure design as basis Changing design as investigation continues Always unforeseen issues.	Reliable on preperation Inefficient design process Human factor
#2	Evaluation process	5	Everything is based on feeling, and all those parameters that are important are incorporated, but in the end those parameters will bring us something: a feeling, do we want this or do we not want this. So it's always a combination of. You do this on the basis of numbers and distribution within the lot. That is very different in urban development than when you take the meadows. That has to do with a number of parameters. Products belong to those target groups, and square meters belong to those products. On the one hand, this target group needs a certain number of square meters, and they can afford it. We depend on two things, which are BVOs (we make them), and GBOs (we sell them). The GFA/GBO ratio does not matter for which development, it must always be as favorable as possible. The GBOs actually just come from the wallet of the target group, so that's kind of fixed data. It doesn't even matter whether something is beautiful or not. You are going to fill in the area and that is purely to see how many homes can be in the area. A number of parameters are important, but they also often stem from the plot passport, prescribed by the municipality, which states what percentage of the site must consist of water, there must be sufficient greenery, etc. In this way you go to a looking at an optimum; how can I create as little public space as possible and how can I spend as much square meters as possible, again in line with what we have obtained from the target group analysis.	Feeling Objective parameters result in feeling BVO, GBO Relation target group - product BVO/GBO ratio Looks not important yet Profit/ precondition ratio	Subjectivity Objective calculations Preconditioning framework Financial feasibility
#2	Evaluation process	6	Based on my feeling, with the underlying fact that I have made an exploitation, have looked at the different models and have interpreted those hard figures and, on the one hand, have also entered them by feeling. So it's a combination of subjective and objective, because you can't put a commercial feeling in one parameter. Look and a market researcher who just goes to see how many people live somewhere in a neighborhood and how much tendency there is to move etc. I should always know that place better than that market researcher but he does so purely on the basis of information that is freely available or which is purchased and I need to have the commercial feel to the location. So in theory it could even happen that two or three target groups are proposed and that I don't even agree with one, that I think well in this city or in this area I don't see that happening so quickly. Then of course you start a conversation with each other, but on the one hand that is just the hard numbers or just cold numbers and on the other hand it is up to you what is going on in the city and what is going on within a city council.	Based on feeling Guided by hard figures Hard figures partly estimates Commercial feeling Developer should know location	Subjectivity determanative Objective condition Preconditioning framework
#2	Evaluation process	6,1	Not	Not	Not measurable
#2	Evaluation process	6,2	That is certainly desirable for the process, it is part of our profession. If I have received a list from our market researchers and they propose for these target groups, that includes the product, the sales prices, then I will use that information. Then it's not about the last square metre, whether that house should be 107 109 111 m^2 and whether it should be 450,000 or 360,000 euros, but in the end I have to include all of that in my operation. from my profession I do deal with all those numbers, of course, they are not rock hard.	Desirable Market advice Processed by developer	Valuable Programmatic principles

#2	Evaluation process	7	Whether something is useful or meaningless and how many products we can load somewhere in an area and what the yield is for both construction and real estate development, then the concept does not have to be so specific. If we say that the area is under control and we are going to set up the structure, especially in larger developments (i.e. larger buildings, larger volumes), then you are already one step further in the process. Then it is very useful to look at what would fit in the zoning plan, within the possibilities, can I perhaps make even more square meters there, can I get a better GFA/GBO ratio there, yes. I would do that after the investment application, because then we have made the investment application for that land and we have formed a development combination. Well then we know from the mass that we have placed on it what we can approximately make at that location and then in the further elaboration, we will really put those buildings in the structure completely well, then you will optimize it. I don't think it makes much sense to determine at the very beginning of the project whether something is useful or meaningless, and then work it out in a very targeted way. You know from your profession what should come and how it should be and that a building can still turn or something, a completely new design will never come out. And that it is possible to play in the facade, in facade materials and in elevation points, but within those masses.	Concept design not too specific Optimise product further in proces Programmatic principles Optimise when masses are known Profession based	Estimation Subjectivity Programmatic principles
#2	Feasibility	8	If the calculations result in a healthy real estate development yield and a healthy construction yield, and these have been determined by our construction and real estate division. We also have to make an investment request in the business case and that is why these parameters are so important, because the moment we do not achieve the predetermined profit percentages in advance, we are also not allowed to make the investment.	Real estate development yield Construction yield	Financial feasibility
#2	Feasibility	9	By doing your research well. Of course, that starts with the available sound card to enter it into your model and find out everything as best as possible. Of course you have your own knowledge, but available data are also important and especially put it in your model. This applies not only to sound, but also to the subsurface, knowing from click messages where all cables etc. are located, so that you do not position a building on it. So also with sound cards, knowing that you do not knowingly put so many sound-sensitive areas full of sound. Look, you must of course have the knowledge of what kind of location I am in, so the moment I really just want to build over a national highway, then of course all kinds of alarm bells have to go off with you, or if I want to be here next to the airport building then all kinds of signals have to go red again, hey, pay attention, I have to investigate this at an earlier stage. If I buy a meadow somewhere in the middle of nowhere, then I don't have to look at these kinds of things. So the moment you see from dude I could possibly be sitting here in a very noise-sensitive loaded location, yes please pull it forward a little earlier because you don't have to go to a follow-up stage, normally I would say from he comes only when you really have the position under control huh, so that we are going to make an offer or have we done so, but if you are here in an extremely loaded noise area, yes then please do some research, especially please.	Doing research Your own knowledge Available data also important Pull research forward in critical situation	More research Profession Knowledge earlier
#2	Case project	11	I can only explain it from my perspective. I was approached by the director of Dudok, who intended to acquire the case project location (the existing building) and the nearby site, but we still have an alleged claim with the municipality of Rotterdam in connection with the realization of the Dakpark van de Big Shops, to realize the so-called North Building and the South Building, which have yet to be realized there at both ends. In doing so, one became one and one became three. So if you could still do something next to the existing monumental building and we have this one, it is not convenient to bring it together.	Via network	Network
#2	Case project	12	I mainly had the first initial conversations and then it quickly entered the value stream and I didn't get involved much anymore. I was not involved in the development of the development combination and the concept designs.	-	-
#2	Case project	13	That's just usual. People have to live there too, you have a parking requirement from the municipality, which is always a very important one. You have a city access road there, so you have to deal with noise. The tram also passes there, so you actually have the regular, inner-city challenges there. Some hey, you never have them all at once. Close to the harbors so you also have to deal with nest noise.	Usual urban challenges Parking norm Traffic noise Nest noise	Standard Environmental constraints
#2	Case project	14	Yes, the nest noise, I understand that caused a number of problems, but that is also a good example of knowledge and experience. If you have encountered that before, you know that you have to take that into account, that it is a risk factor.	Nest noise Knowledge and experience important	Environmental constraints Knowledge
#2	Case project	14,3	No, you can't prevent it, well, you can prevent that you have to make a lot of new models by of course taking that with you and knowing what the influence is, in order to use the positioning of your building and the construction of your building to ensure that you are of course affected as little as possible, both in terms of comfort and in terms of money for the measures to be taken in the end.	Doubt Knowing the influence and take it into account at an early stage	Doubt Knowledge
#2	Case project	14,4	If you're specifically talking about noise in this case; you test the noise on the building mass you designed on the location and then it does indeed happen that too many houses are built above a certain noise limit, which is technically difficult or too expensive to solve with the result that you have to solve it differently	Yes Change of mass because of noise	Possitive Environmental constraints

ID	Subject	Question	Response	Open coding	Axial coding
#3	Real estate development	1	In the initiative phase you really look at the main line, so what can I do in one place and how do I make that feasible, and in particular you really look at the rough counting model. You do not yet look at what the building will actually look like, but you just look at what the numbers are, what are the characteristics of the location, that is of course also important, isn't it. So how high can I build there or what do I have to do to be able to build something there, should I adjust the zoning plan or not? So you actually look at the frameworks that are there from the environment, and if those frameworks are sufficient, eh, so you can do something with them, then you look at how can I make a plan that is feasible on the one hand and which fits within those frames. But really on the mainline, really broad. This phase often ends with a structure plan, so then you have a counting model just an Excel number of homes, with those GVOs approximately and as many GVOs and that also processed in a structure plan in a kind of master study where you can say units. The first concept design is made at the beginning and is part of your structure plan. That depends given frameworks and determines the feasibility of your business case. As far as I'm concerned, the concept phase runs through half VO (provisional design) actually. Look, a concept actually starts with the question; what is promising in this place? Which product am I going to come up with here? What kind of project are we going to make here and why are we going to make it? That starts with the initiative, but it also continues up to and including your architecture, isn't it, so what fits in that place and how are we going to market the product in the future? what should it look like? for who is it? So I actually see the concept phase overarching the phases we have in the Flow. That's why he's not really in the flow of course, the concept phase, he's in it, but he keeps coming back a bit in different places. It's getting more and more specified, your concept is also getting more and more specified. In the initiation stage. And of course you always refine that a bit, for example with a structural plan you look much less at, for example, your access principle. Of course you try to take this into account, but for example the plan I am currently working on was completed an initiative phase about last year. Based on that, we made a kind of overview of: we want so many GBOs, so many GFAs, so many units, based on this mass. Then you will find out a bit, now that you are going to draw up the structure plan, yes, nice that we came up with that then, but that access has to be different, so that the mass and the numbers of GBOs and those BVOs will really turn out differently. So in the end, you continuously refine it as your design process continues. On the one hand, you simply have that due to a change and insight and that you come up with smarter things, on the other hand, also because of simply changing laws and regulations.	Main line How to make it feasible Context Framework Structure model - Counting model (BVO GVO) - Concept design - Feasibility Concep design phase overarching Concept design gets more specified over time refining concept design - new insights - smarter solutions - changing laws & regulations	Feasibility Structure model Convergence Preconditional framework
#3	Concept design	2	In the projects that I have done so far, I join the initiative phase a bit later. The feasibility is then no longer really up for discussion, because it is already quite a project. It already has a certain certainty, so to speak, whereby we think that the project has a lot of potential. For me, the concept phase is really the beginning and I think what you mean with the concept phase is a bit earlier then when I join a project, the moment that you really start looking at: Why do we choose that place and why are we starting with an initiation phase? Why is it interesting? We have the Design Studio, they really do two things; on the one hand they look at the market, so what's interesting in that place? and that simply has to do with the neighborhood and the environment, based on that they reason from; that's interesting there. Then you really have the concept and that is much more about which product suits the environment and what kind of home, or what kind of offices, or what function do you want to use there? So they are actually much more on the main line before you actually start with your initiative. In your initiation phase, look at your counting model and see what you are going to make, that is actually a product that is a bit further than you think of we want to make houses there, or we want to make offices there, or build a hotel there. We are now doing that at Diepenveen, for example, where you have the existing building, which is really the concept phase. There you will expand a bit on the concept that we have already come up with with the new construction, but we are now looking at what we can do with the existing construction and then you look very closely at what I say, so on the one hand; what do you want there? what fits within the area, both in terms of products and target groups? Well then you go through all kinds of different scenarios and let ID work out different counting models, different products, functions and then you knead together to see what fits best and then you start calculating.	Concept after market analysis Determine potential Determine feasibility Design studio - market analysis - fist concept designs initiative with counting models and calculations	Concept designs Market analysis Feasibility Structure model

#3	Concept design	3	No idea, I don't know. What I said I have just done that at the case project, and then you just get a number of concept designs, but we also wanted to do that on a small scale because we didn't want to put too much time, money, and effort into it, because we We didn't know what was possible at that location, and we think something of it ourselves. Dudok, the development partner, also thinks something of it and also looks at it differently. So there we worked out a handful of concept designs, 4 or 5. But it also has to do with the size of your assignment, look at the larger the assignments and also with the frameworks that are there, of course. If you just have a blank sheet, you can of course make many more variants than you have certain frameworks that you have to take into account, on the other hand, the size is also simply decisive. When you have a very small plot, it is logical that you can think of much less variation than a very large plot with 100 types of allotments or 4 or 5 towers, very high towers, or some lower smaller towers, and so on.	No idea Small scale due to uncertainty with regards to potential Time Money Effort Preconditions and scale affect quantity	No idea Few concept designs Uncertainty
#3	Concept design	3,1	Well, that's always the question isn't it. Look on the one hand it is very nice to have a lot of variants, because then you know for sure that one of those variants is the optimal one, on the other hand that also gives a lot of work in the sense of a; those variants have to be made, B; because we don't do that ourselves and spend a lot of time in it, it costs a lot of money, and c; we have to assess all those variants and on what basis are you going to assess that and what do you take with you and what do you not take with you? So in the beginning are you only going to look at, for example, those products that I find interesting and those that I don't? Yes, you can do a shift pretty quickly. Then there is just a handful left compared to a whole bulk that you have before, or are you going to do it much more extensively? Are you going to look at the number of square meters that you have in one model and are you going to quantify that right away? So that's going to cost so much and yield so much? So yes, I think it certainly makes sense to have many variants, but it must remain manageable in the assessment of those different variants. With a handful of variants it is very manageable to make a selection of this is good and this is less good, this is promising this is less promising, with a lot of variants that is of course much more work. Yes, that does not mean that it is by definition wrong, but that does mean that you get a different time use and therefore also a different distribution of costs.	Very nice Remarks: - a; they have to be made - b; creation costs time therefore money - c; they have to be assessed, which takes time therefore money assessment must remain manageable how to assess? different cost distrubution	Valuable Expensive Manageable
#3	Concept design	4	For example at Diepenveen, you ask ID if they can work out some variants and then a few days later you get some variants, with a counting sheet and then you say well, we want that a little different. Then they will adjust that again, it takes some time again and that in itself is fine, but the best thing is of course when you could turn those knobs yourself, at least that's what I like best. The plan I'm working on now has a lot of frameworks from the environment that need to be processed, which are really indicative of the building that you can build there (or not). We now have the structure plan elaborated by an architect and we have been working for weeks now to properly direct that architect and ask whether he has thought of all the frameworks. Then I'm really talking about the concept level. How you normally often work as a developer is that you just have one counting model in Excel, but that is just arithmetic. Ultimately, you also want to make that translation into a mass study where you can shift the units a bit. I find that very interesting, that you can simply test the feasibility yourself and play with the model so that in the case of that project I am currently working on you no longer need an architect for the mass study. So just being in control yourself, seeing for yourself what happens when you adjust something. I think you can also complete your structure plan much faster, so in your initiation phase, and you will actually have the optimal solution much faster. That goes beyond whether I see a future in loading all those frames into a model and then letting the computer determine it. I personally feel that you just keep the overview yourself, that you take into account all frameworks, laws and regulations, environmental elements, that you keep those kinds of things in your head for a while and come up with something smart based on that, with a tool with which you immediately have a counting model and a mass model.	Concept design very time consuming process Complex framework --> longer process Need to twist buttons and test feasibility directly Shorten processing time Find optimal structure plan Keep the knowledge Keep the control Not too dependend on tool Quickly generate counting model and mass model	Inefficient design process Inefficient evaluation process Human factor Lead time
#3	Evaluation process	5	That of course consists of a hard and a soft side, subjective and objective. You can imagine the hard side of that, so that's just what can be done on the spot? Then you have to deal with a certain building height, for example, or a certain volume or building percentage, that is really the hard side. This ensures that one variant is suitable and the other variant is not suitable anyway. On the other hand, of course you also have the feasibility of your business case; how many meters should we build? How much revenue do I need to raise to have a business case? So you look at that and on the soft side you also just have the vision you have for the place. So the soft side that is much more about what is beautiful, which masses and which composition of those masses do we find most suitable? That is of course much less hard than actual hard parameters.	Subjective - vision - beautiful Objective - possiblilities within constraints	Subjectivity Objective calculation Preconditioning framework

#3	Evaluation process	6,1	I don't think they can be tested because in the end it just has to do with taste and vision. Look, I find something important as a developer and another developer may find something else important. It has to do with experience, it has to do with representation. Look at a good example, for example, if you again include the monumental building of the case project, a developer from Dudok, for example, said; I don't want to cut those buildings loose, so an existing ensemble of buildings. ID had one variant in which the masses are cut up where you have a kind of walk-through, so that you connect one side of the plan area with the other side of the plan area. Where I think that the fordability of the plan is good for the experience of the place in the future, because of that it is nice and you get commotion, commotion is nice anyway, social safety and so on. His perception is; no, an alley is not nice, people sit there to piss, bums go to sleep there, etc., so it also very simply has to do with your own experience and your reasoning about what is a good place. Making it testable is very difficult because my definition of a good place can be different from someone else's definition of a good place Or, as a development department within Dura Vermeer or within another club, you have to determine a joint definition of what we think is good development, then it may become testable.	I don't thinks so Taste Vision Very difficult to make testable Defenitions differ Maybe if you develop joint defenition	Not measurable Perception
#3	Evaluation process	6,2	These are incredibly testable, you simply have the maximum or minimum building height, the number of floors, the width/length of the building, whether or not a deepened parking garage is available. Those are all things that you can just enter hard, with those kinds of things they are just hard numbers or a yes/no. Minimum square meters, maximum square meters, that is very easy to test.	Incredibly testable	Measurable
#3	Evaluation process	7	As far as I am experiencing and experienced that is not structured, you already do that yourself and it also has to do with who you work with. Look if you work with another developer who is also used to doing it a certain way. It is not the case that at a certain moment you have, say; now we are going to evaluate, we are going to put all the models next to each other and we are going to pit the pros and cons against each other, no because you see different models and in advance you think well this is not so great so you slide that already bit aside because that is not very promising anyway, then you discuss it with each other. You partly decide on instinct whether a design has a chance, but suppose you have five variants and one variant has 2000 m² GBO less than the other, then you already have something like; that is less likely. It is not that you do nothing with it at all, because after that, of course, the real assessment of such a concept will start. Of course, that does not mean that it is nothing at all if there are fewer meters in it. See if that makes it more salable and you can optimize your sales revenue, yes. On the other hand, you also have less construction costs, so that is also an advantage. So you can always reason it both ways. Based on your gut you often already have a certain preference for models and then you discuss it with each other, that can be with a development colleague, or often with development combinations or with the architect or with ID, that you just go delve into each other of; now what do we find together? New ideas often come up based on that, and then you park certain variants. We leave those for what it is and the others you will optimize and refine again. With ID we often schedule a brainstorm where you just look at; these are the models, so we don't like them anyway, we don't really look at them anymore, we think they are promising and by talking about it with each other and sparring you also come to new insights and become that variant that you see as promising may be even more promising.	Not structured No moment of comparing pro's and con's Think this is promising Instinct, backed by numbers Gut feeling Improve by discussing Make the model more promising	Unstructured Subjectivity Consultation Optimize
#3	Feasibility	8	It is certainly already being tested on the main line, so very broad. Also because you will continue to invest so you have to be sure of; we think what we are doing is promising or we think it is not promising. So for the case project, for example, we looked at different variants for those existing buildings and on that basis we also wanted to see whether we thought it was interesting enough to give it a follow-up or not. So do we see enough yield potential and enough feasibility for this plan to involve an architect or bring in an advisor who will look at certain themes? You really do look at it, but that's really just on a very broad level. So that is just no more than a simple cigar box calculation of well this can yield that variant and that will cost approximately, well what remains at the bottom of the line and do we have a business case or not? As you go further and further in the process, it becomes more and more intricate, then you can better estimate the costs, you can better estimate the yields. Where you first just calculate with BVOs and GBOs and a key figure, so as much as €1,000 per square meter of construction costs and as much as €1,000 in revenues, roughly speaking, and as much as €1,000 for additional costs. Of course you can peel it further and further. You also look very closely at the feasibility of the environmental factors, but again you go from broad to specific. Of course you always check what can be done on the spot? So you always go through the zoning plan and if the zoning plan is not yet there, then of course the question is; to what extent do we consider it feasible to implement a change in the zoning plan? I don't know exactly to what extent, for example, the positioning of a building in relation to noise pollution is taken into account when determining feasibility, but if we take the case project again, for example, I can imagine it. With regard to traffic noise and industrial noise, eh, so the frameworks that we were able to measure for which we already knew the limit values, I can imagine that the composition of the blocks was looked at at the time. It is not without reason that building two, that is a fairly elongated building, quite slender, a gallery flat, which of course has the advantage that you have a sound buffer for a noise-free inner garden between the blocks. So in the composition of the blocks, we really looked at a low-noise courtyard, and of course you also look at that with the orientation of your homes.	Main line Investment opportunity or not Promising or not Feasibility business case Yield Further in proces it becomes more specified Environmental factors broad to specific What is possible? Composition adapted to noise Take measurements - orientation - compositon blocks - low-noise areas	Main line Financial feasibility Practical feasibility Profession

#3	Feasibility	8,1	That is simply tested with the information in the building decree, how many dB a house may have inside and based on that you know how to orient a house. If you're on the track, you also know that you can't think of any outdoor space or a bedroom with a window that you want to open. It is possible, but then you have to make provisions for it, a second facade or something similar. Well that depends on what's already available. If there is already a zoning plan, you often know the noise exposure in a place. Of course, you do not yet know what the noise load on the actual facade of your development is, assuming that that development has not yet been projected in the zoning plan. If it is projected in the zoning plan, you know the noise load, so it is controllable, so you also know that you have to take this into account and how to position and arrange your building so that it fits within those noise requirements. If you have to adjust a zoning plan, as was the case with the case project and with Pompenburg, then you do not know that, but then it is conceivable that when you are on the road, you have to deal with a high noise level and that you have a certain amount of noise. provision must be made. So you know that, but it's not verifiable yet. You will check it when you have a certain certainty about the positioning of your building blocks, then you will do research or have it done at the zoning plan. you are not going to do a sound research for every variant, that would however be ideal	Tested with excistin info (if available) You know what measurements If no data available in building decree: - you know you should take measurements - assess after positioning is certain - not every variant is tested - would be ideal	Objective data Subjectivity Profession
#3	Feasibility	9	I think that's an interesting question... look at the uncertainty about the feasibility of the plan, which is often due to certain developments, especially market developments, I often think. So rising construction costs, falling yields, that is of course a large part of your uncertainty. There may be some uncertainty about the process you're running, will local residents object to our plan? Look, of course it helps if you just have everything under control in the preliminary phase. But the question is to what extent is that possible? Look in the ideal world in the initiation phase you already have a grip on everything and a solution for everything, but then we would no longer have any work ourselves if that were possible, because we are in favor of coming up with solutions and making the plan feasible and to remove or discount the uncertainties. I find it a difficult question. Look yes it helps anyway to know as much as possible as soon as possible, as far as you can know things.	Market conditions influence Local residents resistence Ideally control and know as much as possible, as early as possible	Market conditions Knowledge earlier More research
#3	Case project	11	I just got in at what is it, VO/SO plus there somewhere. I didn't really experience the initiation phase, it was mainly Dudok in the lead, then we eventually joined because they were looking for a development partner. I don't know how that went.	Dudok in the lead Where looking for partner	Network
#3	Case project	12	The vision was, of course, simply to form a switching point for the surrounding neighbourhoods, a sort of pivot point. At the same time, we also respond very much to the maker's district, the MH4 port, and also come up with a housing product for it, in which you really get the interaction between the creative sector and housing, so that you really get a vibrant environment, which also benefits the surrounding area. move is good again. That was the vision that was taken into account to make a nice plan and I think it has largely arisen, and that seems very plausible to me, simply because of the environment.	Vision to connect neighbourhoods Originated due to environment plot	Subjectivity
#3	Case project	13	It depends on how you look at it, of course, but in general it's a pretty standard inner-city development I think. It's not super complex, when you think of inner-city you naturally think of a clump together, it's all close together, existing buildings make development difficult. That is much less natural at the case project, you only have that shopping strip, the Dakpark and furthermore, the distance from the environment is quite large, you know. That was really a piece of wasteland, so in that sense it was perhaps a bit simpler than a really complicated inner-city task. Hefkwartier is a bit of a comparable development, also an inner-city development. If I compare it with Pompenburg, it is much simpler. Pompenburg is much more complicated and that has to do with the fact that there are many more environmental factors there. I think the best way to measure the complexity of an inner-city assignment is the environmental factors that play a role, and at the case project they are significant. During the design process we found it a big challenge, but in retrospect the design was easy to tweak, with respect to the relevant environmental factors.	Pretty standard urban development Environmental factors are determanative	Standard Environmental constraints

#3	Case project	14	Yes, the mill biotope. That is a very concrete example of something that... Well, we only had it at gunpoint, the Memorandum of Principles stated two things; in the text there was a certain height above ground level and on the drawing above NAP or vice versa. The architect who used one of the two measurements had not noticed that there was a deviation in one of the two, and the difference at this location between ground level and +NAP is 3.6 m, which is just a full building layer. The architect hadn't noticed, we hadn't noticed, he had simply taken over one of those sizes, so that we found out at the VO that it was not possible. Then we took a layer off somewhere and put a layer on it somewhere else, so then you compensate for it again, but then you go back to the drawing board. The same with the water board, also a concrete example where we suddenly had to move the building a bit. Look, the building remained the same, but he has to go to the drawing board because the composition of those blocks changes slightly. We also thought that there would be a parking space all the way under. In your feasibility phase/initiative phase, during SO, all of this was still considered feasible. Then, as your plan progresses, the fine-grainedness of your business case also improves, doesn't it, and the grip you have on it, because you can estimate construction costs much better, you can estimate your yields much better, plus the moment of starting construction. / start sales so to speak that is getting closer and closer. So you get more and more control over the market development. Suppose you were to go on sale in three years, then you can now withdraw a certain yield potential, but we all don't know what that will be in three years when you actually start selling. As your process progresses, you get more and more grip, control, and more and more feeling for the situation that arises at that moment. On the one hand, the moment of start of sale and start of construction is getting closer, so the moment of purchasing and the certainty of your construction costs is becoming increasingly accurate. Because that accuracy increases, you will eventually discover that what you had in mind is no longer feasible, simply because, for example, the construction costs turn out to be higher than we had intended. Well and back at the case project, we had a parking space under it and because of that we were missing out on so many revenues because you could no longer make a program on the ground floor, that at a certain point we started to wonder whether we couldn't do otherwise. Then we opted for a much smaller parking container, so that you add revenue, so to speak. So it sometimes happens that in your concept phase, in your initiative phase and your SO phase you think of; what we have is feasible, based on that all signals are really green and it is really plausible that it is feasible, but there can always be a development that makes it no longer feasible. Then you have to refine; layer somewhere on top or a layer off, halve the parking box.	Problem due to difference in documents --> Lead to change in mass quite late in process Fine-grainedness resulted in different outcome Not feasible anymore --> changes to building mass.	Data quality Feasibility Afterwords
#3	Case project	14,1	That is of course difficult for me to determine because I wasn't there yet, so I'll argue it from the moment I joined SO and which pieces were already there. It was already clear in the Memorandum of Principles that we had to take the mill biotope into account, so the first moment you really sit down with the municipality. Look at an NvU, that often comes a bit at the same time as your concept phase, at the case project it also happened a bit at the same time, so we were working on our concept phase and in conversation with the municipality, the municipality that was working on that NvU and, for example, that mill biotope that is included therein. That nest noise so to speak, the noise load on your facade, that was also a problem, but you know that in advance. Look, on the one hand, we knew that we were just next to a busy road, on the other hand, there is a port area, so that was quickly clear and we were therefore able to make good agreements about this with the parties, including the municipality. But with the water board, that was actually addressed too late. We then consulted the water board to discuss provisions that we should take during construction, because we are building outside the dykes near a flood defence. Then the question was asked of; "Wait a minute, how come I don't know this whole plan yet? you skip a few decoys. I have to assess the plan first." That was really too late to have that conversation with each other and that is partly because laws and regulations regarding such a flood defense system are very viscous. It is not clear, so to say, even for a municipality it is not clear what needs to be taken into account. Ideally, you should have known that sooner. The complexity of the nest noise is that there was just very little apparent when we were working on the plan. We knew it was there, we knew we had to make arrangements, but we didn't know which ones because we didn't know how nest noise would be measured either. That was not yet known at the time and the municipality was busy with the investigations; what are limit values? That was the question for a while, also because it is new in the legislation and regulations. I don't even know whether it is already in the legislation and regulations, but the municipality had the ambition to include it in the plan and that makes it difficult because of course you are involved in a design process in which you have to make design choices. in which you do make provisions for the nest noise. That while you initially do not know whether these facilities are necessary. So what we did then is we peeled it off a bit. You have certain design choices that you have to make early in your design process, which we just took, such as mechanical ventilation. Of course you have to make provisions for it in your building, so that has really influenced the design of the building and the spaces in the homes and the energy concept. We had to make those choices relatively early during secondary education, and things like glass thicknesses and gap sealing of your window frames can be made later, so we split that up in consultation with the municipality. We discussed; we make these choices now (mechanical ventilation, heat recovery), and we postpone the other choices as long as possible, before we have more control over the nest noise. That just went well in the end.	Simultaneously with concept design Nest noise --> lack of framework Problem water board: - addressed too late - laws and regulations viscous and unclear Nest noise complex: - lack of framework - unknown measuring method - influenced design of building - lots of discussions --> solution	Simultaneously Rules and regulations Environmental constraints Negotiations Knowledge

#3	Case project	14,3	Yes, this could be done by linking a zoning plan, for example, or a memorandum of principles to a sort of checklist, on the other hand, I think that is also part of our work to do that check. But at the same time suppose you would make such a checklist, that is of course also very error-prone, because how do you ensure that it is up to date? Of course it also makes it really difficult that you just have to deal with a lot of frames that are in many different places. Look, you have a Memorandum of Principles that is established in the preliminary phase, well it still applies and then there is also a zoning plan two years later. Well, if you have a zoning plan and a memorandum of principles, you would say that they should be the same, but sometimes there are some differences between them. What do you hold then? So you should have a conversation about that. Furthermore, the water board, which writes things in the Keur, well the Keur that is not in the spatial plans. So I think it's very difficult to structure that and if you've already structured it, how do you make sure that it's up to date and that you know for sure that what's there at that moment is correct? Look, if you just have all the documents next to each other, you have knowledge of those documents and their content, then you can steer much more actively and I think you are also much more involved with those frameworks, because you actually have to delve into them than it is a checklist. would be like well okay, checklist says it's in it so it must be in there. It really forces you, that's more what I mean to say; it is precisely that structure that is not there now that forces you as a developer to really immerse yourself in a location and in the environment, so that if something changes you immediately know about it; oh now I have to pay attention, now that also has to be adjusted, or now I have to talk to that department of the municipality or with that institute because they have now come up with that and that means that for my plan, so we have to something with you. I think a checklist makes you lazy. Well, not everyone, I will then have the ambition to really delve into it; why is that on the checklist and what is the background to it? What does that mean? And so on, but at the same time you're busy, if you're going to think well, I'll do that when I have the time. Well, you don't have time, but the design process is underway. It could co-exist in theory, it could co-exist in practice, but I think it's becoming a must for a lot of developers. It will often go really well, but the point is that you just have that one time that doesn't go well and then you just have a really serious problem.	Link land-use plan with checklist Link MoP with checklist Part of job Difficult to structure checklist & up to date Knowledge developer stays important Danger in lazy effect checklist Doubt whether it works	Possitive Design assessment Manageable Human factor
#3	Case project	14,4	That you have to adjust something, really on a mass level that doesn't happen very often. If it happens then it often has not so much to do with the environmental factors, I think, but more with making your plans feasible, so that is more due to your revenues or cost side, where a layer of construction more or less might just make the difference, or just a little extra turnover and then that sometimes happens. As far as my experience is, this does not happen often because something has been overlooked from the environmental frameworks. Of course it is often the case, and I think that is interesting, that you deliberately deviate from something in the zoning plan. A municipality may of course deviate from the zoning plan. They may crumble within certain margins and it still wants to be the case that you look for the boundaries in that and that then something else has to be done left or right. Then they want to deviate, but then it has to be slightly different. Then you have to go back, but you won't solve that with a certain tool in which you can load all environmental factors, because you still have that derogation authority that a municipality has and that you sometimes try to look up.	Not very often Minor role environmental factors Feasibility more important Often try to deviate framework Challenge boundaries Can result in re-work Tool wouldn't solve this re-	Sometimes Environmental constraints Feasibility Deviation framework

ID	Subject	Question	Response	Open coding	Axial coding
#4	Real estate development	1	In the initiation phase, you sketch together a bit at the very beginning and see what is possible, rough calculations, is that feasible? And can you continue with that? Then you go to VO. This is how you make your steps towards realization.But the initiation phase for inner-city real estate development differs slightly per company, of course. Look what you see, compared to Dura we are a smaller player, Dura is of course much bigger. We are now with 22 people, of which half of the people do finance and invest, so our investment portfolio. At Dura, of course, you see much more that they have a construction branch and a development branch. So we are developing with a somewhat smaller group, we don't have a separate department with concept designers or anything like that. I think at Dura there is a department where concepts are created with concept developers employed. We don't have those. If you are employed by us, you are expected to be, can and do everything. You are ultimately responsible for that. That's kind of the difference between us and the bigger developers. If you look globally, for example, we participated in a tender with Dura Vermeer, what you saw there is just an old industrial site that needs to be transformed into a very large residential area in the region. Well what you do with each other is that you first look yourself as developers; how big is that area? What kind of buildings are there that need to be preserved? Are they there at all or can everything go away? What does the neighborhood look like? What is the need? These are a number of market analyzes that we do. What should we add? What type of housing? Or are they homes, or should you focus more on care for the elderly. So you're actually going to peel off all the factors to see what influences what you have in mind. Perhaps it will come out that there is a need for offices instead of houses. That is not the case at the moment, but that could just be a solution. Then you actually talk to the municipality to see; what does the municipality want? Then you decide together the program that you have in mind at that time at that location, and you see what kind of program does the municipality have for ambition? And from there you start making models, I often still do that with a sketch roller. That's the way I've learned it in the past and I just like it, but I just see that everyone is doing it digitally these days, which I also just love. Then you go together to see what the possibilities are, and it is always the case with us; drawing, calculating. So I want to make a subdivision right from the start, even with the first sketch, and see together what kind of program or volume can be done at that location. Then you are not yet going to look at how many homes that is exactly, but you are going to look at how many square meters, how many cubic meters can I put on it. Then I calculate what kind of program it could be, I make a very short calculation and you look together, is there a feasible business case to make? What do we have to pay for that land? Is that land owned by the municipality or by a private individual and can we just buy it? Can we make an offer? Those processes are, of course, different. So it just depends on what the situation is, because do you have a location that takes you out of the market because you cycle past and ring the bell and say; hi there, I want to buy your property, and they happen to want to sell it, or have you registered for a tender with the municipality where you have to participate in the tender, because then you see that the municipality itself has often already determined a lot of program for that location. Then, of course, it becomes a request that is already much more focused on a specific question from the municipality. So the difference between; is the land owned by the municipality and has the municipality already written an entire program? Or is it an	Determine feasibility Phase differs Scale company influences Smaller company broader responsibilities Market analysis Area investigation Desires municipality Determine program location (with municipality) Start making models Sketch or digital Programmes Volumes Square meters Not to number of houses Short calculations Feasibility Process differs Land ownership Discuss with municipality Tool for local factors helpfull Tool to create options helpfull	Feasibility Inconsistent process Market analysis Opportunity analysis Preconditioning framework Structure model
			initiative of your own and do you come up with example ideas yourself and try to get that done at the municipality. Just as an example; in Schiedam we bought the glass factory, which is a site of almost 6 hectares, where glass used to be blown. That glass factory is closed and we are going to develop a residential area there. But we simply bought that location from the owner of the glass factory. Then you go to the municipality and just say; "We want a development for the ground here, do you want that too?". "Yes, I'd love to," said the council. Then you will try to come up with a program together and then a tool with which you can load all factors would be very useful. Who helps you in that and lays down all kinds of options instead of me drawing 86 different options myself with my sketch roll.		

#4	Concept design	2	Once you have a location, I'll just assume that we have a location ourselves, I'll take the glass factory. We have since acquired that location. Then you buy it while the destination is still a factory site, so you actually buy the location as a factory site, and then you take the risk of whether you will be allowed to build homes there at all, because you don't yet have anything on paper from the municipality in which the zoning plan states that it is allowed. You have already researched a bit about what they want and whether they would be open to it. But every four years there is a new lecture and every four years you are waiting to see if this lecture wants to continue the same things as the previous lecture, so you have no guarantee that it will work, it is a risk. You actually see that with the different phases within project development, each time you reduce the risk. Now we have reached the stage that we have signed an anterior agreement with the municipality, which is a preliminary agreement in which the municipality indicates that I am willing to adapt the zoning plan to this and this program globally under the following condition. Then you already have something on paper from the municipality, but we only received that a year after purchasing the location. Of course, this means that the location has become much less risky in the meantime and has therefore become more valuable. We are now working with the municipality to convert this Memorandum of Principles into a zoning plan. Then you really go into the procedure to change a zoning plan to housing. That must then be 20% social housing of up to 750 euros, I'll just mention something. That percentage must be mid-market rental properties, that percentage must be medium-sized owner-occupied homes, it may be that percentage of expensive purchases. There has to be so much program in terms of shops or commercial spaces, so much parking included. All of this will eventually be laid down in the zoning plan. In the beginning, I always sketch myself, or do we always sketch ourselves, Dura does that too, but at a certain point you choose to involve an architect and then you set the architect on the road with a program and he will sketch for you. Then you look at those sketches and you say well this is not what I want, this is more what I want.	When you have a location Potentionally change land-use plan Discuss with municipality Form programme Products for the area Beginning sketch Involve architect Monitor program Steer architect	Feasibility Concept design iterations Structure model
#4	Concept design	3	I don't know, no I don't think so. For example, when I look at the case project, that's a nice example, we had first thought to erect two high towers there. Well then the town planner said; I am completely done with towers in Rotterdam, I don't want any towers in this area. Then we started looking at how we can get a development done? It's actually funny that with the design we now make just as many homes as we would have liked to make in two towers then, only now it has become a much more accessible and smaller development.	No, I don't think so At the case project: - initial idea 2 towers - cities town planner said no - same amount of units now - while smaller, more accessible development	Inconsistent
#4	Concept design	3,1	Fantastic. I think the people who do concept development are very creative, but you have to have your own creative mind. When there are already several examples, I don't think you will make an example like this one-on-one and translate it like that, but it does provide new insights that might allow you to arrive at different insights than you would have come up with yourself. It is very difficult to just put something down from scratch, once something is in place it is much easier to comment on it and adjust it, and then make something better of it. That is much easier, so I think that if you have all kinds of proposals, it will be easier to arrive at a design from those proposals, to arrive at an allotment. So I think it can help a lot.	Fantastic Limited by own creativity Difficult to create from scratch, easier to comment and adjust Could help a lot	Valuable Human factor
#4	Concept design	3,2	A lot of concept designs are made currently, but I would prefer that you can make a model that simply produces 80 different allotments, I'll just name something. That simply saves time, of course, if you ask an architect to draw 80 subdivisions, that takes a lot of time and therefore also a lot of money. Of course you want to know as many options as possible at the earliest possible stage, with as little investment as possible.	Time Money Desire to have many options, as early as possible, with little investment as possible. Software	Knowledge earlier Software Expensive

#4	Concept design	4	Yes, capacity at the municipality is a very important challenge that you encounter a lot. You simply notice that the municipality actually has too few people and therefore cannot properly answer your questions and they therefore really appoint someone dedicated to your project. Then they have to be there, they have to have the space, time and people for it. I think that is a very big problem. Because there are so few people, the capacity of the people is not there, so they will make concessions and hire people who may be slightly less experienced in a certain area. The capacity of those people is therefore sometimes not sufficient, if someone who is perhaps a bit better at one thing, also has to find something of something they may be less good at. That makes it more complex. And I think environmental factors such as the water board. A mill biotope, all things that hang around it, that don't seem very important. That's more the point I think. There are a lot of environmental factors that don't seem important at all, but if you haven't thought about it beforehand, you can be delayed for years afterwards. I do have an opinion about how that could be solved, but if I could solve it I would have done it a long time ago. You just see that a water board is a bit of an official organization where you really have to be on the right track to get something done. Until you get there you only meet people who are hired to be against, I always say, that's a bit very flat you shouldn't take it that way, but that's what happened. Very often a tailor-made solution has to be found, in Rotterdam you now suffer from nest noise in several places, that has been solved here at the case project, but there are plenty of projects that are at a standstill because of nest noise. Who made that up? The new thing about nest noise is that the calculation method has changed, and because it has changed it has become a problem. A different calculation method has emerged from the regulations and as a result it comes to light much more and has much more influence on development. The question now was to what extent you should include this in the building decree with measures that you had to take in the home. It was first seen as something that happened every now and then, and now it is what they say; yes, but those ships are of course much more frequent there. The closer you are to it, the more often it happens. That means you have to take it much more into account. It weighed more heavily in the calculation.	Capacity municipality (time) Capacity municipality (functional) Environmental factors don't seem that important, but can cause massive delays Rules and regulations Example: change calculation nest noise	Lead time Human factor Environmental factors Reliable on preperation Rules and regulations
#4	Evaluation process	5	A: that is not something you decide on your own, that is something that you decide in consultation with each other, but the interest of the developers is of course often different from the interest of the municipality in this case. In any case, what we often do is that we really look for the variant in which we are going to put the program that we can be proud of, so that makes us happy and says; "I can associate myself with this, when I walk past I am proud that we have developed this", in combination with the fact that we have made the most money with it. Yes, very simple, we are a party that would like to earn money and we are not ashamed of that at all, but we would like to do that by making beautiful things for people. You are looking for that consideration, that balance. So you're actually looking for a subdivision, an urban design in which you say; the quality here is of a high level, you would like to live here as a person, this is what you want, in relation to the fact that it earns enough money. Just as an example, you have a project, then it can sometimes be the case that with eight homes for a project (that is much too small, we don't build such small projects at all) than with a project with ten houses. While the quality of life is also much higher for those eight homes. You can set up a whole row of houses with freely named (von) prices for a terraced house, or you can build semi-detached houses and perhaps the revenue model for that two-hairdresser is much better than for that terraced house, and living in that house is perhaps also much more pleasant. The trade-off is actually the balance between program, money, and risk. I skipped that one for now, but it could also be that the market for two-hairdressers is not there at all at the moment. Then you have to bet on the terraced houses. So that really has to do with all kinds of factors, you will have to look at how the market works; what is the market demand? What is the program you say of; this really fits this place and there is market demand for it, also by the municipality, and what is the most optimal from a functional point of view?	Decision made in consultation Different intersts Proud Money Program Risk Market demand	Subjectivity Financial feasibility Objective calculations Preconditioning framework
#4	Evaluation process	6,1	Objective parameters are easy to implement in your model, subjective parameters are a bit more difficult to get into your model. The question is whether you should make it tangible, I can also imagine that you simply use a model based on objective parameters and that we as project/concept developers, as human beings, weigh that subjective side for ourselves and make a choice between the models. Well, that model is not interesting, because that parameter has not been properly taken into account. If you take the mill biotope, objectively you can just see, this is the height at which the wind arrives, so that means that you are not allowed to have any buildings within that radius, because it obstructs the wind, that is very objective. For example, a subdivision is subjective, do people want to live there in that way? Is this suitable as you want the design to be? Objectively you can make it reasonably black and white, subjective of course not. It may well be that I think it is an incredibly beautiful allotment, but the urban planner of the municipality doesn't like it at all. That makes it very difficult to put a score on that, I think.	Difficult to get into a model Part of job developer Use model based on objective parameters Difficult to put a score on I can like it, he can dislike it	Not measurable Objectivity condition Perception

#4	Evaluation process	6,2	Yes, a water board indicates that you are not allowed to build in a dike body, then you can measure exactly from the drawing where you can and cannot drive piles. The same applies to noise, you can see exactly how much noise exposure will be on a facade and which facility should you take if you have a deaf facade? I can do much more with that, that is much more solvable. You will of course consider which factors influence the development so much that it really changes your design completely and which things you can simply implement in your plan, there is of course a difference. You have to consider very carefully what the environmental factors are, actually in a due diligence investigation. Before you buy a location, you always look; what are the factors that will influence my design? The zoning plan is often one, with nuisance contours added, for the same money there is a Natura 2000 area in a circle of two kilometers within your project	Measurable Much more solvable Determine significance of environmental factors Due diligence investigation What factors influence my design?	Measurable Feasibility
#4	Evaluation process	7	We have checklists. We just have a checklist that we go through. A developer with us who is more involved with concept development goes through the entire checklist. That goes down the list. A: a very important one perhaps; there is a huge housing shortage in the Netherlands at the moment, but the funny thing is that the province has allocated certain areas where they would like to add housing, but they have also allocated areas where not so many housing needs to be added. So, for example, we were offered a location in Oud-Bijerland to build houses there, but Oud Bijerland doesn't have enough housing quota at all, so you have to compete for every house with the municipality to make that house. That is why less development is taking place there and developers are less interested. So that's a parameter; have housing quotas been allocated? Well, for example in Rotterdam or here in Dordrecht that is huge, there is an enormous shortage of homes. Here in Dordrecht I believe we need to add 1000 homes per year, in Rotterdam 4000 homes per year. Oud Bijerland 0, so that is of course really a parameter that you look at first. Then you go and see is the location close to public transport, isn't it? Do I have enough space to make parking facilities, or not? You look at the contours around it, there are factories beyond that create nuisance contours. You are not going to buy a house right next to a factory, for example. These are environmental factors that you have to deal with, noise from a track, explosion hazard from a track, a highway that makes a lot of noise. A contour at the river where you have to stay 25 meters out of the sailing lines because of the risk of collision, if a boat just enters the quay	Checklist Allocated housing areas If not, you have to compete at municipality for permits Public transport Public facilities Nuisance contours	Location checklist
#4	Feasibility	8	Yes, we test that. Only the problem is a little bit; you test the design, but that's a lot of assumptions. You are going to adopt; just as an example: we had a residential area and we had an analysis made there, because we wanted 500 houses there on the water. Then an analysis was made by a certain consultancy and they said; the inclusion of this type of housing in this area is a maximum of 20 per year. Well 500 homes, 20 per year, then you can calculate how long we will be busy. I have said; very nice research, but this product is just not there right now. So yes, you can say that that inclusion based on numbers from the past is 20, but this product just isn't there. So I finally said of; we're just going to develop those homes, we're just going to do it and we're going to sell them. Everything was sold out in no time. So yes, you can say we are going to measure objectively, determine from the past what it is like in this situation, but subjectively we have ultimately decided to build those homes based on feeling. We sold it big. So it does not have to be the case that the outcome of the report is always leading and determines whether you continue with a project. You also have to keep thinking for yourself.	Yes Problem: lot of assumptions Often based on historical data Market changes Keep thinking Decide based on feeling	Assumption based Subjectivity Objectivite data Profession
#4	Feasibility	9	There is no easy answer to this, but these are also factors that remove uncertainty. By conducting a very good due diligence study, in other words by knowing very specifically what the environmental factors are that influence your development. So yes, all you can do is map out as best you can which factors influence your project, and it's the developer's job to figure that out. It is also possible that there is a factory next door that does not cause any nuisance at all, but it is like I don't want any houses next door at all because if I expand later, it will get in the way. You have to estimate that in advance, because that factory will then object to the Council of State once you start developing those homes. You have to weigh all such factors well in advance and by mapping and weighing them all well, you can minimize your risk. That is the constant challenge.	Due diligence study - know what environmental factors influence the project - developers job to do so - minimize risk	More research Profession Minimize risk

#4	Case project	11	We were cycling through Rotterdam with a number of colleagues and we cycled past the masonry tower (monumental building case project location) and saw the lawn behind it. Then we thought; this is actually a nice place to get a development done. And we own the HAKA building, which is located in the M4H area. We would like to develop that building, but that is very difficult, because that area is not yet developing very much. There are a lot of nuisance contours, but this is a kind of step away from the city center to this area. So we actually just cycled to that building, rang the bell and said we were interested in the building. He wanted to retire, so he needed a pension pot. So we eventually made a deal with each other and bought the monumental building at the case project site. Then we talked to the municipality, I had already asked the municipality whether they wanted houses at that location? At that time, that was really only about the own site of the monumental building. Then we made a plan with an architect who was involved from the start. The municipality was very positive and at one point the municipality indicated that the area required a larger-scale development, so we looked at it together. So we had made a larger design for the entire planning area where the new building is now being built. Dura Vermeer has realized the Big Shops and the Dakpark in the past and then we noticed in the discussions with the municipality that they were concerned that Dura Vermeer actually had a bit of a right to the development of that location. So then we talked to Dura, indicated to the municipality that we were going to develop it together and we agreed to become 50/50 owner of the location. I believe in equality and it would be nice if we could also achieve something equivalent the other way around. That's how we started and started developing, that was all before the Didam judgment, that is a decision by the Council of State and that was about supermarkets that were in conflict with each other. This meant that the municipality could not just award a location to a party on a 1 on 1 basis. They have to offer this to the entire market, which is now a bit in the way because we have acquired it 1 on 1, on the other hand, the Didam judgment also offers opportunities because if you as a neighbor are the only one who can develop it in this way and the other cannot, then the municipality may award 1 to 1. So that's why it just went on.	Found plot Could improve already owned plot, bridge between industry and city center Talked with municipality Bought land Started designing Municipality desired larger development Included Dura Vermeer Equal development (50/50)	Standard process
#4	Case project	12	Well, of course we had made a design with the first architect, and we looked to see if we could build two towers there. We had already noticed then that the municipality did not want that, it wanted much more accessible and lower. Then at one point the congregation said; "It's also our land and we can't just award that 1 to 1 to an architect, an architect selection has to take place on it." Well then we discussed whether it was still useful to let that architect participate because if they already have prior knowledge, other architects will no longer register. So then we settled the bill and then we held an architect selection with the municipality and Dura, in which we finally chose an architect who made the design. That was really a process in which we had three architects make a design, with starting points that we formulated together in advance. They came to present them to all of us and on the basis of that we made a choice together which design and which architect we thought was the best party to design this. Well one design was one big monolithic block, very cool gesture, very robust, big block. Then you go back into the subjective discussion with each other of yes, the M4H area is of course a very industrially large area. What you want is that you will get a much more intricate living environment, if you then make such a big gesture, you are actually stamping out those industrial characters while you want to get that sweetness and niceness into it. Based on those kinds of factors, a design was chosen that simply has much nicer small blocks. So one of the three designs had already fallen off because it was way too colossal. Then you look at how can we ensure that you can live comfortably in such an area? Well there we have a very nice interior space here in the design that we have chosen. This design was the best fit because you got a very nice, nice indoor area in which people are on the one hand close to the city, close to industry, but still have their own quiet living environment in this area. That is how this design was ultimately chosen. Indeed, it is mainly based on subjective parameters, because the objective properties, they all fulfilled that. They could view it in advance. But subjectively you start looking at; This is something that I actually find much more important.	Municipality didn't like towers Procurement law, 3 architects One design too robust Chosen design living comfort Subjective decision making Objective framework known to architects	Subjectivity Preconditional framework

#4	Case project	13	I think it is a fairly normal urban project, for Rotterdam it is a bit more special because they are not towers. Well, there are also many developments in Rotterdam that are not towers. It has been a fairly quick process, well I know that Dura has been even faster with the development with the Big Dipper, but in development terms this has gone fairly quickly. I always think that our lead times are far too long, our development process takes too long. But this one was essentially developed within two years. The Big Dipper in a year and a half I think. It usually takes five years or so. So in terms of process, in terms of speed it has gone faster than normal, but otherwise I think it is a fairly normal process. The question is only of yes; it's good that I think it's normal that the municipality takes so long to do something, if you compare it with other projects, that's completely normal. In my experience, it should just be possible to go even faster, you can see that with the Big Dipper. If everyone really wants it, the right people are sitting at the table and everyone is in the fashions of we're going to realize it now, you can develop much faster. This development went relatively quickly because there was sufficient attention from the municipality, because there was enough attention from us and Dura and because the alderman did benefit from it. It had to get 4000 homes a year, the elections were coming up. He was kind of on the brink of making it or not, so it was a good thing to push a little bit of throttle on this development. Very subjective, but important. I think the development could have been a year faster, because we spent a year with the first architect, we threw that in the trash and then we started over with a new architect. The municipality ultimately wanted a different process, if they had said so a year earlier, we would have put several architects on the project a year earlier and we could have started building a year earlier.	Normal urban project Fairly quick process due to sufficient attention form municipality	Standard
#4	Case project	14	Well what you see is that we, as Dudok, mainly took the lead in the concept phase and the preliminary design, after which it was taken over by the project developers of Dura Vermeer. So in that you see that the development has come more from Dura Vermeer and less from us. I think you are referring to things like the mill biotope and the nest noise, which is what Dura Vermeer also attracted. I have been a continuous sparring partner for that and I have also taken the decisions, but Dura Vermeer has been more the driving force in this, so with the consultations with the water board, etc. These issues emerged in the development. That nesting sound came afterwards, it came out in the process while we were already at it. It certainly happens that afterwards it turns out that a party has not tested the objective parameters well enough, or perhaps we ourselves have not provided the correct parameters.	Mill biotope Water board Nest noise Issues during development Afterwords happens that objective parameters aren't tested well enough Or wrong parameters provided	Environmental constraints Afterwords Data quality
#4	Case project	14,3	Everything can be prevented afterwards. The question is to what extent it is culpable that it has not been prevented? If you look at the water board, there is simply a place where you can build, but afterwards it turned out that there were two maps where the line has just shifted a bit on one map. Yes, if you start from one map and the water board comes up with another map... what can be avoided? Which card is the real card? In the end you have to get out with the water board, well that worked. I think the block and gauge shifted and we got out. Of course I think you could have discovered some problems earlier. Of course we also had to deal with a mill biotope, we knew that that biotope was there. But, sometimes you think to yourself; Well, the soup isn't eaten as hot when it's served, we'll fix that for a while. You often estimate it correctly, but sometimes you also estimate it wrong. The disadvantage is, if you want to avoid everything, you have to keep yourself very specific to each starting point, but then you are really doing yourself a disservice. This means that you skip a lot of things that are in the gray area and then you also miss a lot of things that can make a project much smoother, better or higher. You miss all of that because you stick to the rules so neatly. Look I always say; you have green, orange and red. You should not come in red, most of it should be in green, but there will be some things in orange and afterwards you can say; yes I may or may not have done that, but you can only say that with today's science. I wouldn't want us to just have people who are just in the green field and say; "I don't do orange because it's too dangerous." Then you simply miss a lot in your projects and that is a shame. So you should always look for the gray or orange area, in order to get the most out of your project.	To what extent culpable? Two maps different data Discus to solve Traffic light Orange/grey to get most out of project	Doubt Data quality Negotiations Deviation framework

ID	Subject	Question	Response	Open coding	Axial coding
#5	Real estate development	1	That really depends on the project. Sometimes the initiation phase of a real estate project is more like a tender, so the municipality has actually already prepared a lot up to and including the spatial envelope. Then you really only have to think about how you can fill in the building in that spatial envelope in a good way. So you have to imagine that the urban planner has already selected the streets and roads and has actually made a kind of 3D Lego block in which you can make your homes. That's actually the easy version. Conversely, also the difficult one because then you no longer talk about identity or freedom, but you talk about within what percentage can I use which program and how exactly does it fit within the puzzle. Development then becomes almost more mathematics than it really is about feeling. The other variant is that there is really just nothing at all. That you have a larger area within the city, for example an industrial area, where you have to start thinking all the way from the front about what are the connections through the area? Who will live here? What kind of functions are included? What will the height be? How am I going to ensure that the business case, the amount for the land, is paid? What is legal? What are the city's ambitions? These appear to be two completely different branches of sport, they actually are, but they result in the same goal: to create a beautiful city district or residential area in a certain area. There are two polarities, and the case project was somewhat in the middle. It was not just one building, you could still make streets through it, you could still knead with it, you could still determine high / low, you could still determine all those facets. So you still had a certain amount of freedom within the spatial framework. I believe we could even fill in the number of houses. You increasingly see that, especially in the current housing demand, that the municipality regulates things, so that you are increasingly imposed; so much percent of cheap rent has to be included, that much percent of mid-range rent, such a piece of sale, such a piece of special program. So that is increasingly becoming a mathematical game to arrive at perhaps not the right market image, but the right program mix. The concept development piece determines that you get the residential area you fall in love with, so whether it gets an industrial character, Little C for example in Rotterdam, or whether it gets more of a green-urban character, or more familiar, that's the part. concept development. That has to do with everything; how you connect the buildings, how you organize the public space, what function belongs to it, it very much depends on what type of person belongs to it; maybe you are very blue and you like status and you don't really feel the need for cosiness, but maybe someone else really needs that togetherness and that means that you have to design that public space very differently . That search for how to live communally in the city is actually the whole story of concept development, and you therefore have an enormous degree of freedom in that. I can create different living environments in all those different facets, from land-bound city districts to metropolitan areas, I can also think of a cozy metropolitan environment, or status-oriented metropolitan environment, that is actually a bit of searching for what is the right thing from a market perspective, what you want to achieve there, which you reach your target audience. If you work with a housing corporation, they often have very complicated registration models. People don't really choose a home there, but they are assigned one. Then you have to switch how you make that neighborhood in a completely different way than when you do it for a buyer. A buyer who can choose, who can think I'd rather live in a suburb, or I'd rather live in that part because that's where the cafe is where I can meet my friends. That's the game we end up playing, it's about creating identity.	Differt processes, same goal Location Preconditions municipality More math to get programme mix Creating identity	Inconsistent process Location Preconditioning framework Structure model Identity
#5	Concept design	2	This can also be done in different ways, it depends a bit on whether you do it yourself or whether it is a group process. Sometimes you have your own plot, sometimes you have five or six stakeholders who are in the same area, then you get the part that you have to agree on which identity is suitable for the area. For example, within Schalkwijk we had nine owners within the same area, then you have to take steps to believe that this is the future for the area you are going to create. Is there their idea of value in it? I think in the end if you make one area that is bigger then you have more value than if you only work individually in your own plot. So you first have to go through one door with each other, is this the value we choose? And only then jointly, so to speak, in a process of urban planning and all sorts of other things. If it is only your own area, you only have to hook up to the environment or put something else down. Researching what you want at a location are actually different methods for; you can start with a values game, you can start drawing, so imagining, you can start by first making an inventory of what the wishes are, you can organize in all sorts of ways that people start looking at an area in the same way. And starting with selecting partners together, that also helps a lot in the choice, who are we going to do that with? Well, if we have our eye on a piece of land, we have to buy it first. That's the first step so to speak. Then we actually go through projections and the first drawing and calculation sessions we make a bid based on what we think is possible at that location. Then we check the policy of the municipality, we check the parking policy, we check the fact; does it fit in that location? That is the method of how we make a land offer. Now suppose that land costs 10 million euros, then we buy that land and we have some sort of idea of the plan and a market view. Only then will the process begin in which we coordinate with the municipality, take steps with the neighbors and any other land owners, until we really arrive at an identity. Only then will we actually make a plan. If you now take that piece of land for this, we do our market analysis and we see that there is a need for ground-bound homes, apartments 80 m2, etc. Then we make some drawings and say this would be our market program in the intention, under value of this soil image, with an x return. So that drawing is for us, what we want ourselves, you could of course investigate all kinds of different scenarios in it. We usually investigate about six of them, of which would fit best here. That depends a bit on the speed, sometimes you have to make a bid in one day, then you don't always have the time to view 700 different variants. So there is still a bit of progress in the acquisition process, are we going to buy that land now? And what kind of mass actually fits on it. This has very much to do with the parking balance, because that actually determines every urban development project at the moment.	Different processes Land ownership Preconditions Market analysis Create identity Investigate different scenarios, usually six Parking balance	Inconsistent process Preconditioning framework Market analysis Structure model Concept design iterations

#5	Concept design	3,1	Well, if they allocate multiple scenarios to a higher land offer, then it does add value. Just developing scenarios for the sake of developing scenarios doesn't make much sense. And we always develop scenarios based on identity, we just did a study in Breda; well you have a plot, we have x number of square meters (25,000 square meters), we feel we could come up with eight different variants there. One was an urban environment with ground-level homes, the other is one large park with one tower, so that's very extreme isn't it. What do you really want to make with each other to achieve that, and those scenarios are also included in that bandwidth. So I think if you've chosen a model, so let's say I choose green with a tower, then I think it's super interesting to have 50 different variants, about how well that tower is best positioned for the sun and all other things can become. Then you have chosen a direction and I think it will be very interesting to have something that seeks the optimum for you between spatial quality and program differentiation, or maybe just program differentiation, so then it is only about money. I think that's an interesting step, you hear yourself in the conversation that almost everything is about math / drawing, so something that calculates faster for you is always of added value, I think. So on the one hand correlation parking balance / program, on the other hand how much can be on the plot in combination with the spatial quality that is a very important correlation. There are many different parameters that are very interesting if you can get them out at the front. If you can mold it to our own values.	Valuable Develop scenario based on identity Once scenario chosen, interesting to have 50 different variants Optimize scenario Math/drawing Faster calculation valuable	Valuable Find optimum
#5	Concept design	3,2	Yes, those studies are happening now, but they are now being done by hand. We now do this on the basis of our own knowledge and expertise. And there's a facet behind that, we work for a construction company, we always say that. So in part we know how to build. So you can do a study based on GFA, GO and the ratio, this roughly fits in, but in the end our revenue model also consists of knowing that everything is right above each other and that we can also quickly identify those types. to build. That knowledge, that building component, it is very interesting that that knowledge also emerges. That's about very stupid things, for example about what kind of shafts are in it, or about what sustainability systems are in it, how high you can go to arrive at a certain construction cost cap. Those are all of those components that you know a little intuitively, that you take to that front to do those studies. That's what I'm always looking for, how to integrate that. That's the joke, isn't it, we do a new area development every eight years, we do several at the same time. So you see that everything we build, that knowledge is taken over to the next area development. So without that market knowledge, we also have that physical knowledge in-house.	Done by hand based on knowledge/expertise	Human factor
#5	Concept design	4	Capacity... And that you sometimes spend too much time on the wrong things, because you do quite a lot of acquisitions that don't land, so it's mainly about time and capacity. And what I find very interesting is that you don't know a number of things that you could know with another program or something; sound, sunlight, all of those physical characteristics that you now take with you by feeling, which you can then pick out more tangible. Green capacity, biodiversity, these are all kinds of assumptions that you just don't know exactly. Well, for example, we take that location for us, you have a noise-affected road close to it, so you automatically make something close to that road, but it just depends on the nuance how many dB is on such a facade and what for housing type you can add. And whether you are making a noise-affected or other form of facade. This has a lot of consequences for your offer and also on your home circuit. If you switch that house slightly differently, you may not need all those things. Then you can actually make a higher offer and draw a higher return, because you have to charge fewer provisions. That also has something to do with a local study somewhere along the highway, when we had a very high tower, but during the study we actually found out that if we only built up to six storeys, we would have no noise pollution. So we could simply cut off that entire tower, because everything we had to invest in for those facade measures for that tower was not included in our return. Then we had better make a six-layer high block, because then we wouldn't have to do all those sound facilities. Then it is interesting again, if you do that, do those lower houses still have enough daylight? Does that still match the feeling you have? The question is how quickly you need to know that knowledge in the preliminary process, but some notion of it, so say I'm sure that house downstairs has at least two hours of sunlight, a very physical parameter, if you can say yes check, then you know that you have chosen the right model and you can then continue. I think that's definitely worth knowing up front. At the moment we do that on intuition. Purely because, if you really want to calculate it, you are one or two weeks further along, and there just isn't time for that. The question is say if you make a bid, you do it based on 70% know, and 30% "it's a good place, we're going to get out", because you know you've got two years left. to study how it works there. It's more that you really want to avoid those pitfalls, I think you want to avoid them. A pitfall is when you really have to deal with heavy noise pollution, some pitfalls are also that we have devised a plan and that the municipality has a completely different image of the area, and you cannot get that from software. So have conversations, so to speak, to get it right. Because if we take this piece of land here again, I think I'll make more on that if I just build five ground-level homes than if I put a tower on it. But it could well be that the municipality simply says "I just want a tower". Then you can jump high or low, but then we're just stuck with a piece of ground, which is difficult to get to. Sometimes those frameworks are very clear, sometimes there are simply no frameworks, then we don't know it yet. Or you take a lot of risk, so you take a piece of land that is now a business park in the hope that you can build houses on it. The branch of sport that actually happens a lot here is that you have to find the optimum between your GFA/GO ratios, so you make a block from which you	Capacity Time management Opportunity: Acquire more environmental information Knowledge up front Currently based on feeling When knowledge needed? Risk estimation Find optimum	Human factor Inefficient design process Environmental factors

			can rent out or sell as many meters as possible, and which actually has as little shell as possible around it. It would be interesting if you could iterate on that. So then you have drawn a plan and you think this GFA/GO ratio is 75%, we often do that based on experience, huh, it is 69% often. As you become sharper in this, the amount you are willing to pay for it will also increase. That is something that could be calculated in a hundred thousand variants. What would also be interesting is that you can look at a location that we don't think you can live there, that you might be able to. There are also opportunities in that. I recently had a location in Zoetermeer, where we had a whole discussion about the fact that those houses simply cannot be there because of the noise. If you have that data earlier, during such a conversation for example, you can have that conversation much more tangible. If you can then say, look, there is a lot of noise pollution on that facade, that will simply cost a lot of money, that will not work. Then you take that part of the discussion away. That is of course incredibly valuable, that you could provide insight very quickly in the meantime, where are the pain points?		
#5	Evaluation process	5	This can also be done in various ways, it can be done intuitively in the short term, you can also do it scientifically, semi-scientifically. Last time we did it with numerical values, that you state very clearly at the front what are the criteria on which you judge the different concept models, you can judge them on the flexibility of your program, does it fit the area? Can you lose mobility in it? Does it match the market view we have? You can give them all a value, and eventually you will come out hoping, on a concept design with the highest score. And consciously we always do it with the hard, because somewhere urban planning is also something of feeling. Interestingly, when those of the heart and those of the numerical come together, then you also have the same choice. Then you can also say, does it contain 20% green? Are there sufficient opportunities for further development? That's basically how you SWOT those different models. It also depends a bit on whether we do it ourselves, because if we do it ourselves, of course we know best, then we just make that choice and if we don't need it, it's really just a design process. When we do it with partners it's nice to make it tangible, to get it out; you choose numerically, this choice, because it is then also very clear that we all agree on this. So you step into a kind of collaboration. If you do it yourself it is often subjective, then you look at the insolation but you intuitively take it with you. With high-rise buildings you don't sit on the east side because you know that the shadow will then run over the entire plan. Those are just simple models, but you can't look up the margin in them. Perhaps eight layers is possible, but ten layers is not possible, you have not yet had that conversation in this phase. If you could know that, and know that you can add two layers, it is an interesting strategy. It's just often related to those other things, isn't it, parking balance and states, so when you add, you also have to add to other things. It is a part of integrated thinking. I think you always keep doing something intuitively.	Intuitively Programmatic principles SWOT-analysis	Subjectivity Objective calculations Preconditioning framework
#5	Evaluation process	6	We actually test the indicative construction costs, so if we know a little bit that one building resembles another building, ie what we have already built, then we use an indexation to say what it will be in five years' time. Building costs have of course increased enormously in recent times, so it is now complex to follow that indexation. But that's actually the way we're doing it now. I link it very much to a kind of purchasing policy; So suppose you have to pick out a new bike. Then you'll be doing some research based on it, it's got plenty of gears, it's light, it's within budget, but some of it is just emotion; this color suits my image, so I just buy it based on gut feeling. So that's personal, I think you also see that with developers in the purchase. There are some things they just check; the return, opportunities within the development, that is the part "it is possible". There is also a bit of subjectiveness, we do this by feel, we have the feeling that we are going to make it here in the next 2,3,4 years. You can never really make that scientific. I think everyone has used that in their own buying/selling, it's just a kind of entrepreneurial gut feeling so to speak. But I do think that the more you know, the better you can substantiate your gut feeling with facts and data. The part about the SWOT is more about identities, so you're actually SWOT based on data. You can go a hundred ways with every place, that can be from very modern to very traditional, that is possible from very green to very sleek, everything is possible, but that part is the intuitive, so to speak; “I think this is the best way to hit my consumer at the moment, and thus have the best market success.” But it all ultimately has to do with the financial parameter, that's something you take with you. I could want that image, but I'm actually just not financially satisfied with it, we might actually have to take a different course to come up with the same idea. I think it would be useful to have those calculations. That you don't screw yourself. I think in a collaboration, you always have something subjective. It could even be that you have ten different designs where three different designers have made something, that you subjectively have the best feeling with a specific model because you just like that designer. That is difficult to put into words, but because you know that when you choose that, you can work very nicely with that person in the process. Then you don't even have to find it the prettiest thing. That subjective side is in all such aspects of working together. That can be difficult to write down.	Research before decision Input for gut feeling Gut feeling decisive More knowledge, better substantiate gut feeling Financial parameter	Objectivity condition Feasibility Valuable

#5	Evaluation process	7	When you talk about land purchase it is structured, you have to file a BEO. That's an investment model you write, in it are all those physical ones; money, finances, volume, those states and policies written down. That is fairly structured, the concept development process is not so structured. We actually do that a bit depending on the question that is there, that is also because we also have a lot of different questions; sometimes for one's own area, sometimes for a collective, sometimes for a third party, sometimes it is very large, sometimes it is polluted. It is sometimes really a bit invisible where the right precondition is included. So maybe you can structure that selection process, only the input is slightly different every time. I'd like to see something in that too. I was a bit off, but I think that... If you want to achieve the optimal spatial quality, it is interesting to organize a selection process about that. Then you will also say that I just want to create that optimal spatial quality, and then you can weigh up. Well, normally it's a SWOT on core values, so you can just picture yourself having ten different models, and you're talking about; what do i think is important? That is actually the most important thing you have to do, and that you see those core values among all models just the pluses and the minuses. That you see at the end of well I thought this was so important, and that comes out best in that model. This makes it very clear how you link values to the spatial structure. Look in Groningen we had ten different models. We had city blocks, large courtyards, ground-level dwellings, only towers. We said we have some very important values; we think it is important that people can meet each other; we think it is important that a sustainable urban district is created, so PV panels, conditions, etc., public greenery; we find it important that there are sufficient connections. We have looked at that list over all those models to see if it is in it, is it correct, and do we give it a 0, 1, 2, 3, 4, 5? This gives you a kind of total score which model actually scores the best. And that scoring is still subjective, isn't it. But you already make a more considered choice, a considered choice with each other because you are having a conversation about it. I think you could specify the parameters per problem, subjectively. You could perhaps make that feeling quantifiable in the amount of public space	Land purchase is structured (BEO) Concept development proces not structured Maybe: Structure selection process and weight up options Different input Currently sometimes SWOT: still subjective Already more considered choise Enables conversation	Unstructured Subjectivity Optimize Consultation
#5	Feasibility	8	Yes, always, what we draw, yields the value. This means that five models have already been eliminated, so to speak. It starts with the question of what is the amount we want to match and what kind of program is involved? That's the method we work on, otherwise it's just not worth getting in. Yes i'm talking about financial feasibility, but the financial feasibility is a broad conversation. That is about sales, buildability, construction speed, does it fit within our investment volume, etc. So not just; can I extract that much volume to yield the soil. The environmental factors are currently estimated. Those are risks that need to be included, so if noise is a risk, a post is included for it. So that is indeed a financial conversation.	Financial feasibility Environmental factors estimated Risk allocation	Financial feasibility Assumption based
#5	Feasibility	9	Yes, making those risks more transparent. The uncertainty lies more in the fact that you think you can push more programs into those dangerous zones, and that you can demonstrate that it is possible on the basis of such a program. Then you can also, for example, make a higher offer or something else and then you have made it demonstrable. Then you need more information to tackle that part of those risks. That requires, and I think there is a very difficult thing there, for a model in which you have the data and find it reliable what happens in such a system, so to speak. It could well be that the output you get is something I don't believe with my own calculation model. Now we ask a consultancy because we assume that he has his knowledge in order, and then the risks lie there too. Perhaps you could still say in the concept phase that I have this indicative, and this is in line with my indicative feeling. But the chance lies mainly in the fact that you can use it or more, or something else and that you do not rule out things based on intuition. You can look more for the edge.	Making risk more transparant Reliability data/program is imporant factor Opportunity: look for edge potential location	More research Knowledge earlier Minimize risk
#5	Case project	11	We had owned that land for a long time, we gave it back to the municipality. It was once a commercial real estate project; the Head and Tail of that shopping center. In the meantime, we have actually done a study on the other side for housing (de Kop) and the municipality has started a study for this side (de Staart). The municipality has made a kind of preconditions book for this, the Memorandum of Principles, where they say well this could be about the volume and program that we think fits. We then developed an alternative model for how we would see it. We didn't own it, Dudok bought it. Then we had a kind of deal-making with that group to set it up together. Then we said on the basis of these two models together, we can formulate a request for three agencies with whom we will enter into a collaboration. The municipality's precondition was one office and a young architect, so to speak. So we have jointly determined, applied for and said that you will all receive a few thousand euros to translate our program into a feasible urban development strategy with identity, simply based on your intuition. Then three models came out, we assessed them together and made a choice for one architect who, in my opinion, remained reasonably close to the model he also submitted, in terms of urban planning, and we just kept optimizing that until we have the right housing, the right products in the right place; owner-occupied housing, rental housing, social housing.	Memorandum of Principles municipality Network Kept optimizing design	Network

#5	Case project	12	At the case project we chose very emotionally, there were three different architects' models and we chose one that did a few things that we thought came closest to the plan we want to make; the Maakstraat, the way the different public spaces were connected, all that sort of thing was in it. There was a model that was much nicer, but based on factors such as phaseability, we didn't think it was a good product at all. Then you see that you are going to name parameters, which you use to motivate your choice. No, at that moment, those objective parameters are no longer looked at, we simply assume that they are included. But I'd rather give that up front, that we think that within this configuration we could get the optimal result What I do want to add is; we do make a comparable choice between those designs by the architect, same program, same parking balance, everything is already there because we have already figured it out spatially ourselves. They may deviate a bit, but that is what our business case is based on.	Very emotional decision Subjective decision Assumed correctness objective parameters Rather now optimal configuration	Subjectivity
#5	Case project	13	For 90%, so quite normal	90%, quite normal	Standard
#5	Case project	14	I think the problems that are of value say; there was a huge parking space with it, so to what extent we could look up the relationship with the environment. That parking space under the Dakpark was half empty, I think we could have put more in it, we eventually did that, but I would rather have known that at the front. But that is a difficult dependency to coordinate with each other because it involves a lot of risks and conversations and money, municipal policy and civil servants. That could be something you'd like to figure out sooner. I think the height, I would have liked to talk about that earlier... about how, with maybe a little more height, you could have gotten the same light, sun, shadow. That is interesting, you could have optimized that within the current spatial model. That mill biotope and the noise exposure at the front of the facade would have been interesting parameters to know a little more about, I think. Those are things that were uncertain now.	Have known available parking spaces up front Height, find optimum with regards to environmental conditions Mill biotope uncertain Noise exposure uncertain	Knowledge Environmental constraints

B-12 Axial coding overview

Real Estate Development							
Question 1							
Inconsistent process	4						
Location	3						
Investment decision	2						
Preconditional framework	4						
Opportunity analysis	2						
Feasibility	2						
Structure model	3						
Convergence	1						
Identity	1						
Market analysis	1						
Concept design							
Question 2		**Question 3**		**Question 4**			
Inconsistent process	3	Inconsistent	3	Inefficient design process	4		
Concept design iterations	3	Few consept designs	3	Inefficient evaluation process	2		
Preconditioning framework	3	Uncertainty	2	Human factor	5		
Market analysis	4	No idea	1	Reliable on preperation	2		
Feasibility	3	Valuable	5	Lead time	2		
Gut feeling	1	Expensive	2	Environmental factors	2		
Concept designs	2	Manageable	2	Rules and regulations	1		
Structure model	3	Find optimum	2				
		Human factor	4				
		Software	2				
		Knowledge earlier	1				
Evaluation and decision-making process							
Question 5		**Question 6**		**Question 7**			
Subjectivity	5	Preconditioning framework	2	Programmatic principles	2		
Objective calculations	5	Subjectivity determanative	2	Financial feasibility	1		
Preconditioning framework	5	Objectivity condition	4	Land price	1		
Financial feasibility	2	Not measurable	4	Estimation	1		
		Perception	2	Subjectivity	3		
		Sustainability	1	Unstructured	2		
		Feasibility	3	Consultation	2		
		Measurable	2	Optimize	2		
		Programmatic principles	2	Location checklist	1		
		Valuable	2				

Feasibility

Question 8		Question 9		Question 10	
Financial feasibility	4	More research	5	Possitive effect	1
Main line	1	Profession	2	Inefficient	1
Practical feasibility	1	Knowledge earlier	3		
Profession	3	Market condition	1		
Assumption based	2	Minimize risk	2		
Subjectivity	2				
Objective data	2				

Diepeveen

Question 11		Question 12		Question 13		Question 14	
Standard process	2	Concept design iterations	1	Standard	5	Knowledge	6
Preconditioning framework	1	Subjectivity	4	Environmental constraints	2	Negotiations	3
Network	3	Preconditioning framework	1			Data guidance	1
						Data quality	4
						Environmental constraints	8
						Human factor	3
						Rules and regulations	2
						Feasibility	2
						Afterwords	2
						Simultaneously	1
						Doubt	2
						Possitive	2
						Design assessment	1
						Manageable	1
						Deviation framework	2
						Sometimes	1

Appendix C – Artifact development documents

C-1 Questionnaire protocol

1. Wat is je functie?
   - Ontwikkelaar/ontwikkelmanager
   - Projectontwikkelaar
   - Conceptontwikkelaar
   - *andere*

2. In welke leeftijdscategorie val je?
   - 25 jaar of jonger
   - 26-35 jaar
   - 36-45 jaar
   - 46-55 jaar
   - 56-65 jaar
   - Ouder dan 65 jaar

3. Wat is je geslacht?
   - Man
   - Vrouw
   - *andere*

4. Wat is het hoogste opleidingsniveau dat je hebt voltooid?
   - HAVO, VWO, MBO 2-4
   - Bachelor (HBO/WO)
   - Master (HBO/WO)
   - Doctor, PhD
   - *Andere*

5. Hoe belangrijk is informatie over elk van de volgende parameters **tijdens de conceptontwikkelingsfase** van een binnenstedelijk vastgoedontwikkelingsproject (initiatieffase Flow), voor het bepalen van de **haalbaarheid** van het project in deze fase?

   (Denk hierbij vooral aan hoe nuttig de informatie zou kunnen zijn)

	Zeer onbelangrijk	Onbelangrijk	Neutraal	Belangrijk	Zeer belangrijk
BVO (m2)	◯	◯	◯	◯	◯
GO (m2)	◯	◯	◯	◯	◯
Vormfactor (GO/BVO)	◯	◯	◯	◯	◯
VVO (m2)	◯	◯	◯	◯	◯
Geveloppervlak (m2)	◯	◯	◯	◯	◯
Aantal woningen	◯	◯	◯	◯	◯
Woningtypes	◯	◯	◯	◯	◯
Verhouding koop/huur	◯	◯	◯	◯	◯
Gebouwhoogte (m)	◯	◯	◯	◯	◯
BTO (Bebouwd terrein oppervlakte)	◯	◯	◯	◯	◯
Geluidshinder (dB)	◯	◯	◯	◯	◯
Windanalyse	◯	◯	◯	◯	◯
Daglicht op gevel (VSC)	◯	◯	◯	◯	◯
Bezonning (uren)	◯	◯	◯	◯	◯
Uitzicht (afstand)	◯	◯	◯	◯	◯
Uitzicht tot bepaald punt (is het punt te zien ja/nee)	◯	◯	◯	◯	◯
Aantal parkeerplekken	◯	◯	◯	◯	◯

Verhouding aantal parkeerplekken, aantal woningen	◯	◯	◯	◯	◯
Exploitatiegebied (m2)	◯	◯	◯	◯	◯
Uitgeefbare grond (m2)	◯	◯	◯	◯	◯

6. Ruimte voor opmerkingen:

C-2 Questionnaire results

ID	Wat is je functie?	In welke leeftijdscategorie val je?	Wat is je geslacht?	Wat is het hoogste opleidingsniveau dat je hebt voltooid?
1	Ontwikkelaar/ontwikkelmanager	46-55 jaar	Man	Master (HBO/WO)
2	Projectontwikkelaar	26-35 jaar	Vrouw	Master (HBO/WO)
3	Projectontwikkelaar	36-45 jaar	Man	Master (HBO/WO)
4	Ontwikkelaar/ontwikkelmanager	46-55 jaar	Man	Master (HBO/WO)
5	Projectontwikkelaar	25 jaar of jonger	Man	Bachelor (HBO/WO)
6	directie	36-45 jaar	Vrouw	Bachelor (HBO/WO)
7	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Vrouw	Bachelor (HBO/WO)
8	Ontwikkelaar/ontwikkelmanager	36-45 jaar	Man	Bachelor (HBO/WO)
9	Projectontwikkelaar	36-45 jaar	Man	Bachelor (HBO/WO)
10	Projectontwikkelaar	36-45 jaar	Man	Bachelor (HBO/WO)
11	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Man	Master (HBO/WO)
12	Projectontwikkelaar	26-35 jaar	Man	Bachelor (HBO/WO)
13	Projectontwikkelaar	26-35 jaar	Vrouw	Master (HBO/WO)
14	Ontwikkelaar/ontwikkelmanager	56-65 jaar	Man	Bachelor (HBO/WO)
15	Projectontwikkelaar	26-35 jaar	Vrouw	Bachelor (HBO/WO)
16	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Man	Bachelor (HBO/WO)
17	directeur	46-55 jaar	Vrouw	Master (HBO/WO)
18	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Vrouw	Master (HBO/WO)
19	Ontwikkelaar/ontwikkelmanager	46-55 jaar	Man	Master (HBO/WO)
20	adjunct directeur klant en markt	36-45 jaar	Man	Master (HBO/WO)
21	Conceptontwikkelaar	26-35 jaar	Vrouw	Master (HBO/WO)
22	Conceptontwikkelaar	26-35 jaar	Man	Master (HBO/WO)
23	Projectontwikkelaar	36-45 jaar	Man	Master (HBO/WO)
24	Trainee conceptontwikkelaar	26-35 jaar	Vrouw	Master (HBO/WO)
25	Projectontwikkelaar	36-45 jaar	Vrouw	Bachelor (HBO/WO)
26	Verkoopmanager	26-35 jaar	Man	Bachelor (HBO/WO)
27	Projectontwikkelaar	26-35 jaar	Man	Master (HBO/WO)
28	Projectontwikkelaar	26-35 jaar	Man	Bachelor (HBO/WO)
29	Directeur	46-55 jaar	Man	Master (HBO/WO)
30	Conceptontwikkelaar	36-45 jaar	Man	Master (HBO/WO)
31	Projectmanager Klant & Markt	26-35 jaar	Vrouw	Master (HBO/WO)
32	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Man	Bachelor (HBO/WO)
33	Ontwikkelaar/ontwikkelmanager	46-55 jaar	Man	Master (HBO/WO)
34	Projectontwikkelaar	26-35 jaar	Man	Master (HBO/WO)
35	Ontwikkelaar/ontwikkelmanager	26-35 jaar	Man	Master (HBO/WO)

BVO (m2)	GO (m2)	Vormfactor (GO/BVO)	VVO (m2)
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Zeer belangrijk	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Onbelangrijk
Zeer belangrijk	Zeer belangrijk	Onbelangrijk	Onbelangrijk
Zeer belangrijk	Neutraal	Belangrijk	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Neutraal
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Belangrijk
Belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Onbelangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Belangrijk	Neutraal	Zeer belangrijk	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Neutraal
Belangrijk	Zeer belangrijk	Zeer belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk

Geveloppervlak (m2)	Aantal woningen	Woningtypes	Verhouding koop/huur
Neutraal	Zeer belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Belangrijk	Belangrijk	Neutraal
Neutraal	Zeer belangrijk	Belangrijk	Belangrijk
Belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Zeer belangrijk	Neutraal	Belangrijk
Belangrijk	Belangrijk	Neutraal	Neutraal
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Zeer belangrijk	Belangrijk	Zeer belangrijk
Onbelangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Neutraal	Belangrijk	Neutraal
Onbelangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Onbelangrijk	Belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Zeer belangrijk	Belangrijk	Belangrijk
Belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Zeer belangrijk	Belangrijk	Zeer belangrijk
Zeer onbelangrijk	Zeer belangrijk	Neutraal	Belangrijk
Neutraal	Neutraal	Belangrijk	Belangrijk
Zeer belangrijk	Neutraal	Belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Belangrijk
Neutraal	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Onbelangrijk	Onbelangrijk	Belangrijk
Onbelangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Neutraal	Zeer belangrijk	Belangrijk	Zeer belangrijk

Gebouwhoogte (m)	BTO (Bebouwd terrein oppervlakte)	Geluidshinder (dB)	Windanalyse
Neutraal	Belangrijk	Belangrijk	Neutraal
Onbelangrijk	Neutraal	Zeer onbelangrijk	Zeer onbelangrijk
Belangrijk	Neutraal	Zeer belangrijk	Neutraal
Zeer belangrijk	Neutraal	Belangrijk	Onbelangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Onbelangrijk	Belangrijk	Zeer onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Neutraal
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Neutraal	Neutraal	Onbelangrijk
Onbelangrijk	Belangrijk	Belangrijk	Neutraal
Onbelangrijk	Onbelangrijk	Neutraal	Zeer onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Neutraal
Onbelangrijk	Belangrijk	Neutraal	Neutraal
Belangrijk	Belangrijk	Onbelangrijk	Onbelangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Belangrijk	Neutraal	Belangrijk	Neutraal
Belangrijk	Neutraal	Neutraal	Onbelangrijk
Neutraal	Neutraal	Neutraal	Neutraal
Zeer belangrijk	Neutraal	Neutraal	Neutraal
Belangrijk	Neutraal	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Neutraal
Neutraal	Onbelangrijk	Onbelangrijk	Zeer onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Neutraal
Neutraal	Neutraal	Belangrijk	Neutraal
Neutraal	Neutraal	Belangrijk	Neutraal
Belangrijk	Belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Belangrijk	Neutraal
Zeer belangrijk	Zeer belangrijk	Neutraal	Onbelangrijk
Neutraal	Neutraal	Onbelangrijk	Zeer onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Belangrijk	Belangrijk	Neutraal
Onbelangrijk	Zeer belangrijk	Onbelangrijk	Onbelangrijk
Belangrijk	Neutraal	Belangrijk	Belangrijk

Daglicht op gevel (VSC)	Bezonning (uren)	Uitzicht (afstand)	Uitzicht tot bepaald punt (is het punt te zien ja/nee)
Belangrijk	Belangrijk	Neutraal	Neutraal
Zeer onbelangrijk	Zeer onbelangrijk	Zeer onbelangrijk	Zeer onbelangrijk
Neutraal	Neutraal	Neutraal	Neutraal
Onbelangrijk	Neutraal	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Onbelangrijk	Onbelangrijk	Onbelangrijk	Onbelangrijk
Belangrijk	Neutraal	Neutraal	Neutraal
Neutraal	Neutraal	Belangrijk	Neutraal
Neutraal	Neutraal	Neutraal	Neutraal
Onbelangrijk	Onbelangrijk	Neutraal	Onbelangrijk
Neutraal	Belangrijk	Onbelangrijk	Onbelangrijk
Zeer onbelangrijk	Zeer onbelangrijk	Belangrijk	Neutraal
Neutraal	Neutraal	Neutraal	Neutraal
Neutraal	Neutraal	Neutraal	Neutraal
Onbelangrijk	Neutraal	Neutraal	Onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Neutraal	Onbelangrijk	Onbelangrijk	Onbelangrijk
Onbelangrijk	Onbelangrijk	Belangrijk	Belangrijk
Neutraal	Neutraal	Neutraal	Neutraal
Neutraal	Neutraal	Neutraal	Neutraal
Neutraal	Belangrijk	Belangrijk	Neutraal
Onbelangrijk	Neutraal	Belangrijk	Neutraal
Onbelangrijk	Onbelangrijk	Onbelangrijk	Zeer onbelangrijk
Onbelangrijk	Onbelangrijk	Neutraal	Zeer onbelangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Onbelangrijk	Belangrijk	Neutraal	Onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Neutraal	Onbelangrijk	Belangrijk	Belangrijk
Neutraal	Neutraal	Belangrijk	Neutraal
Zeer onbelangrijk	Zeer onbelangrijk	Onbelangrijk	Onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Neutraal
Neutraal	Neutraal	Neutraal	Neutraal
Onbelangrijk	Onbelangrijk	Neutraal	Neutraal
Belangrijk	Belangrijk	Belangrijk	Neutraal

Aantal parkeerplekken	Verhouding aantal parkeerplekken, aantal woningen	Exploitatiegebied (m2)	Uitgeefbare grond (m2)
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Belangrijk	Zeer belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Neutraal	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Neutraal	Neutraal
Belangrijk	Belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Belangrijk	Zeer belangrijk
Belangrijk	Neutraal	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Onbelangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Neutraal	Belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Zeer belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Belangrijk	Belangrijk	Neutraal	Neutraal
Belangrijk	Onbelangrijk	Neutraal	Zeer onbelangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Neutraal	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Neutraal	Neutraal
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk
Belangrijk	Belangrijk	Belangrijk	Belangrijk
Zeer belangrijk	Zeer belangrijk	Zeer belangrijk	Zeer belangrijk
Zeer belangrijk	Zeer belangrijk	Belangrijk	Belangrijk

Ruimte voor opmerkingen
Bij alle omgevingsaspecten geldt dat het afhankelijk is per project. Indien het betreffende aspect aanwezig is op de locatie, dan geldt dat het in de conceptfase op hoofdlijn belangrijk is. Diepgang op het thema volgt vaak iets later
Gaaf en nuttig onderzoek, Succes!
Momenteel werken we met programma's waarin we geen analyses mbt geluid, daglicht etc kunnen controleren waardoor we er eigenlijk niet naar kijken. Als we vlakbij het spoor/wegen zitten raadplegen we altijd kaarten. In zulke gevallen zou het heel nuttig zijn geluid in het model te kunnen verwerken. Dit heeft namelijk zeker impact op haalbaarheid (zeer dure gevels).
Grove bouwkosten per m2 BVO Residuele grondwaarde berekening / output ook belangrijk
bij ons zijn eigenlijk alle genoemde punten belangrijk aangezien de conceptfase over een totaalvisie gaat.
Ik ben benieuwd naar de uitkomst Menno!
bij ontwikkeling zijn alle onderdelen belangrijk.
Uitgegaan van vgo
Al deze punten zijn belangrijk, maar afhankelijk van het type project. Zo zal een binnenstedelijke ontwikkeling veel meer invloeden hebben (denk aan bezonning, windhinder, uitzicht etc.) dan een ontwikkeling op een leeg stuk grond.

C-3 Additional questionnaire analysis

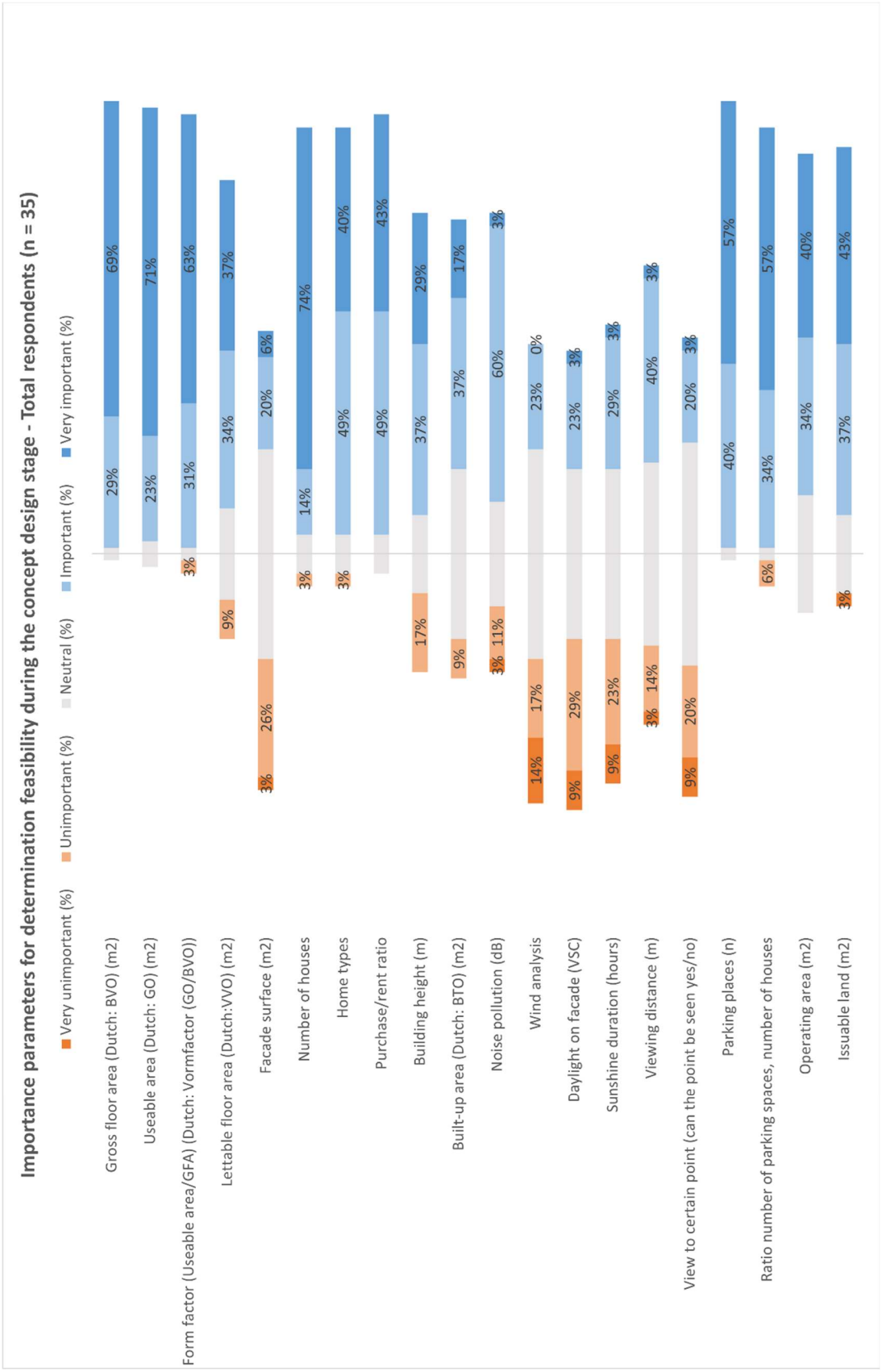


Figure C-3-1: Importance parameters for determination feasibility during the concept design stage – Total respondents

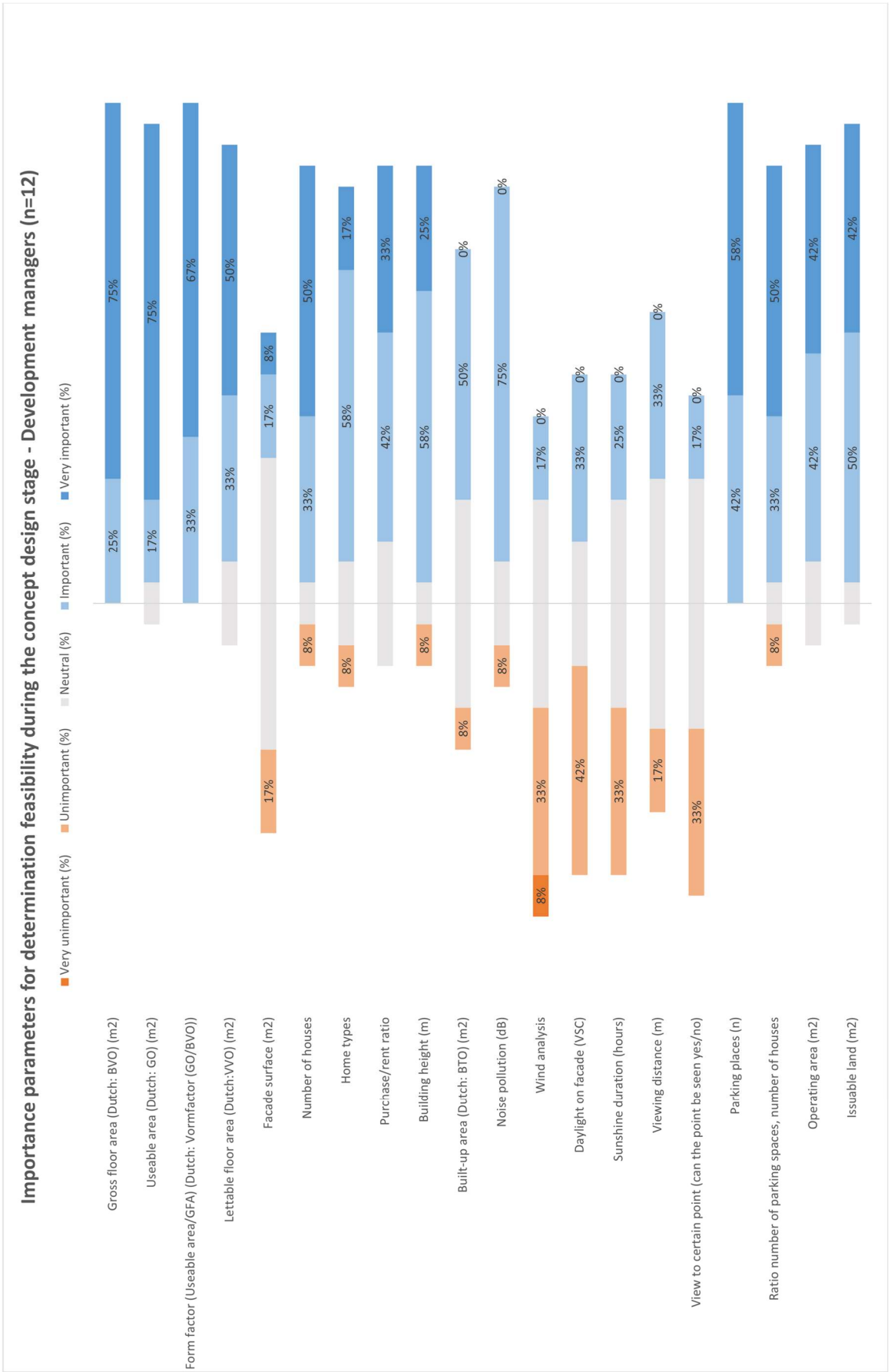


Figure C-3-2: Importance parameters for determination feasibility during the concept design stage – Development managers

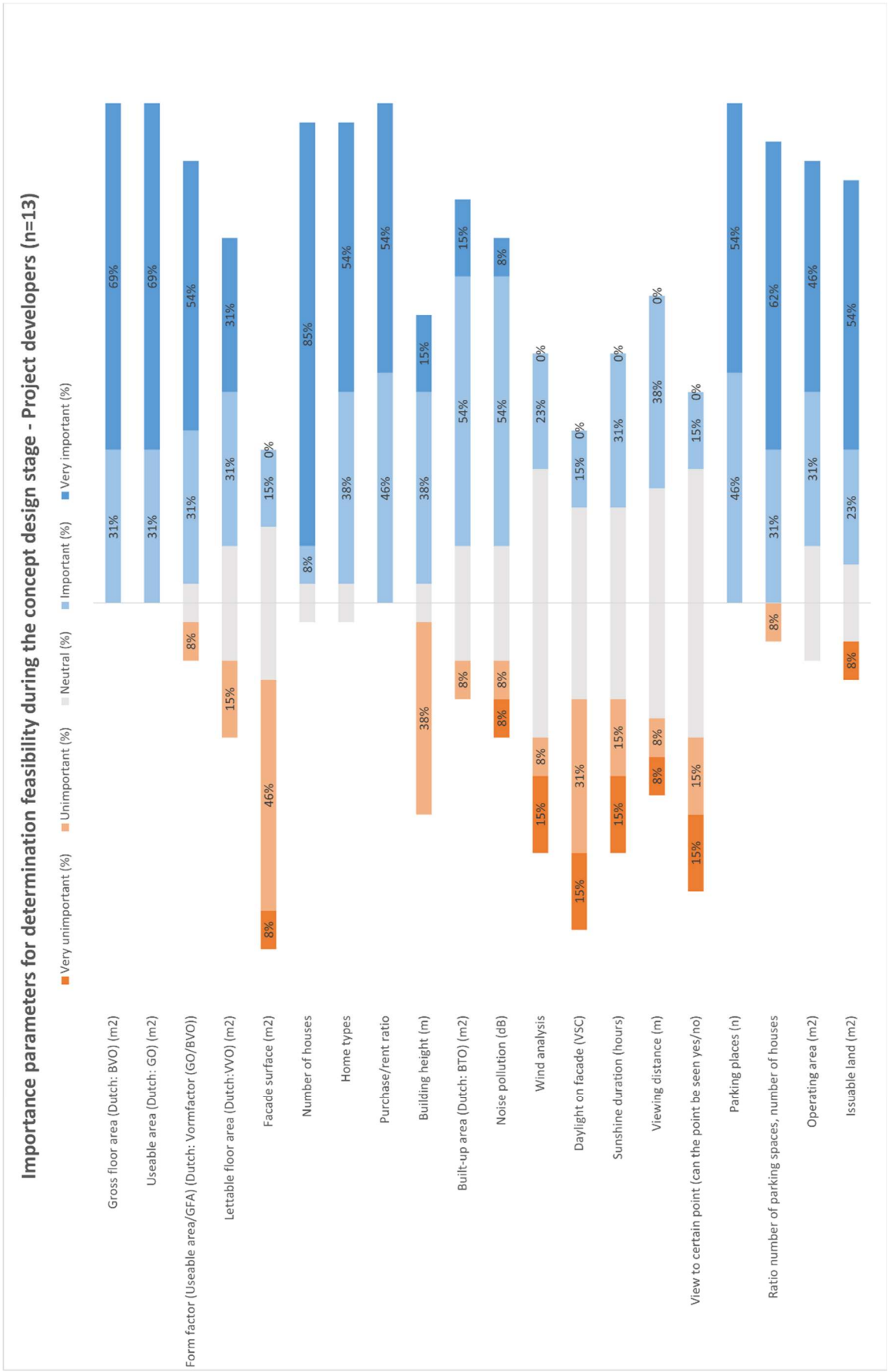


Figure C-3-3: Importance parameters for determination feasibility during the concept design stage – Project developers

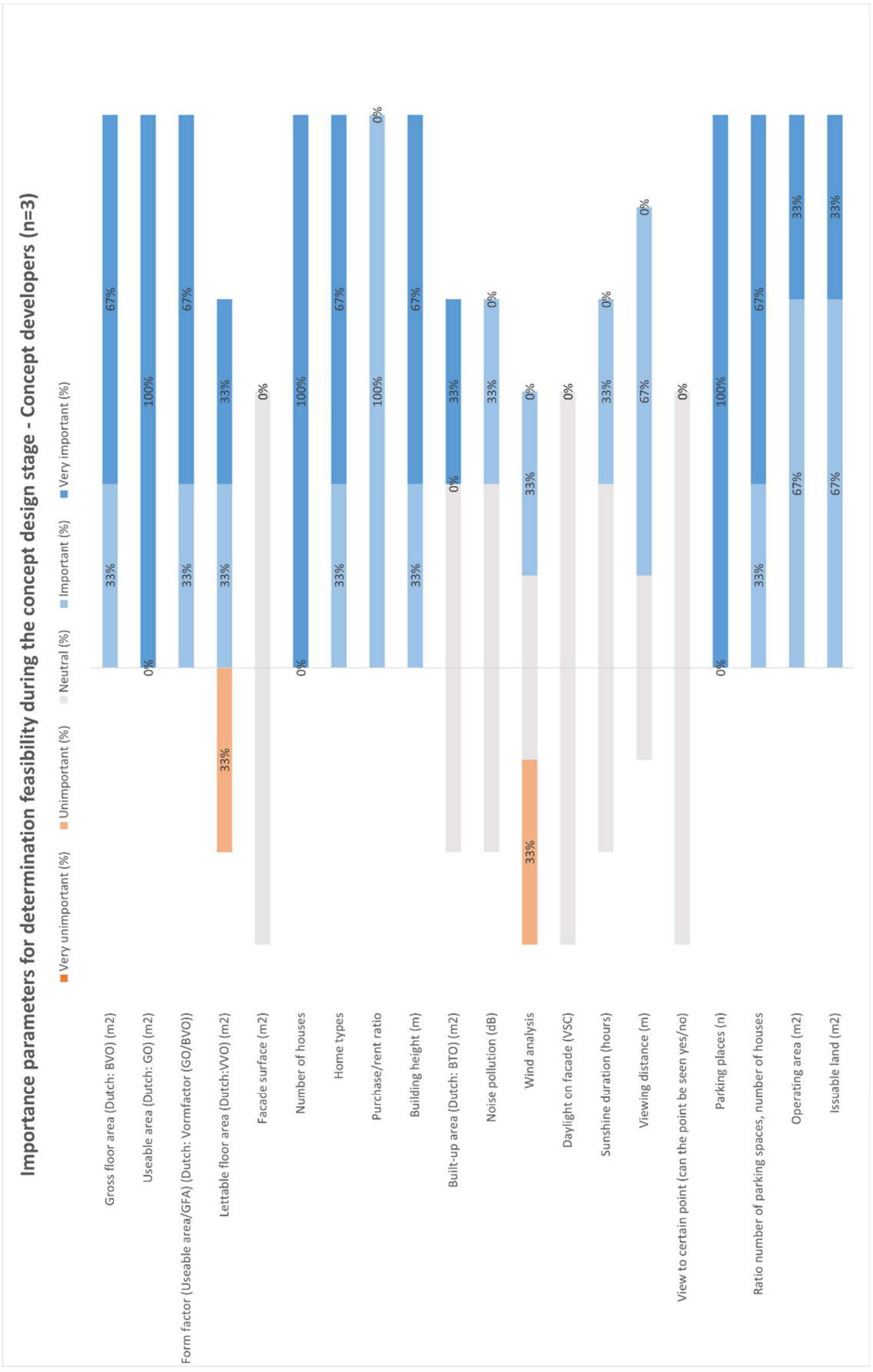


Figure C-3-4: Importance parameters for determination feasibility during the concept design stage – Concept developers

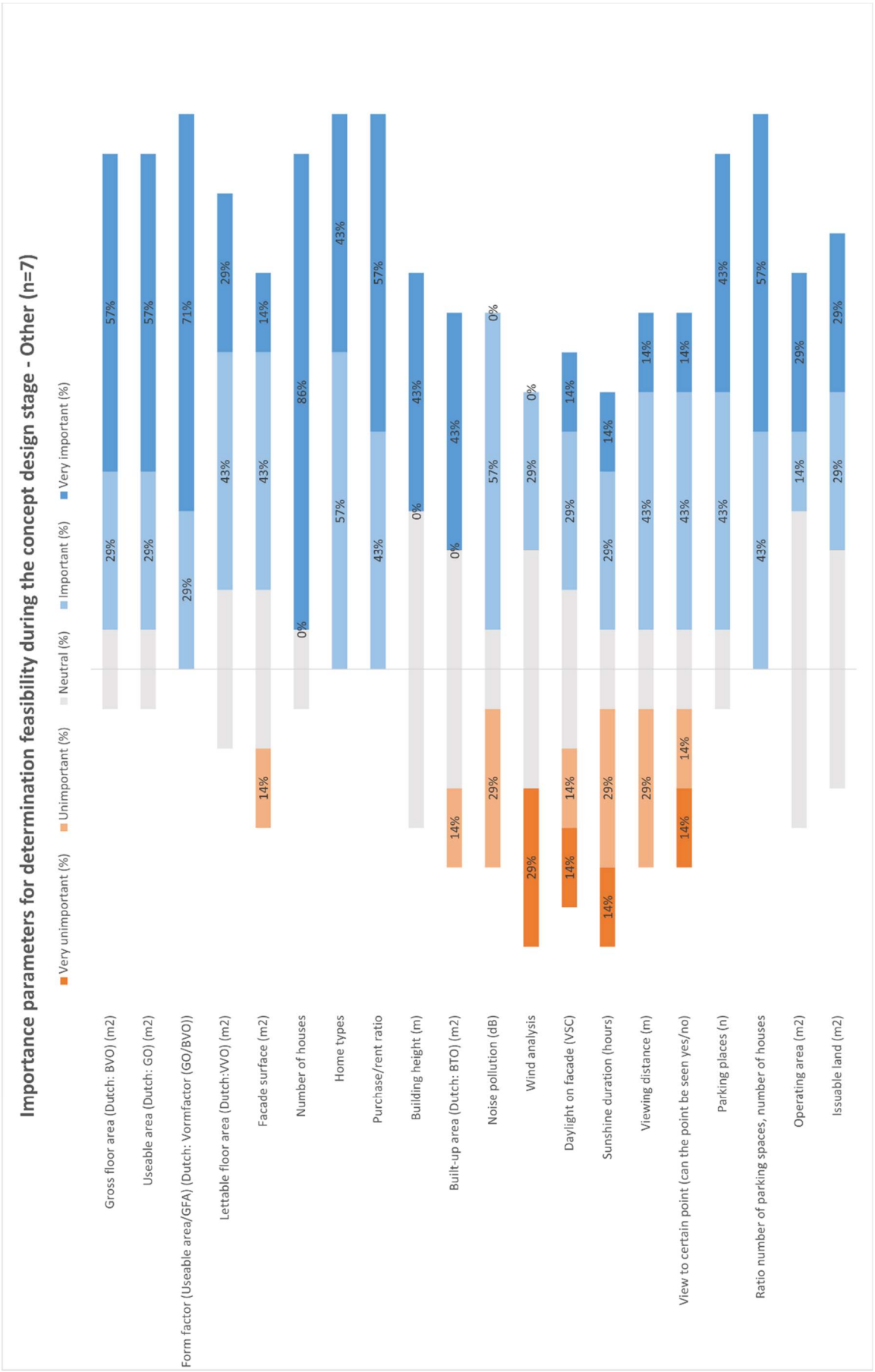


Figure C-3-5: Importance parameters for determination feasibility during the concept design stage – Other

C-4 Data sources and input for the artifact verification

As discussed in chapter 2, Spacemaker is the AI powered generative design tooling that is used for the re-run of the concept development process of the case project. In order to re-model the concept designs of iteration 1 and iteration 2, the researcher used data from the case documentation study. The data concerning the environmental parameters of the concept design evaluation matrix was retrieved from the program. All the data could be retrieved using the database of the program, except the noise pollution data. In order to render the noise pollution simulations, the researcher had to import the average 24-hour traffic intensity of the local roads and rails (table C-4-1 – C-4-2 below).

The traffic intensity can be subdivided into three periods: day, evening, night. The noise pollution calculation differs for each of these periods.

- Day period: 07:00 – 19:00
- Evening period: 19:00 – 23:00
- Night period: 24:00 – 07:00

For all roads the percentage of heavy vehicles has been set on 2% and the daily traffic distribution of 77% / 15% / 8% (day / night / evening)

Street	**Weekly average 24-hour traffic intensity 2029**	**Max speed (km/h)**
Vierhavenstraat (S114)	15056	50
Vierhavenstraat (S114)	13792	50
Hudsonstraat	1080	30
Hudsonstraat	808	30
Albregt Engelmansstraat	808	30
Westzeedijk	13636	50
Spanjaardstraat	1460	50
2e schansstraat	848	30
IJselstraat	808	50
Lekstraat	808	50
Tram	**Daily Intensity**	**Max Speed (km/h)**
Line 18	132	20
Line 8	164	20

Table C-4-1: Weekly average 24-hour traffic intensity near the case project location (source: Municipality of Rotterdam)

	Average day-hour		
Street	**Lightweight traffic [n]**	**Middleweight traffic [n]**	**Heavyweight traffic [n]**
Vierhavenstraat (S114)	915	30	20
Vierhavenstraat (S114)	834	30	20
Hudsonstraat	66	3	0
Hudsonstraat	50	2	0
Albregt Engelmansstraat	50	2	0
Westzeedijk	828	28	18
Spanjaardstraat	89	3	2
2e schansstraat	52	2	0
IJselstraat	50	2	0
Lekstraat	50	2	0

Table C-4-2: Weekly average day-hour traffic intensity near the case project location (source: Municipality of Rotterdam)

	Average evening-hour		
Street	**Lightweight traffic [n]**	**Middleweight traffic [n]**	**Heavyweight traffic [n]**
Vierhavenstraat (S114)	541	15	9
Vierhavenstraat (S114)	493	14	9
Hudsonstraat	43	2	0
Hudsonstraat	32	2	0
Albregt Engelmansstraat	32	2	0
Westzeedijk	489	13	9
Spanjaardstraat	54	1	2
2e schansstraat	34	2	0
IJselstraat	32	2	0
Lekstraat	32	2	0

Table C-4-3: Weekly average evening-hour traffic intensity near the case project location (source: Municipality of Rotterdam)

	Average night-hour		
Street	**Lightweight traffic [n]**	**Middleweight traffic [n]**	**Heavyweight traffic [n]**
Vierhavenstraat (S114)	144	5	3
Vierhavenstraat (S114)	132	5	3
Hudsonstraat	9	0	0
Hudsonstraat	6	0	0
Albregt Engelmansstraat	6	0	0
Westzeedijk	131	4	3
Spanjaardstraat	14	0	0
2e schansstraat	7	0	0
IJselstraat	6	0	0
Lekstraat	6	0	0

Table C-4-4: Weekly average night-hour traffic intensity near the case project location (source: Municipality of Rotterdam)

C-5 Artifact verification interview protocol

Interview Protocol – Original (Dutch)

Onderwerp: Verificatie van het ontwikkelde artefact voor het gebruik tijdens de initiatieffase van het vastgoedontwikkelingsproces.

Interviewer: Menno Smit

Geïnterviewde: -

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Verschil huidige en nieuwe proces uitleggen (door middel van gebruik Appendix D & E)

Lack of knowledge

1) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in objectieve kennis tussen beide situaties denk je?

(Development goals)
- Lack of knowledge - Area; Programme; Building; Parking;
- Lack of knowledge - Environmental (geluid)
- Lack of knowledge - Aantal conceptontwerpen

Structuur

2) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in de manier waarop je het concept evaluatie en decision-making proces zou kunnen structureren?

(Development goals)
- Sturen van het proces
- Concept ontwerpen kunnen vergelijken
- Prioriteiten aangeven

Nauwkeurigheid kosten inschatten

3) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat dit betekent voor de nauwkeurigheid waarin de kosten ingeschat kunnen worden?

(Development goals)

- Nauwkeurigheid kosten inschatten (bouwkosten (invloed geluid), advieskosten, loonkosten (doorlooptijd)

Rework (proces → planning laten zien)

4) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework

(Development goals)

- Kans op rework verminderen

Concluderend

5) Heb je nog vragen, opmerkingen, suggesties over/voor de matrix?

Interview Protocol – Translation

Note: This is the translated version of the original interview protocol which is written in Dutch. Because Dutch is the native language of both the interviewees and the interviewer, the interviews were conducted in Dutch.

Subject: Verification of the development artifact for use during the initiation phase of the real estate development process.

Interviewer: Menno Smit

Interviewee: -

Privacy: The interviewees agreed that the audio of the interview was recorded. The interview will be processed anonymously. The interviewee has the option to skip questions if he/she is not comfortable answering the question asked.

Setting:
The interviews were conducted 1 on 1, physically in a familiar environment for the interviewee. 60 minutes is allotted for each interview.

Explain difference current and new process (using Appendix D & E)

Lack of knowledge

1) If you compare the **new process** with the **current process** for an average inner-city real estate project (apartments), to what extent do you think there is a difference in objective knowledge between the two situations?

(Development goals)
- Lack of knowledge - Area; Programme; Building; Parking;
- Lack of knowledge - Environmental (noise pollution)
- Lack of knowledge - Number of concept designs

Structure

2) If you compare the **new process** with the **current process** for an average inner-city real estate project (apartments), to what extent is there a difference in the way you might structure the concept evaluation and decision-making process?

(Development goals)
- Ability to steer the process
- Concept designs comparison
- Prioritize

Estimating Cost Accuracy

3) If you compare the **new process** with the **current process** for an average inner-city real estate project (apartments), what do you expect this to mean for the accuracy in which the costs can be estimated?

(Development goals)

- Accurately estimate costs (construction costs (influence of noise), consultancy costs, labour costs (lead time)

Rework (process → show schedule)

4) If you compare the new process with the current process for an average inner-city real estate project (apartments), what do you expect the effect of this to be on the probability of rework

(Development goals)
- Chance of rework

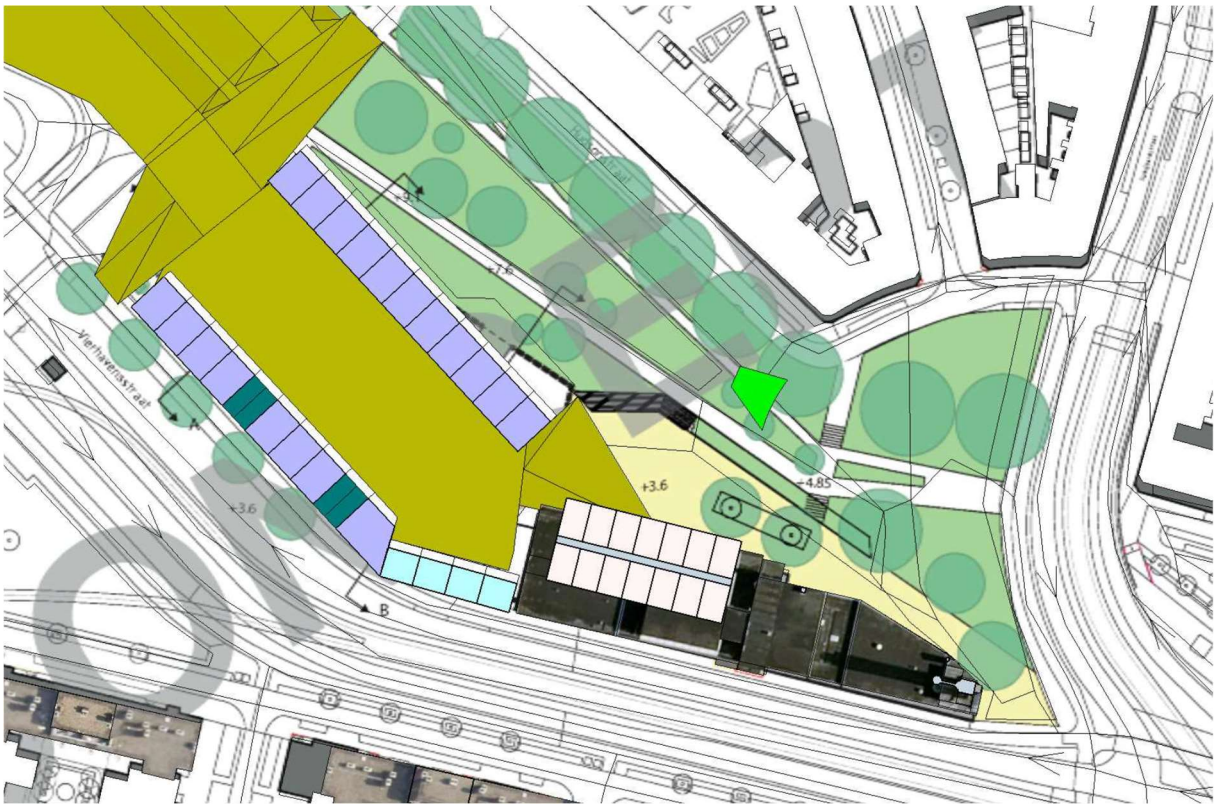
Conclusion

5) Do you have any questions, comments, suggestions about/for the matrix?

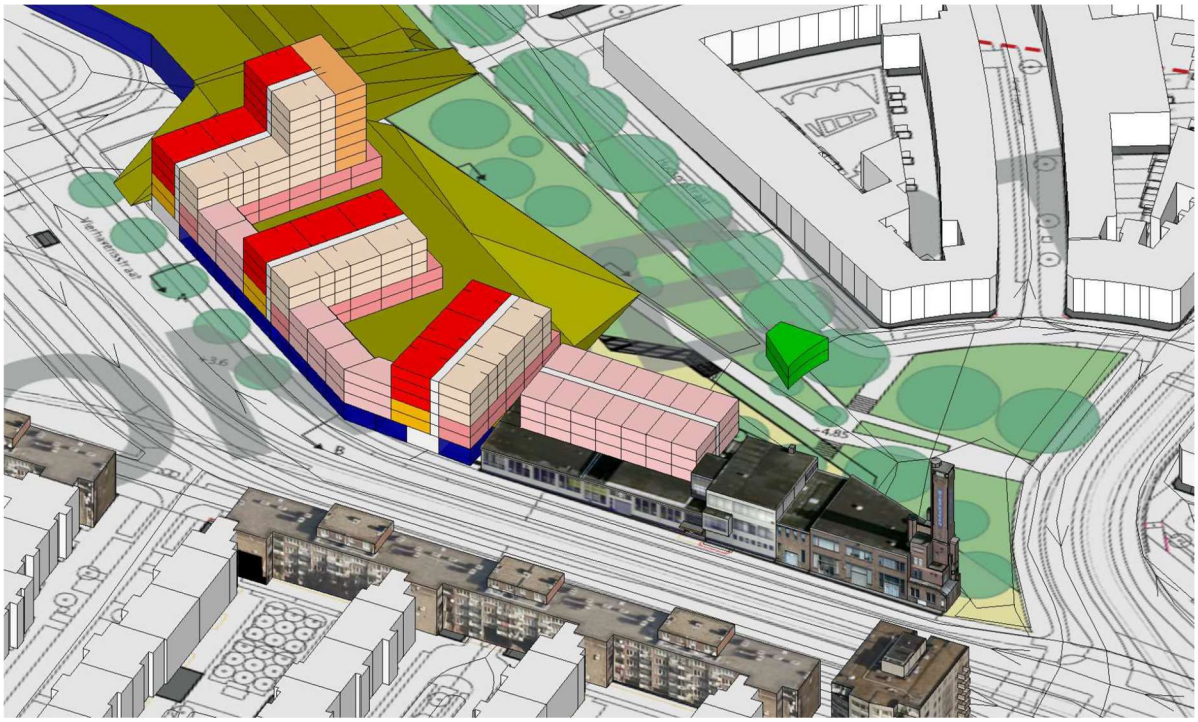
C-6 Artifact verification interview documents: Current situation

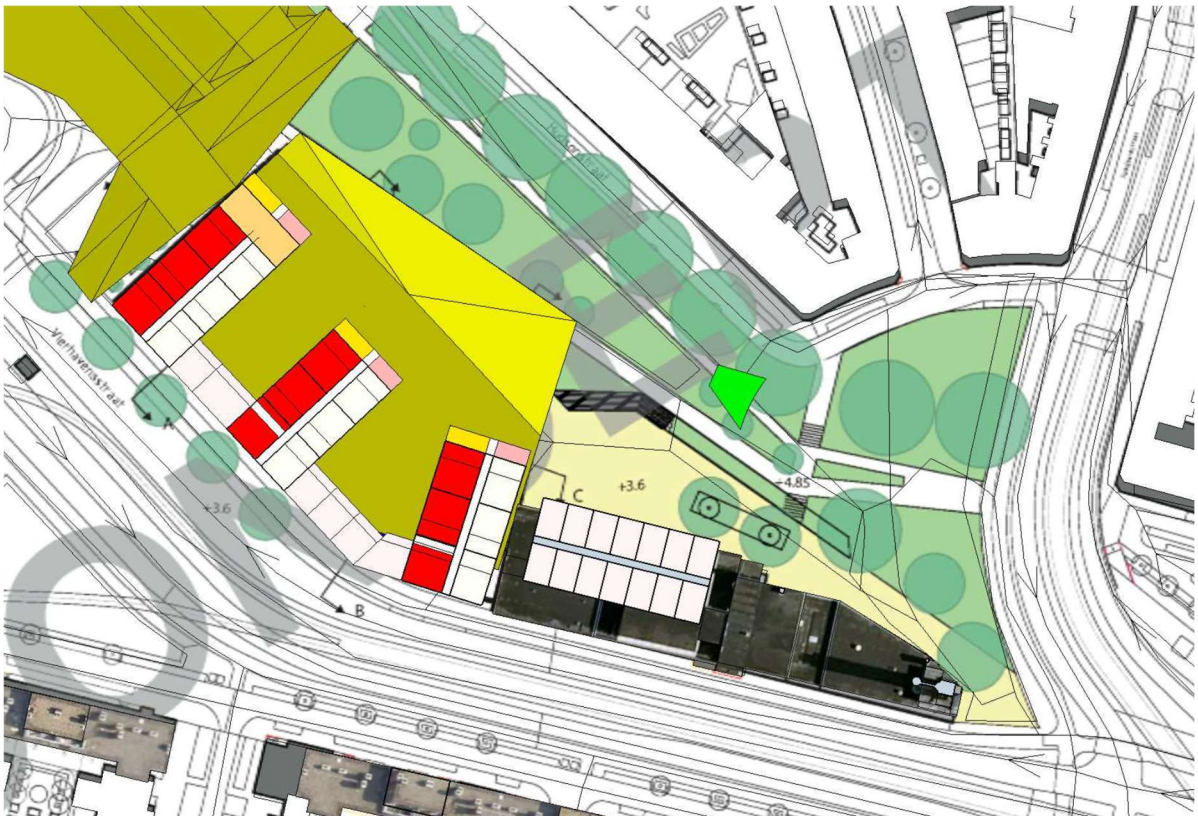
C-6.1 Concept designs - Iteration 1 | Concept design 1

C-6.2 Concept designs - Iteration 1 | Concept design 2

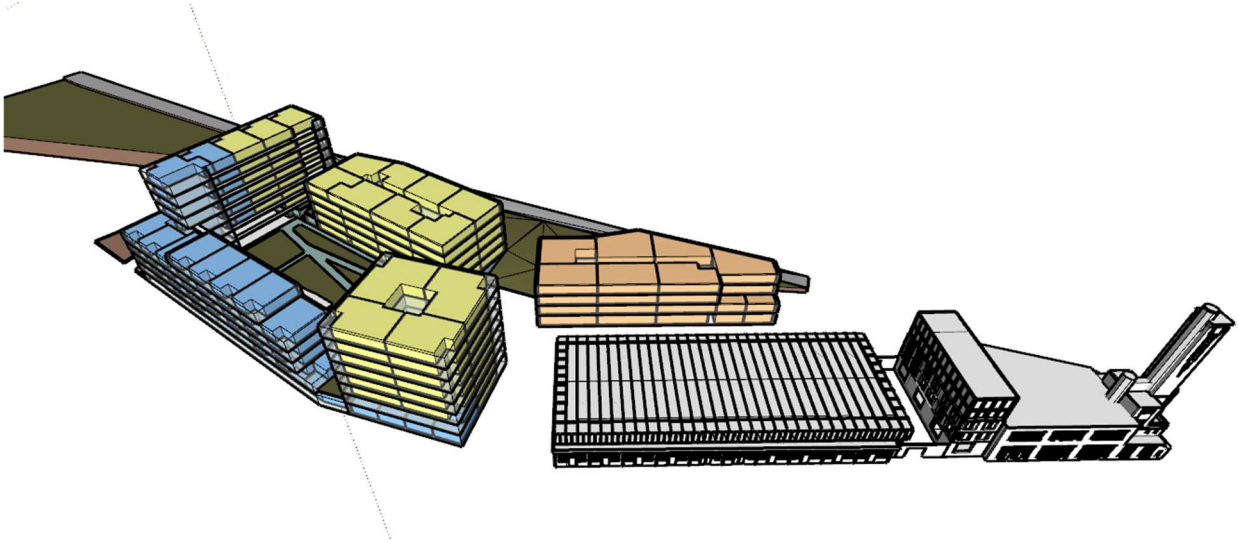


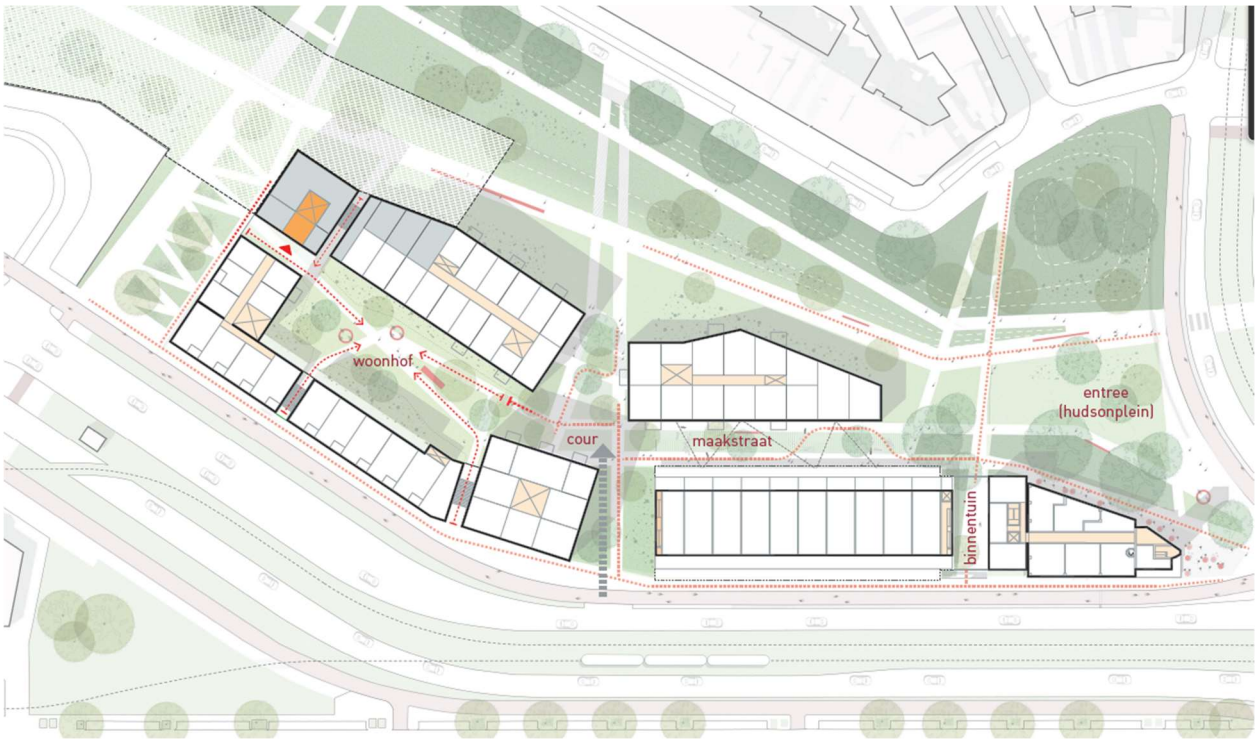
C-6.3 Concept designs - Iteration 1 | Concept design 3



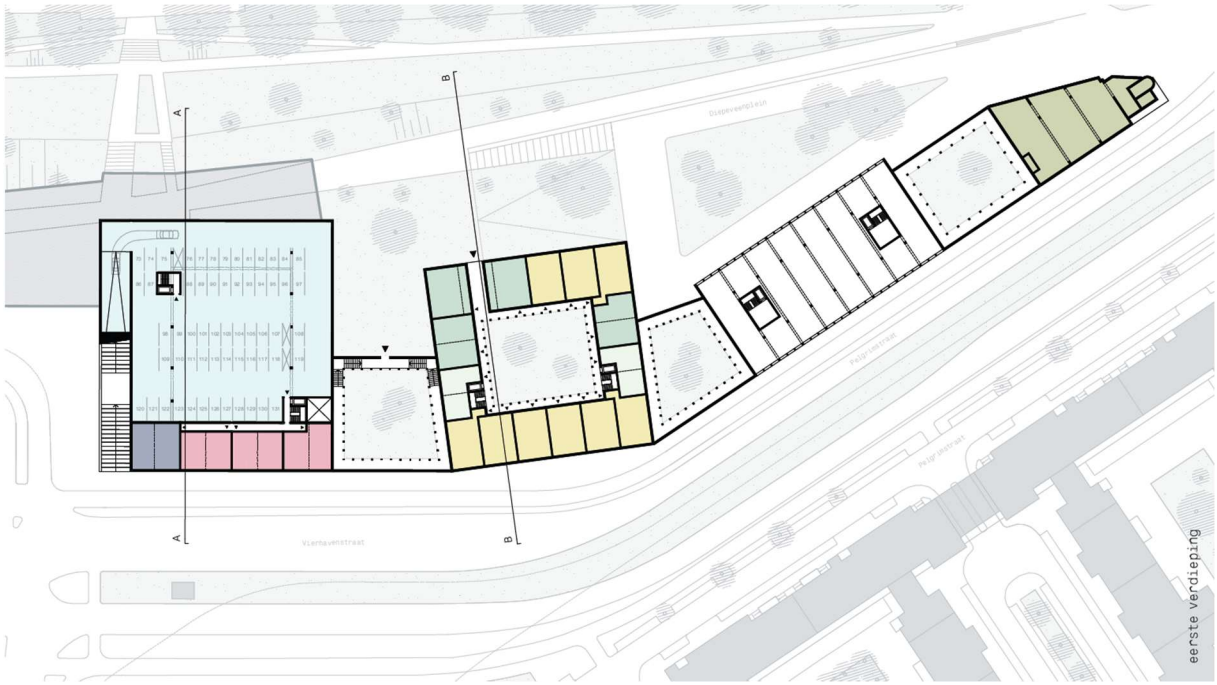


C-6.4 Concept designs - Iteration 2 | Concept design 1

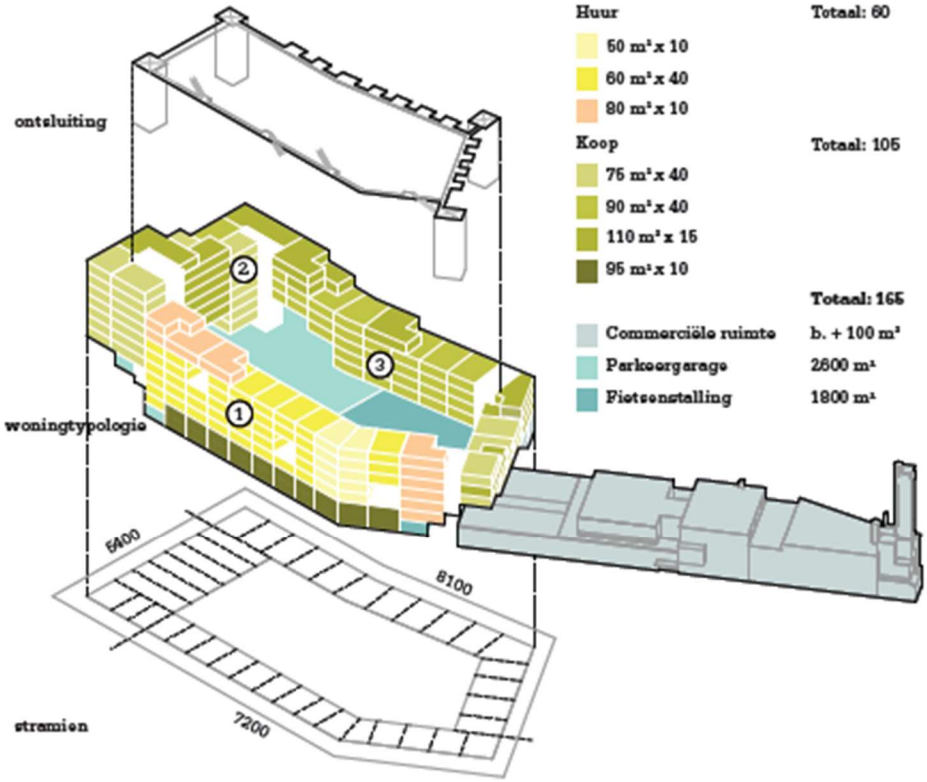


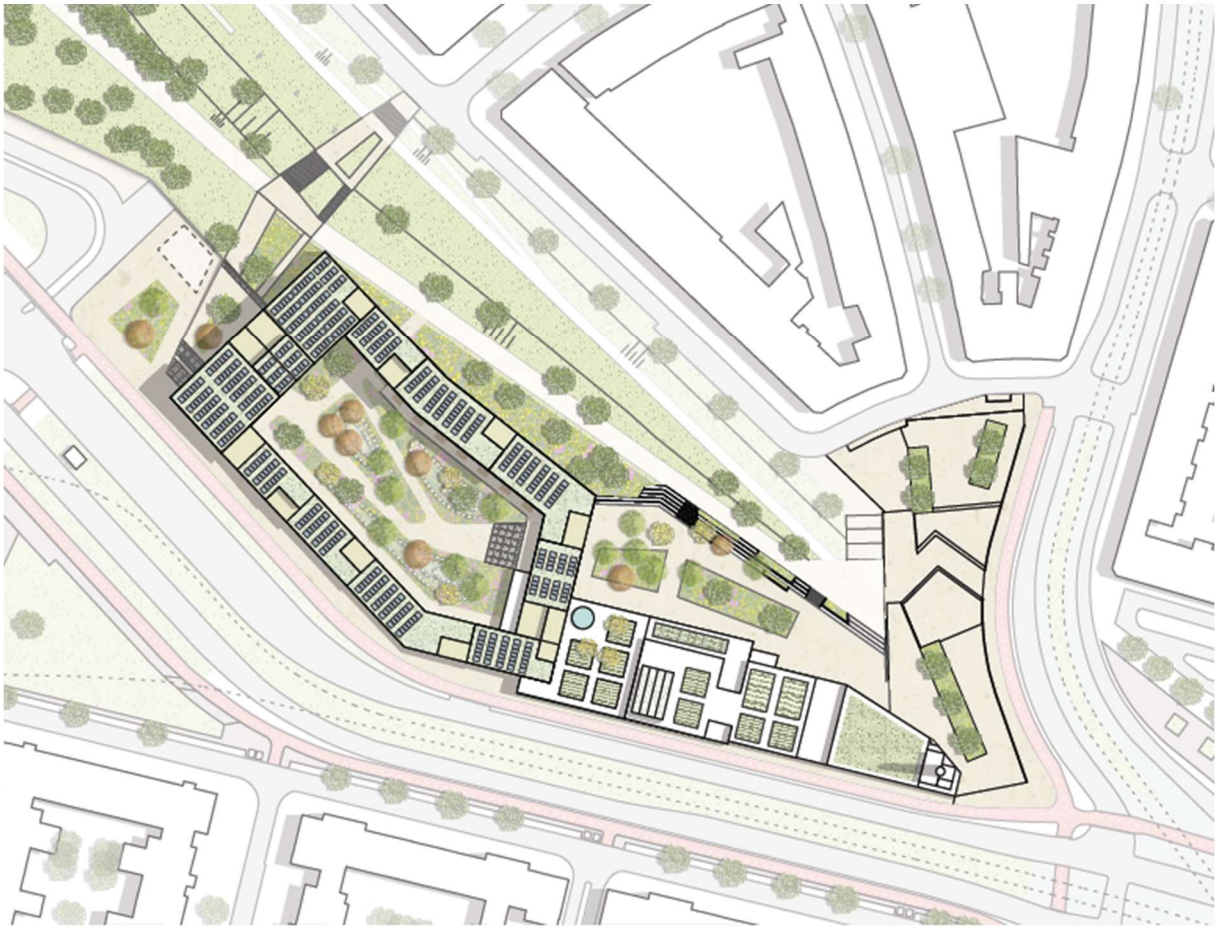


C-6.5 Concept designs - Iteration 2 | Concept design 2

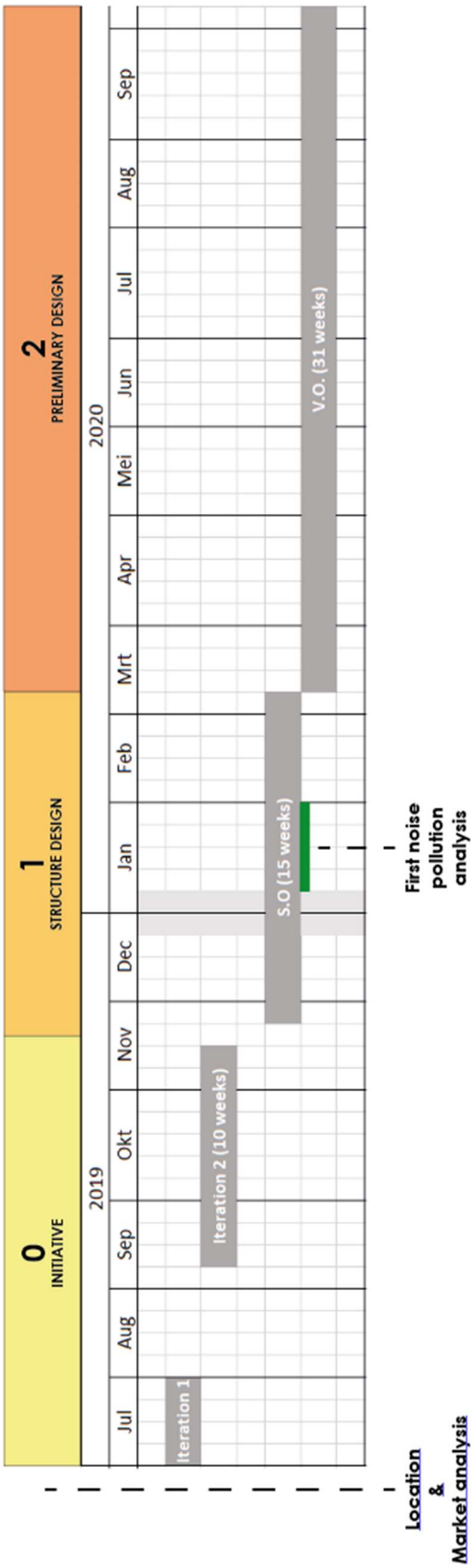


C-6.6 Concept designs - Iteration 2 | Concept design 3





C-6.7 Case project concept development timeline



C-6.8 Noise pollution advisor activities

The activities of the noise consultant during the SO phase include: Testing the concept design and giving advice based on the results. This consists of the following activities:

- Requesting the traffic intensity prognose used for the performed acoustic study of the surrounding roads from the owner of the study, the Municipality of Rotterdam.
- Requesting a so-called free partial model of Waal-/Eemhaven and the ports Noord-west Oost Frankenland from the DCMR
- Drawing up an acoustic calculation model in accordance with Standard Calculation Method 2 for road and rail traffic noise. Two different subdivisions will be included in the calculation model.
- Determining the noise load and testing the results against municipal policy.
- Discussing possible bottlenecks and optimizations with the client and designer.
- Drawing up a memorandum for the discussion with the competent authority.

C-6.9 Concept design evaluation matrix – Iteration 1

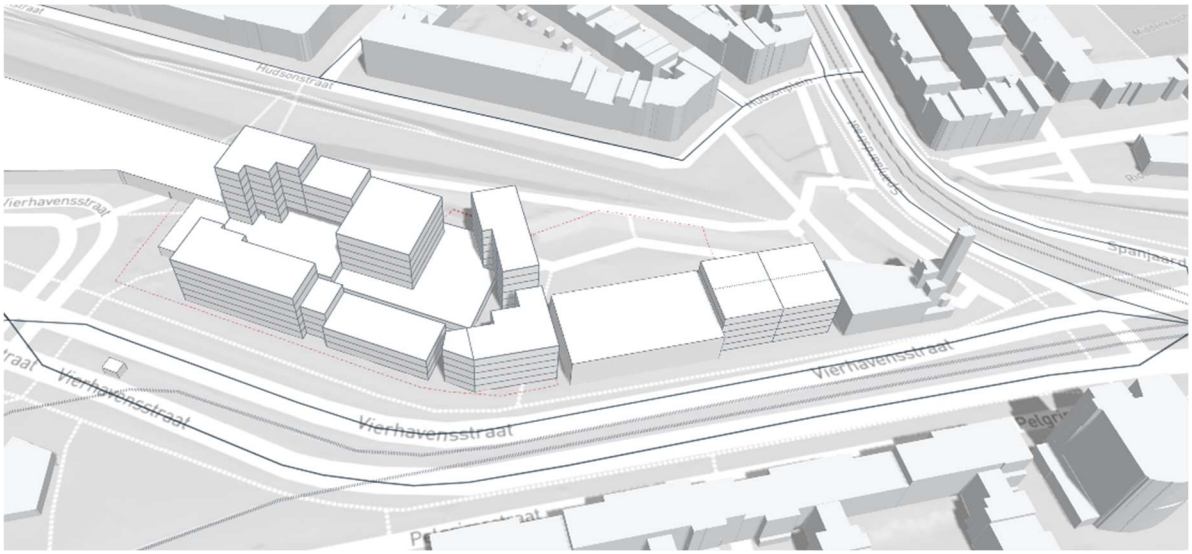
Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:				7752	7752	7752
	Built-up area (Dutch: BTO) [m2]:				4766	6330	5851
	Issuable land [m2]:						
Programme	Houses [n]:				203	170	181
	Home types:						
	Purchase/rent ratio:	*Rent %*	*30/40%*		*30/40%*	*30/40%*	*30/40%*
		Purchase%	*60/70%*		*60/70%*	*60/70%*	*60/70%*
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*			20586	19349	21854
		Residential:			17074	15575	17633
		Parking + storage:			3512	3774	4221
	Useable area (Dutch: GO)	*Residential:*			15366	14017	15870
	Form factor (Useable area/GFA):				0,75	0,72	0,73
	Facade surface [m2]:						
	Lettable floor area (Dutch: VVO) [m2]:				3161	3396	3799
	Max. Building height [m2]:				Voldoet	Voldoet	Voldoet
Parking	Parking places [n]:				69	107	126
	Parking spaces / Houses:				0,34	0,63	0,70
Environmental	Noise pollution	**Facade**					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
	Wind analysis:	[Assessment 3D model]					
	Daylight on facade [VSC]:	*Less than 5 %*					
		Between 5 and 15 %					
		Between 15 and 27 %					
		More than 27 %					
	Sunshine duration on facade [hours]:	**Februari 19:**					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		June 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		October 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
	Viewing distance [m]:	*Less than 400 m [%]*					
		Between 400 and 700 m [%]					
		More than 700 m [%]					
	View to certain point [%]:						

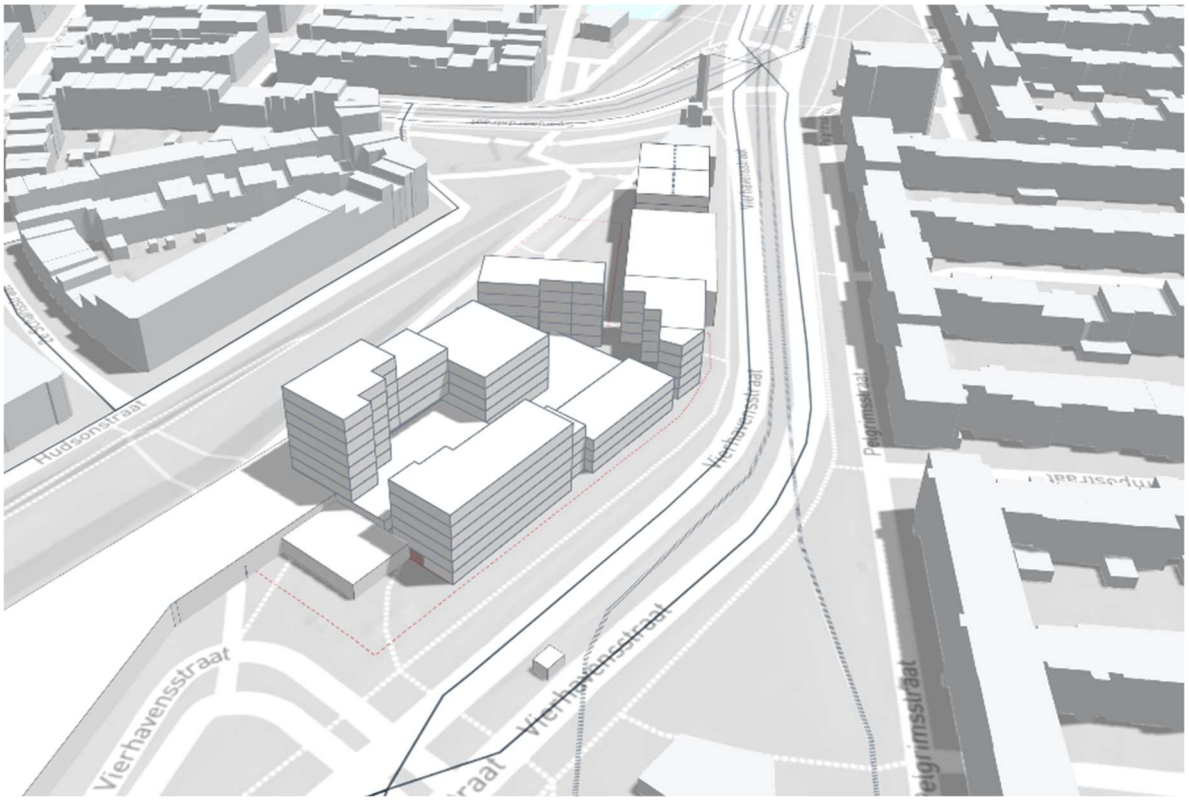
C-6.10 Concept design evaluation matrix – Iteration 2

Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:				7752	7752	7752
	Built-up area (Dutch: BTO) [m2]:						
	Issuable land [m2]:						
Programme	Houses [n]:				203	162	165
	Home types:				Known	Known	Known
	Purchase/rent ratio:	*Rent %*	*30/40%*			48%	36%
		Purchase%	*60/70%*			52%	64%
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*				24415	24983
		Residential:				19411	20755
		Parking + storage:				5004	4228
	Useable area (Dutch: GO)	*Residential:*			16563	17470	
	Form factor (Useable area/GFA):					0,72	
	Facade surface [m2]:						
	Lettable floor area (Dutch: VVO) [m2]:					4503	3805
	Max. Building height [m2]:		Molen biotoop (Ring 1 t/m 4)		Ring 1: Voldoet niet	Voldoet	Ring 1: Risico
Parking	Parking places [n]:				110 (2900m2)	131 (4267 m2)	98 (2600m2)
	Parking spaces / Houses:				0,54	0,81	0,59
Environmental	Noise pollution	**Facade**					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]					
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]					
		Red zone [road > 63 dB ; rail > 68 dB]					
	Wind analysis:	[Assessment 3D model]					
	Daylight on facade [VSC]:	*Less than 5 %*					
		Between 5 and 15 %					
		Between 15 and 27 %					
		More than 27 %					
	Sunshine duration on facade [hours]:	**Februari 19:**					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		June 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
		October 21:					
		Less than 2 hours [%]					
		Between 2 and 7 hours [%]					
		More than 7 hours [%]					
	Viewing distance [m]:	*Less than 400 m [%]*					
		Between 400 and 700 m [%]					
		More than 700 m [%]					
	View to certain point [%]:						

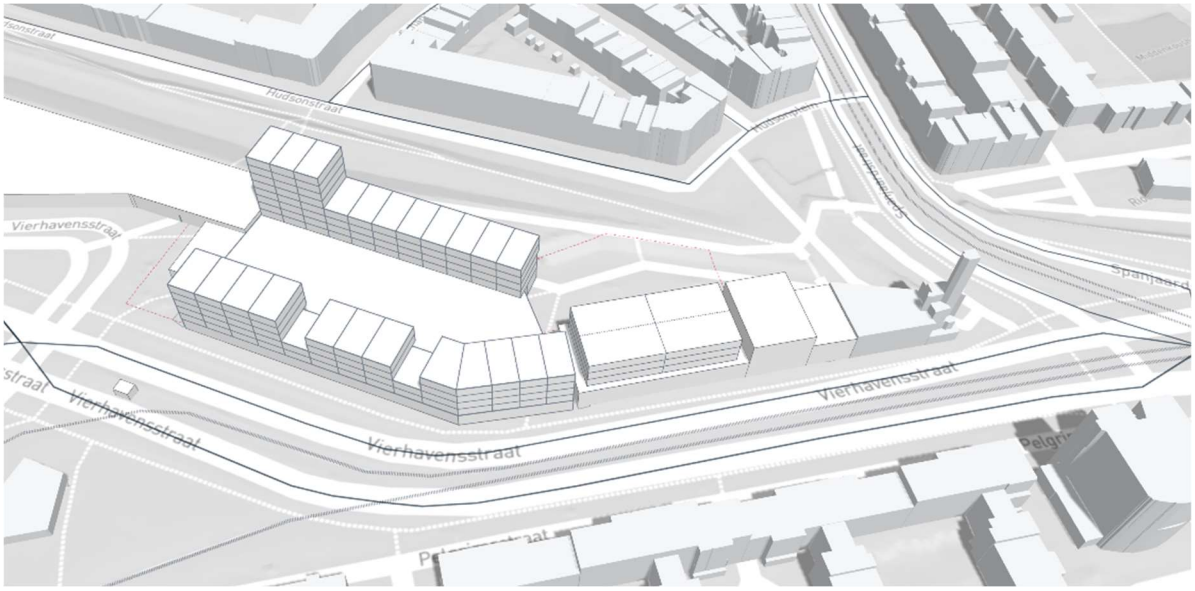
C-7 Artifact verification interview documents: Situation using artifact

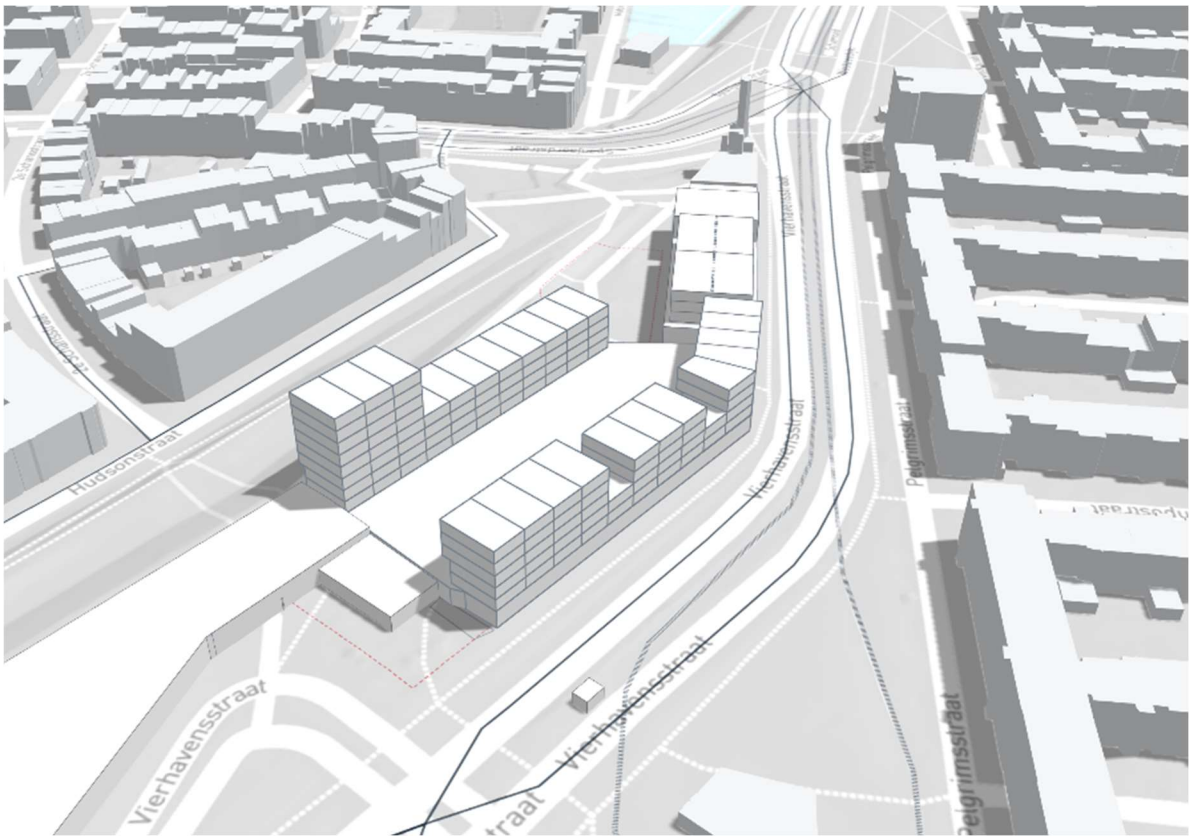
C-7.1 Concept designs - Iteration 1 | Concept design 1



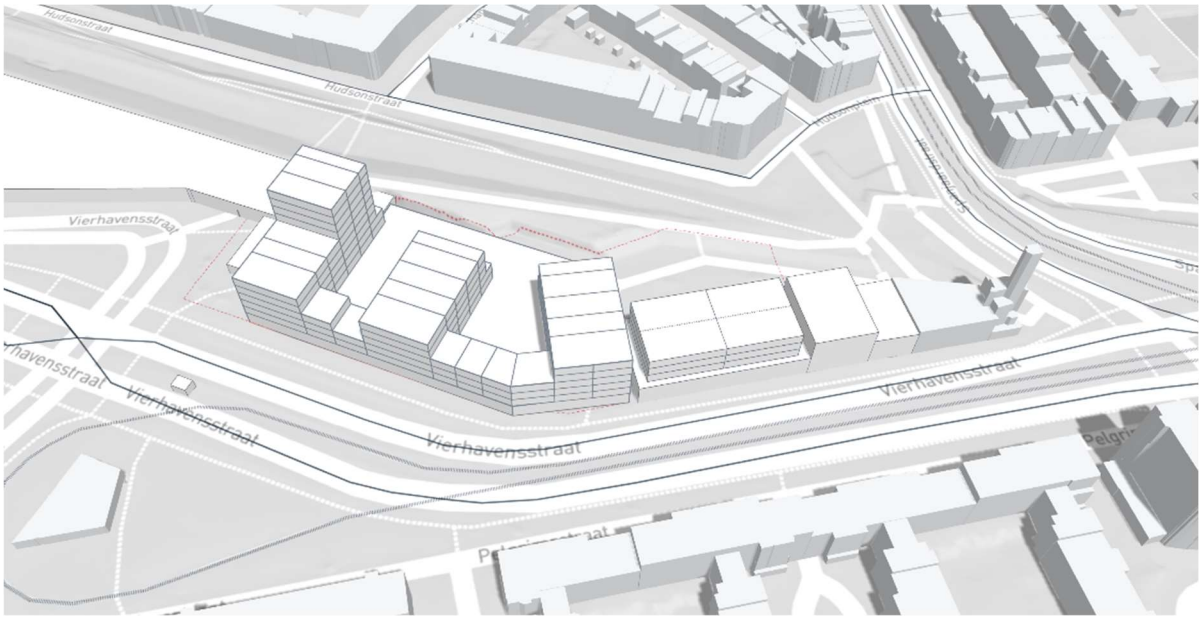


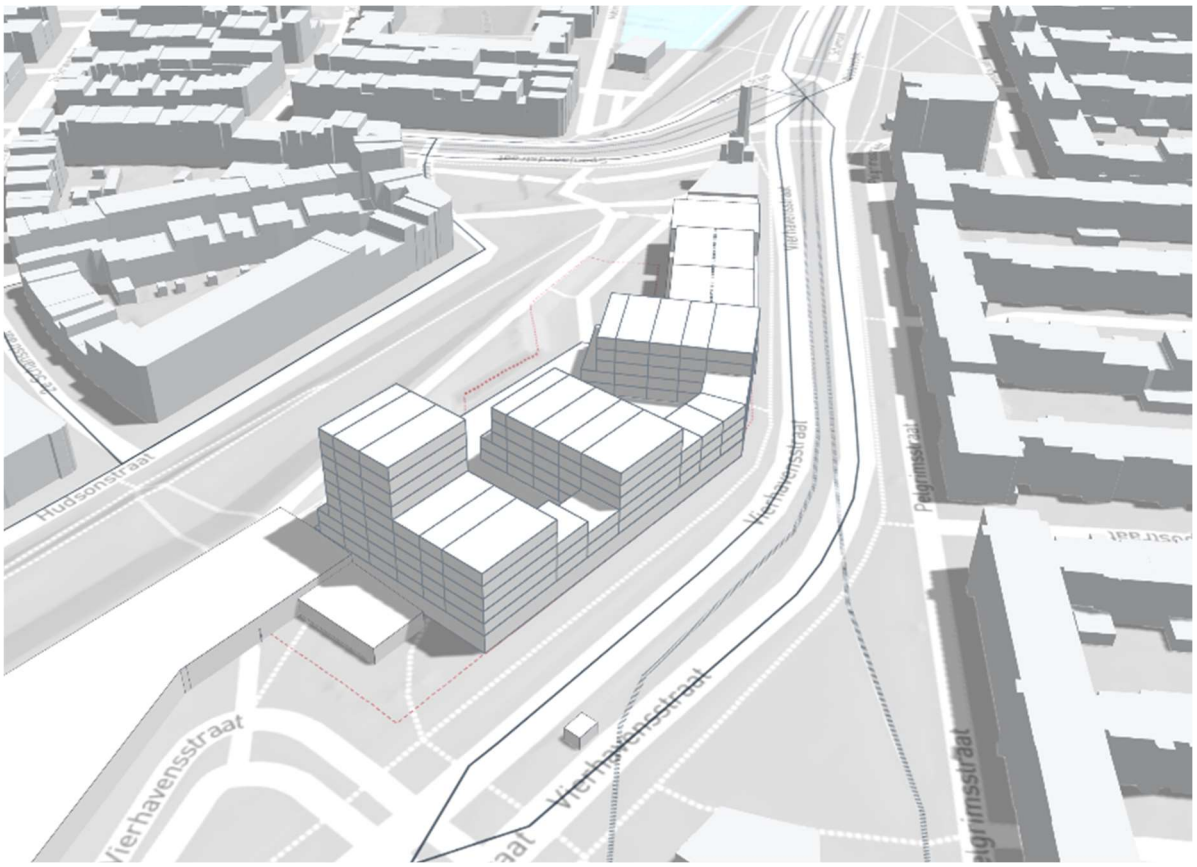
C-7.2 Concept designs - Iteration 1 | Concept design 2



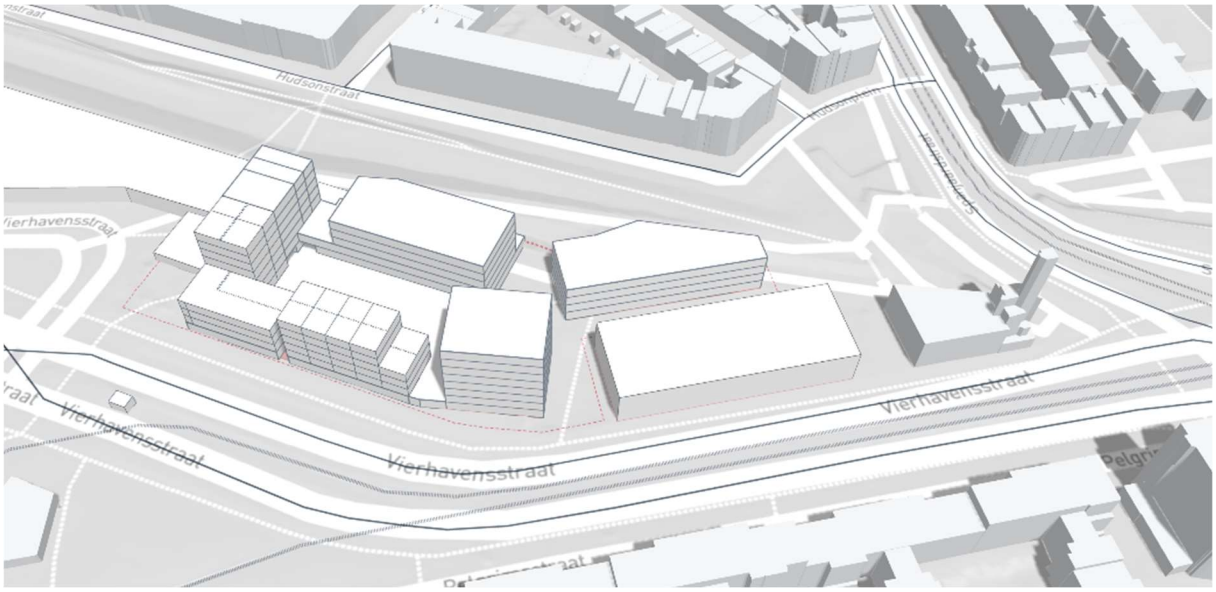


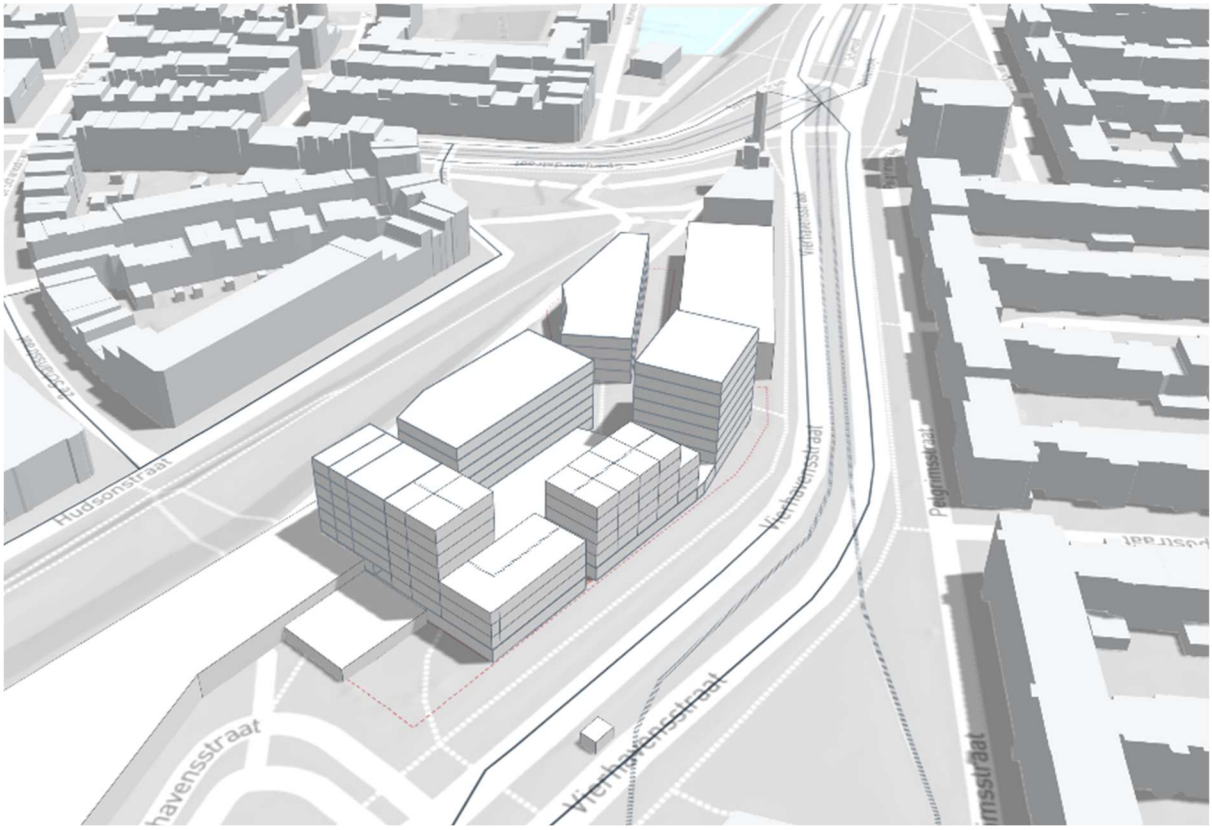
C-7.3 Concept designs - Iteration 1 | Concept design 3



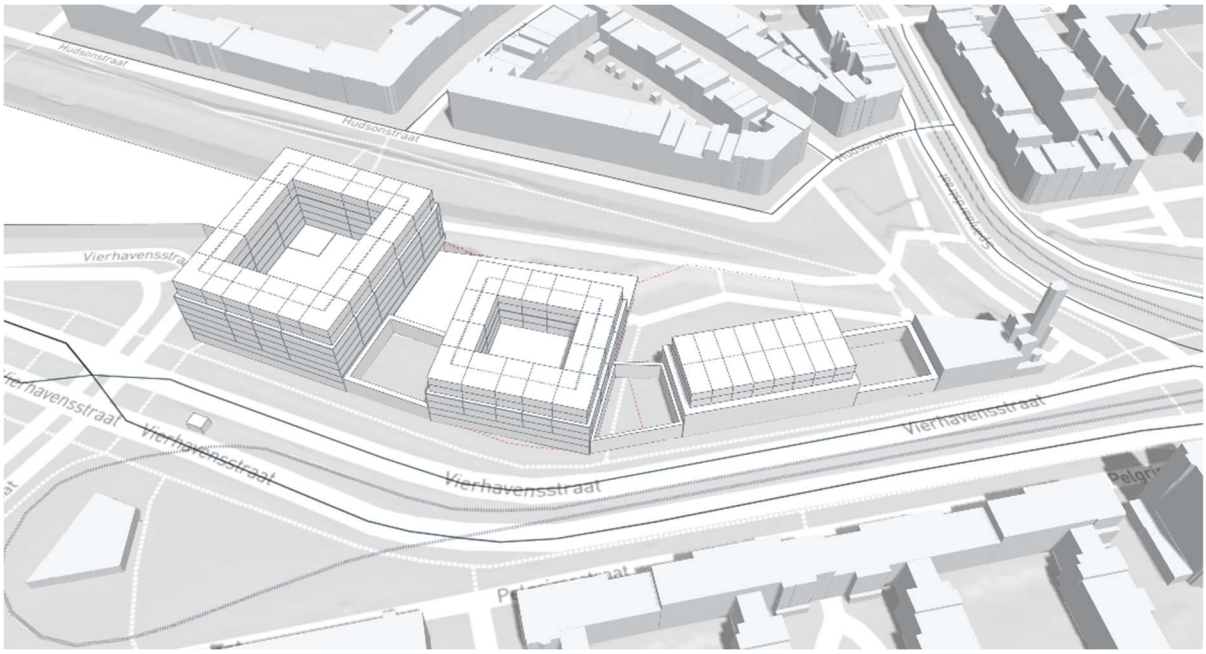


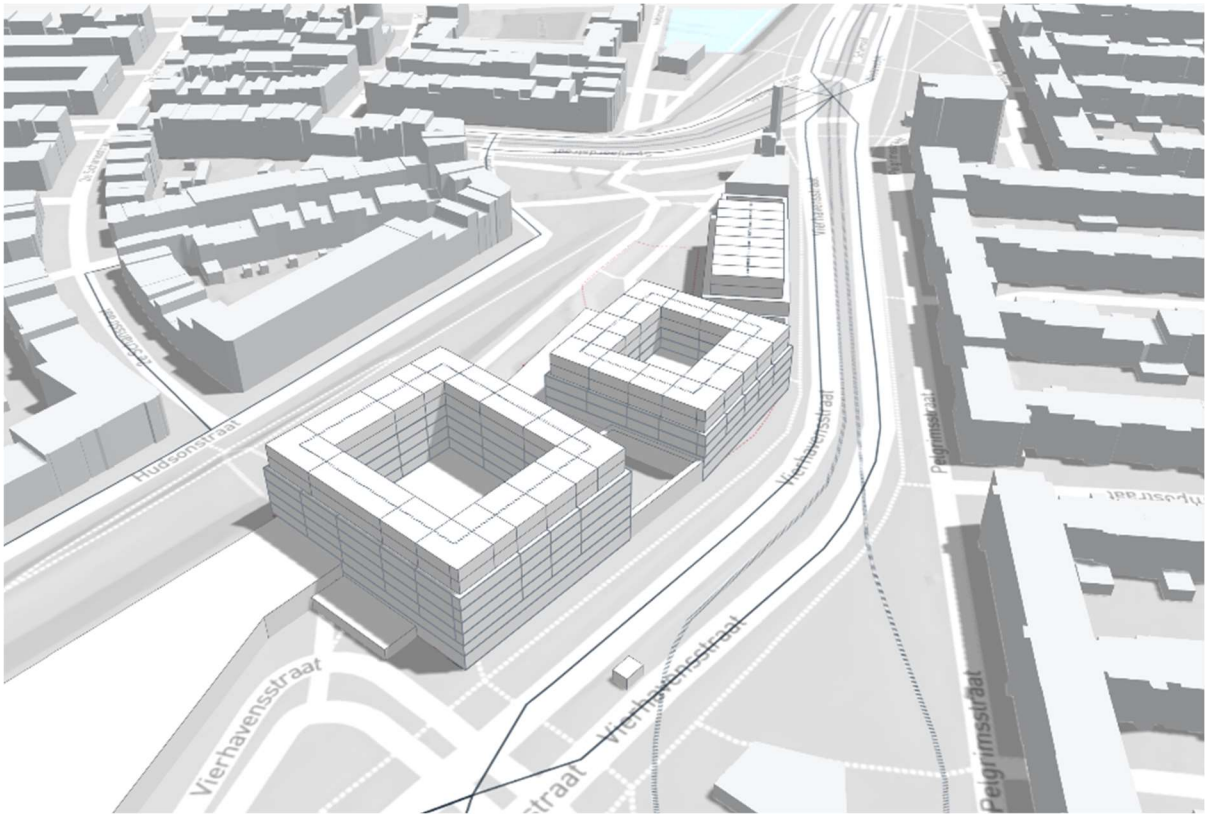
C-7.4 Concept designs - Iteration 2 | Concept design 1



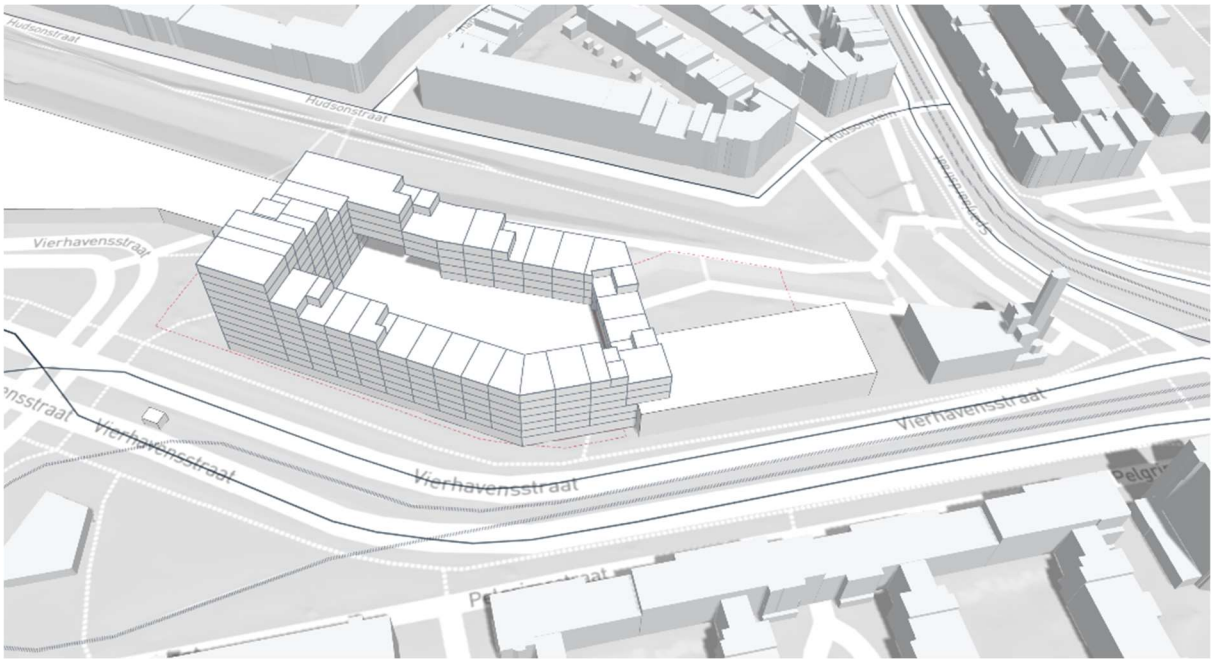


C-7.5 Concept designs - Iteration 2 | Concept design 2

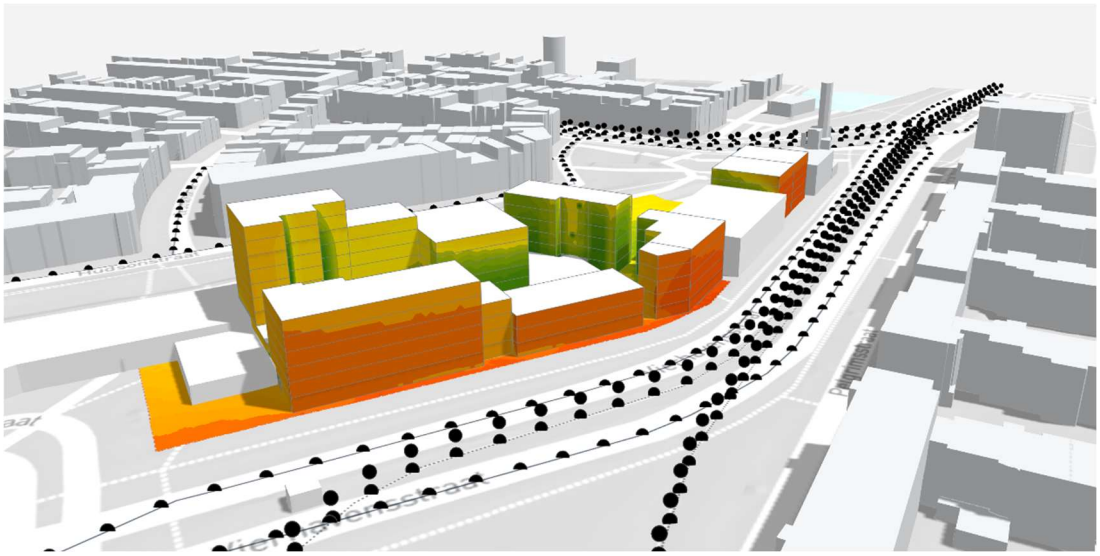


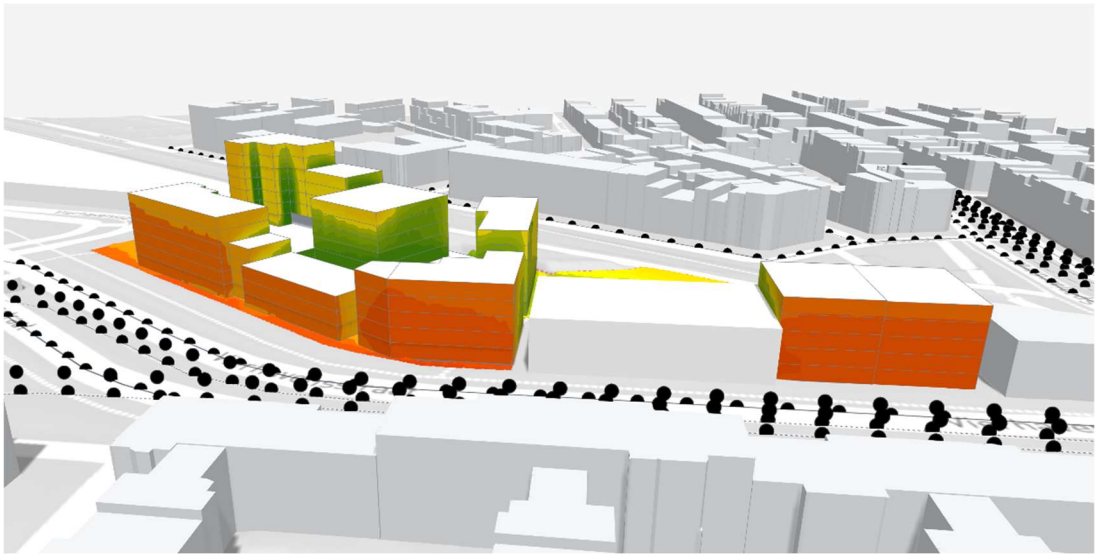


C-7.6 Concept designs - Iteration 2 | Concept design 3

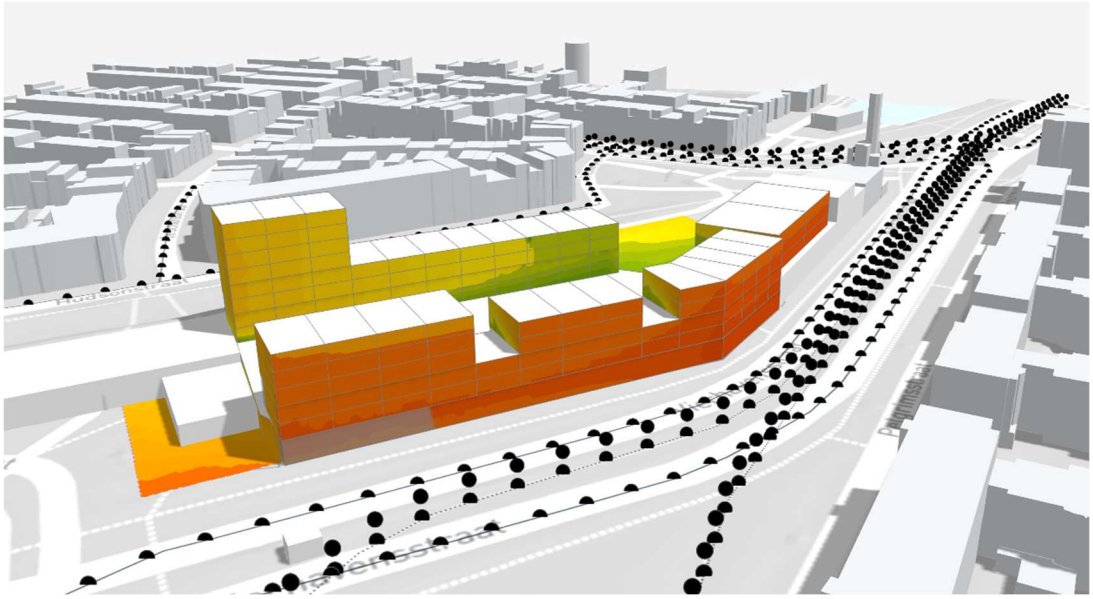


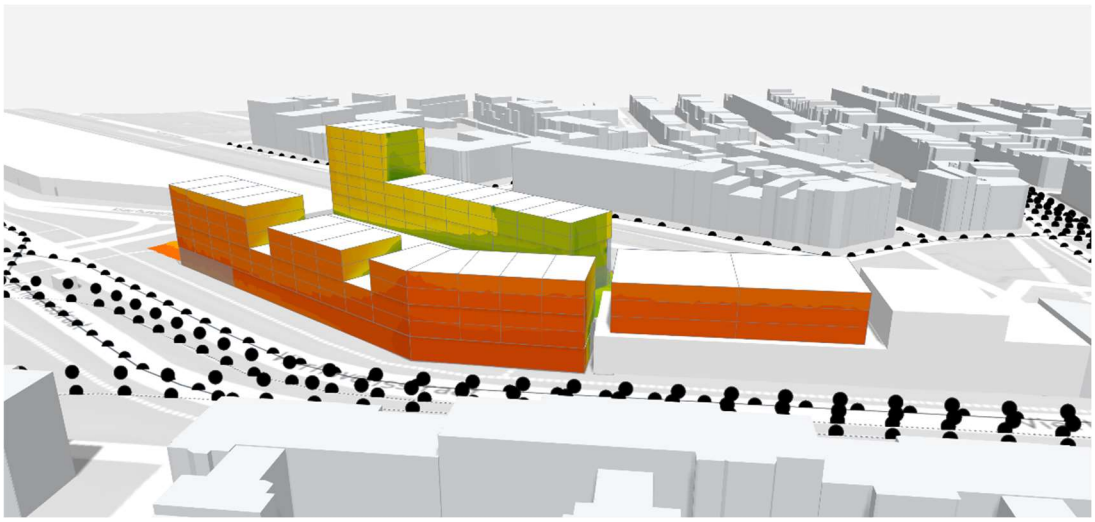
C-7.7 Concept design noise pollution study – Iteration 1 Concept design 1



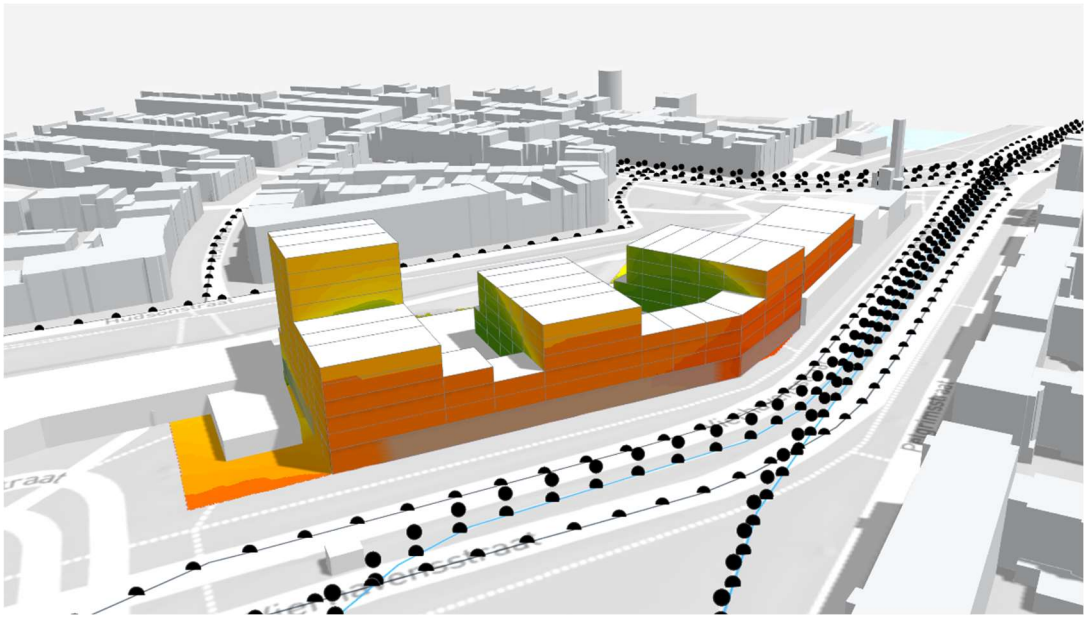


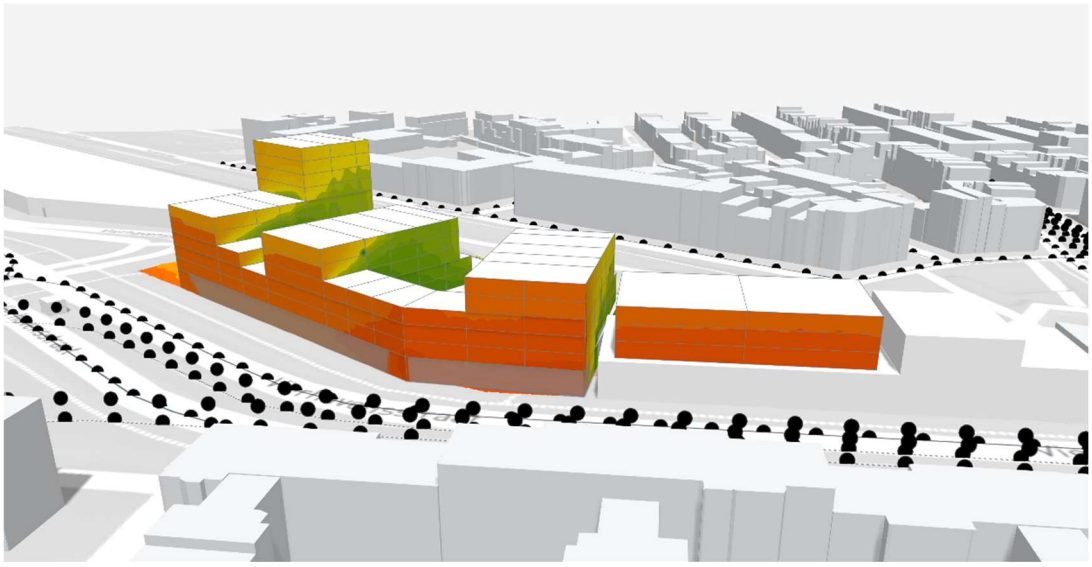
C-7.8 Concept design noise pollution study – Iteration 1 Concept design 2

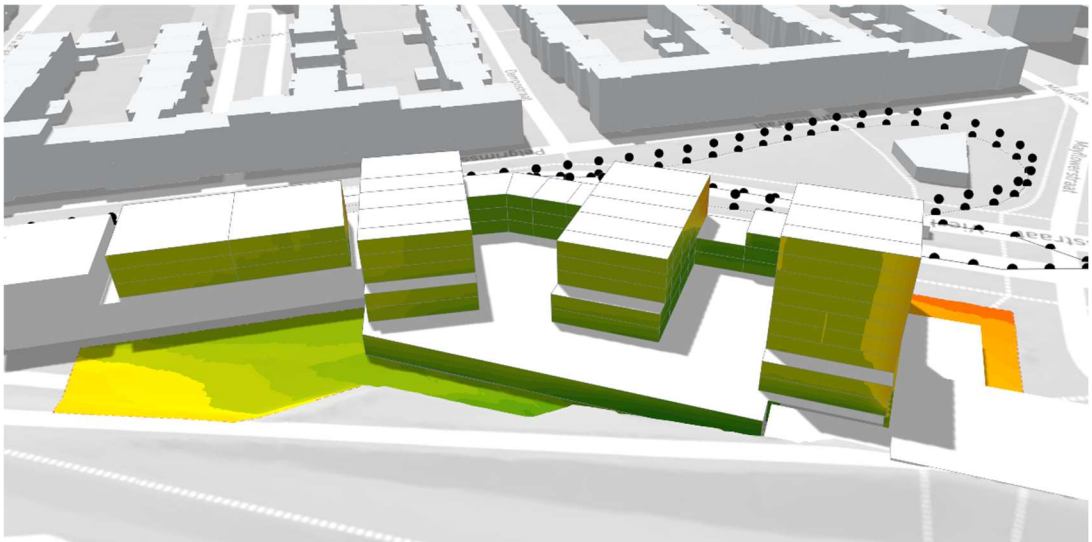




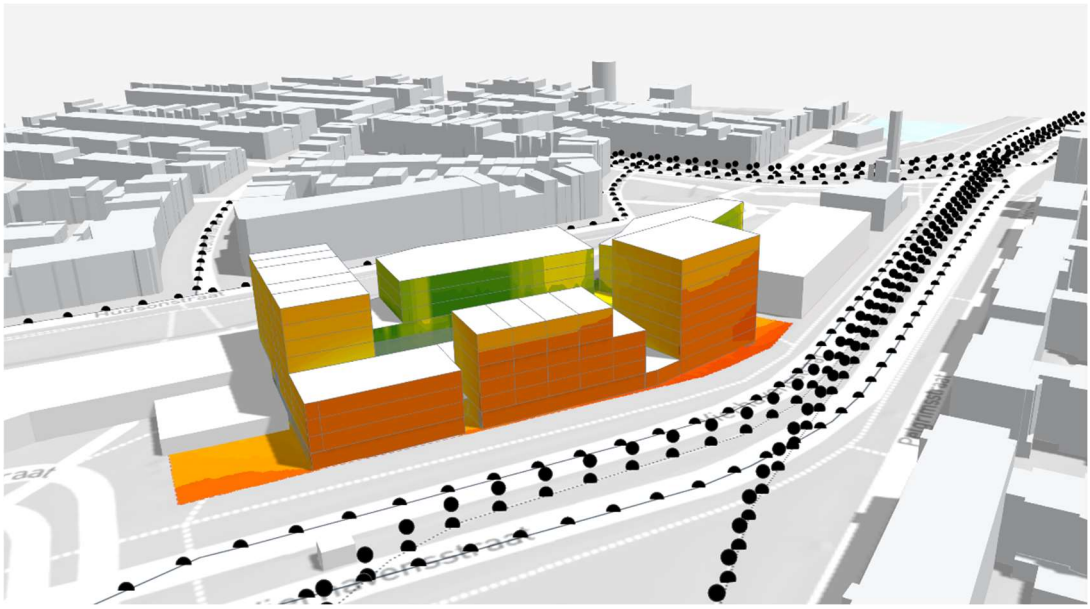
C-7.9 Concept design noise pollution study – Iteration 1 Concept design 3

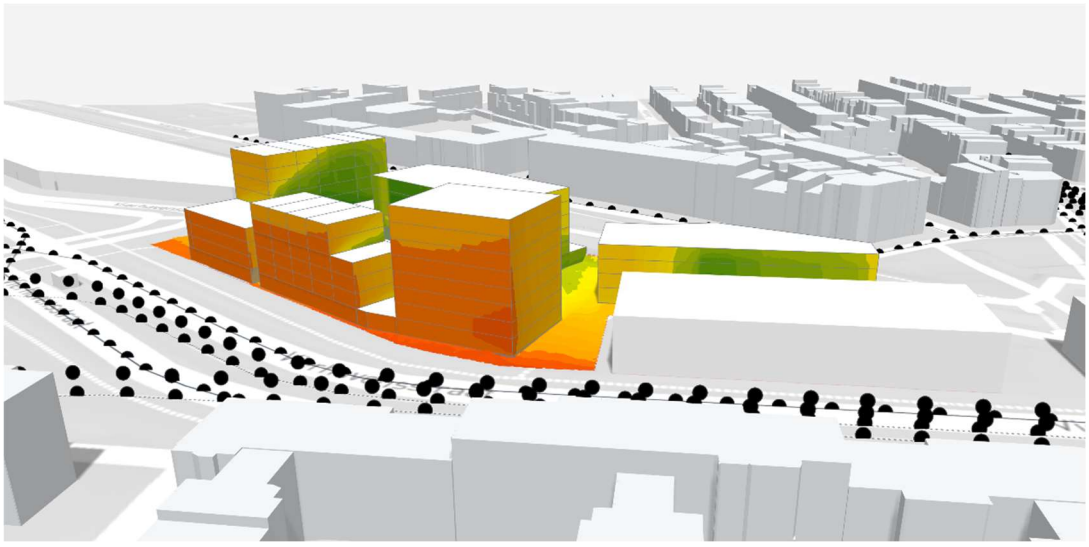


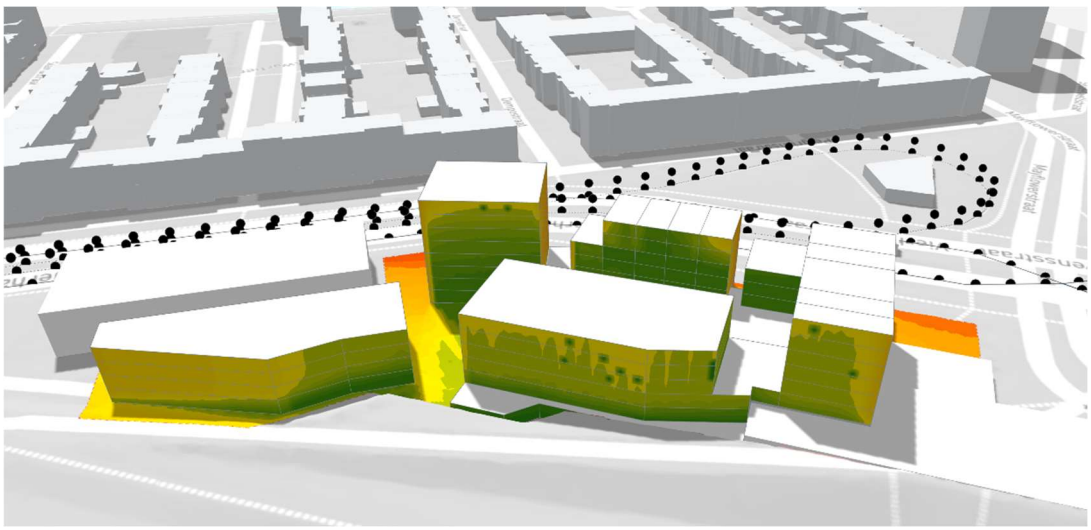




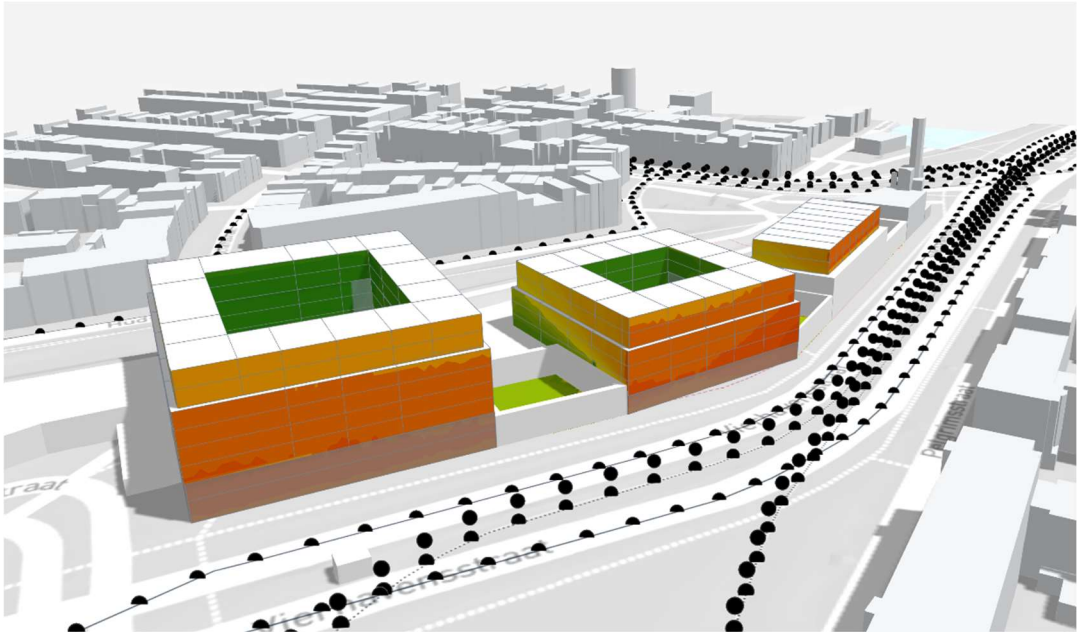
C-7.10 Concept design noise pollution study – Iteration 2 Concept design 1

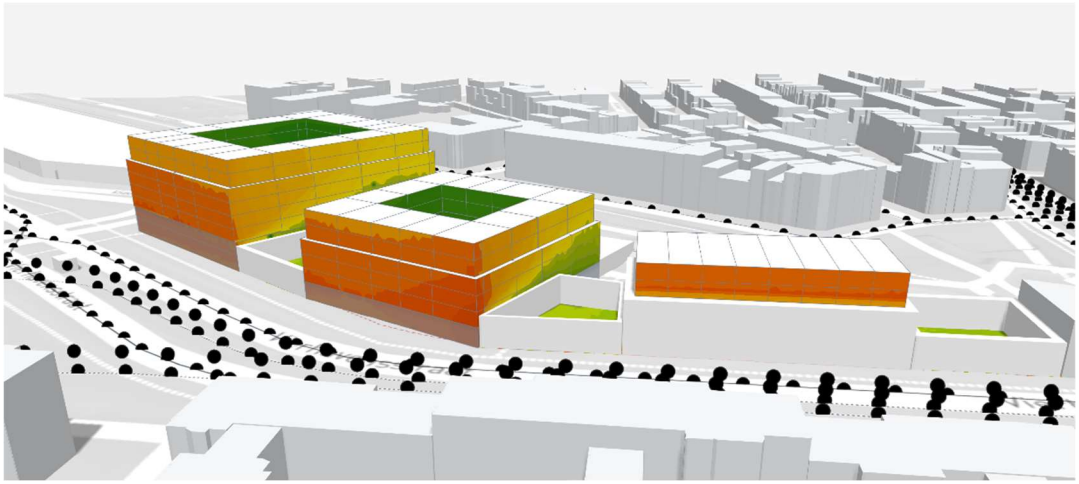


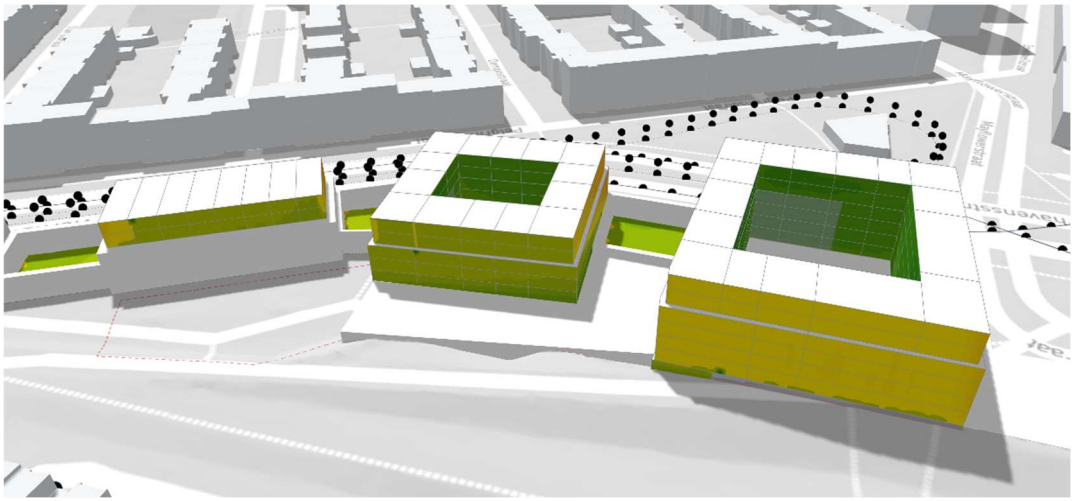




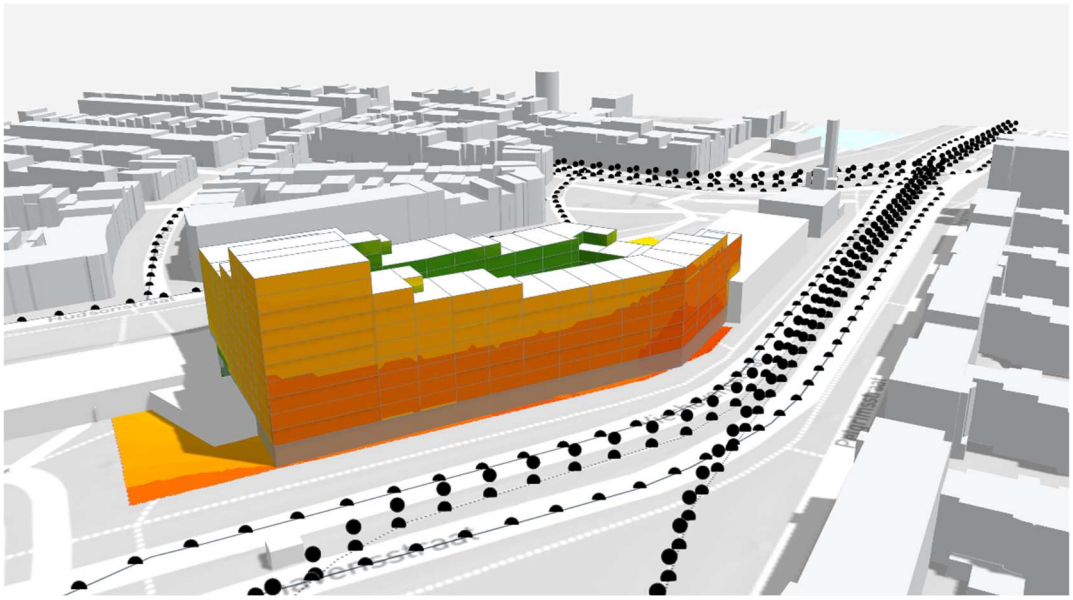
C-7.11 Concept design noise pollution study – Iteration 2 Concept design 2

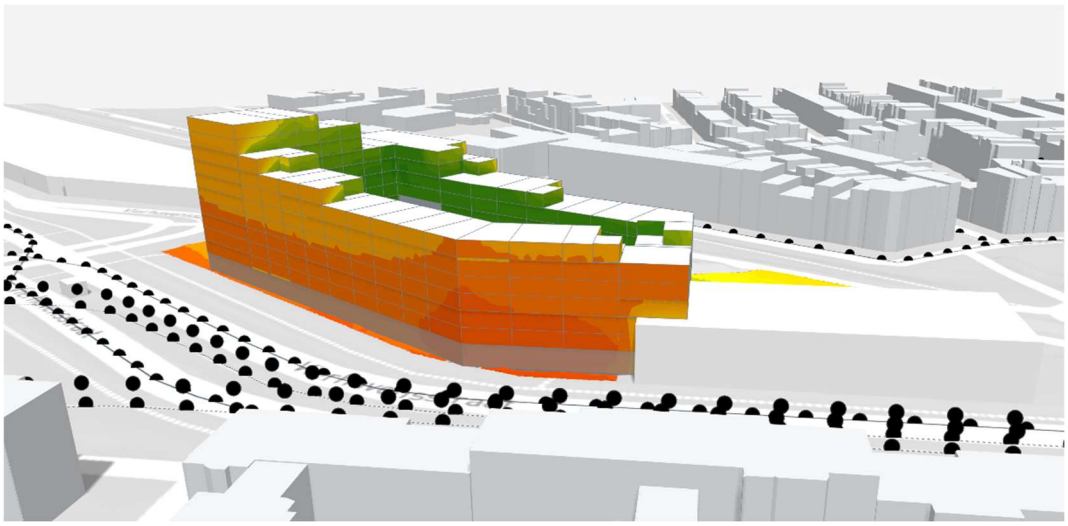


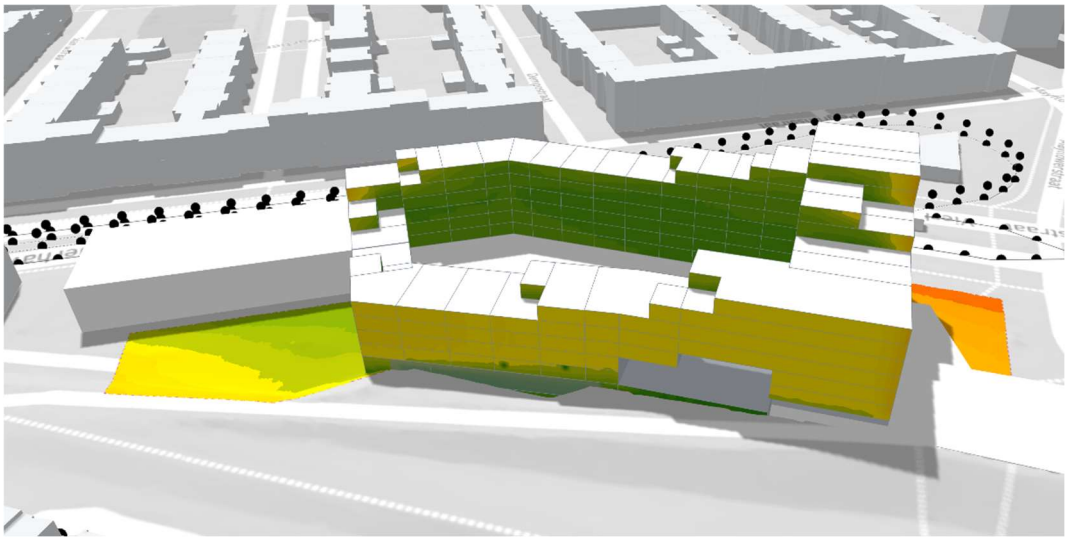




C-7.12 Concept design noise pollution study – Iteration 2 Concept design 3







C-7.13 Concept design evaluation matrix – Iteration 1

Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:				7752	7752	7752
	Built-up area (Dutch: BTO) [m2]:				4766	6330	5851
	Issuable land [m2]:						
Programme	Houses [n]:				203	170	181
	Home types:						
	Purchase/rent ratio:	*Rent %*	*30/40%*		*30/40%*	*30/40%*	*30/40%*
		Purchase%	*60/70%*		*60/70%*	*60/70%*	*60/70%*
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*			20586	19349	21854
		Residential:			17074	15575	17633
		Parking + storage:			3512	3774	4221
	Useable area (Dutch: GO)	*Residential:*			15366	14017	15870
	Form factor (Useable area/GFA):				0,75	0,72	0,73
	Facade surface [m2]:				11699	9179	10133
	Lettable floor area (Dutch: VVO) [m2]:				3161	3396	3799
	Max. Building height [m2]:				Voldoet	Voldoet	Voldoet
Parking	Parking places [n]:				69	107	126
	Parking spaces / Houses:				0,34	0,63	0,70
Environmental	Noise pollution	Facade					
		Green zone [road < 48 dB ; rail < 55 dB]			49%	28%	48%
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]			33%	42%	28%
		Red zone [road > 63 dB ; rail > 68 dB]			17%	30%	24%
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]			57%	60%	60%
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]			31%	37%	35%
		Red zone [road > 63 dB ; rail > 68 dB]			12%	3%	4%
	Wind analysis:	[Assessment 3D model]					
	Daylight on facade [VSC]:	*Less than 5 %*			10%	9%	11%
		Between 5 and 15 %			7%	4%	4%
		Between 15 and 27 %			19%	8%	12%
		More than 27 %			64%	78%	73%
	Sunshine duration on facade [hours]:	Februari 19:					
		Less than 2 hours [%]			46%	37%	41%
		Between 2 and 7 hours [%]			31%	31%	30%
		More than 7 hours [%]			23%	32%	29%
		June 21:					
		Less than 2 hours [%]			14%	12%	14%
		Between 2 and 7 hours [%]			49%	41%	43%
		More than 7 hours [%]			37%	46%	43%
		October 21:					
		Less than 2 hours [%]			46%	36%	42%
		Between 2 and 7 hours [%]			31%	33%	29%
		More than 7 hours [%]			23%	31%	28%
	Viewing distance [m]:	*Less than 400 m [%]*			81%	76%	72%
		Between 400 and 700 m [%]			7%	9%	8%
		More than 700 m [%]			12%	15%	20%
	View to certain point [%]:				*(not specified)*	*(not specified)*	*(not specified)*

C-7.14 Concept design evaluation matrix – Iteration 2

Category	Parameter		Preconditions	Rank	Design #1	Design #2	Design #3
Area	Operating area [m2]:				7752	7752	7752
	Built-up area (Dutch: BTO) [m2]:				4942	5080	5687
	Issuable land [m2]:						
Programme	Houses [n]:				203	162	165
	Home types:				Known	Known	Known
	Purchase/rent ratio:	*Rent %*	*30/40%*			48%	36%
		Purchase%	*60/70%*			52%	64%
Building	Gross floor area (Dutch: BVO) [m2]:	*Total:*			21721	24415	24983
		Residential:			18404	19411	20755
		Parking + storage:			3317	5004	4228
	Useable area (Dutch: GO)	*Residential:*			16563	17470	15870
	Form factor (Useable area/GFA):				0,76	0,72	0,64
	Facade surface [m2]:				11699	9179	10133
	Lettable floor area (Dutch: VVO) [m2]:					4503	3805
	Max. Building height [m2]:		Molen biotoop (Ring 1 t/m 4)		Ring 1: Voldoet niet	Voldoet	Ring 1: Risico
Parking	Parking places [n]:				110 (2900m2)	131 (4267 m2)	98 (2600m2)
	Parking spaces / Houses:				0,54	0,81	0,59
Environmental	Noise pollution	**Facade**					
		Green zone [road < 48 dB ; rail < 55 dB]			44%	46%	44%
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]			42%	37%	36%
		Red zone [road > 63 dB ; rail > 68 dB]			14%	17%	19%
		Ground					
		Green zone [road < 48 dB ; rail < 55 dB]			37%	98%	42%
		Yellow zone [road 48-63 dB ; rail < 55-68 dB]			48%	1%	46%
		Red zone [road > 63 dB ; rail > 68 dB]			15%	0%	12%
	Wind analysis:	[Assessment 3D model]					
	Daylight on facade [VSC]:	*Less than 5 %*			9%	6%	6%
		Between 5 and 15 %			3%	3%	2%
		Between 15 and 27 %			19%	18%	13%
		More than 27 %			68%	72%	78%
	Sunshine duration on facade [hours]:	**Februari 19:**					
		Less than 2 hours [%]			45%	37%	33%
		Between 2 and 7 hours [%]			32%	35%	38%
		More than 7 hours [%]			23%	28%	29%
		June 21:					
		Less than 2 hours [%]			11%	11%	8%
		Between 2 and 7 hours [%]			48%	49%	52%
		More than 7 hours [%]			41%	39%	40%
		October 21:					
		Less than 2 hours [%]			44%	37%	32%
		Between 2 and 7 hours [%]			33%	34%	38%
		More than 7 hours [%]			23%	28%	29%
	Viewing distance [m]:	*Less than 400 m [%]*			76%	71%	59%
		Between 400 and 700 m [%]			10%	8%	12%
		More than 700 m [%]			14%	21%	29%
	View to certain point [%]:				*(not specified)*	*(not specified)*	*(not specified)*

C-8 Artifact verification interview #1

Onderwerp: Verificatie van het ontwikkelde artefact voor het gebruik tijdens de initiatieffase van het vastgoedontwikkelingsproces.

Interviewer: Menno Smit

Geïnterviewde: #1

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Verschil huidige en nieuwe proces uitleggen (door middel van gebruik Appendix D & E)

Lack of knowledge

1) *Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in objectieve kennis tussen beide situaties denk je?*

(Development goals)
- *Lack of knowledge - Area; Programme; Building; Parking*
- *Lack of knowledge - Environmental (geluid)*
- *Lack of knowledge - Aantal conceptontwerpen*

Area veranderd niet heel veel aan denk ik, je kan de vierkante meters in het huidige proces uit het kadaster halen. Dan komt het erop neer, wat is het bouwbare deel? Dat is voorgeschreven door de gemeente dus daar moet je het bestemmingsplan voor hebben. Dit moet je altijd 100% weten. Programma, het aantal en het type woningen kan allemaal veranderen door het proces heen, dat is voornamelijk onderdeel van je randvoorwaarden vanuit de gemeente. Maar uiteindelijk ga je dat altijd nog bespreken wanneer je een ontwerp hebt met de afnemer en de gemeente, past dat helemaal binnen de woonvisie, wat we willen? Ik denk dat het verschil voornamelijk zit bij de categorie Building en Environmental, ik verwacht dat ik daar echt een beter objectief beeld van heb in het nieuwe proces, als dat tegen zou vallen word ik echt een beetje verdrietig, dan zou ik echt teleurgesteld zijn.

Parkeren, dat moet je in het huidige proces ook gewoon echt weten, want dat is een hele bepalende factor. Dat verandert niet zo veel denk ik, ja het zou prettig zijn als je daar wat mee kan spelen om te kijken hoe het verandert als je aan wat knoppen draait.
De omgevingsparameters, in het huidige proces weet je op basis van kennis en ervaring. Op het moment dat je een eerste opzet hebt, kun je er een geluidsmodel op loslaten. Je weet nou daar zit een drukke weg, dat zal ongeveer wel goed gaan. Je hebt nu bestaande geluidskaarten, maar dan kun je natuurlijk niet bepalen hoeveel decibel dat op de gevel van het ontwerp geeft, dus dat is wel erg interessant aan de nieuwe situatie. Dit (nieuwe situatie) is een beetje een versimpelde versie van een geluidstudie van een geluidadviseur, die zou alleen ook nestgeluid en eventueel het vliegveld meenemen. Ik vind het van belang dat je deze

toetsing zo snel mogelijk doet in het proces (geluid), er moet wel eerst iets komen, en dan komt die analyse. Dus ik vind het zeker wel van toegevoegde waarde om deze kennis (geluid) zo snel in het proces al te hebben, om dan ook een optimum te zoeken zeg maar. Het liefst zou ik het al bij iteratie 1 deze kennis hebben, zodat ik een gerichtere aanvraag kan doen bij de architecten (iteratie 2).

En denk dat er een verschil is in het aantal concept ontwerpen dat je kan maken binnen een bepaalde tijd tussen de nieuwe en de huidige situatie? Denk je dat je daarmee je kennis vergroot?

Je bedoelt dat hij zelf ontwerpen gaat genereren? Ja dat kan weer tot nieuwe inzichten leiden denk ik. Het is sowieso altijd beter om meerdere modellen te hebben… maar, dan moet je er wel eerst op filteren, dus niet die 80 modellen allemaal gaan zitten vergelijken, dat is ook weer een beetje zonde van je tijd.

Structuur

2) *Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in de manier waarop je het concept evaluatie en decision-making proces zou kunnen structureren?*

(Development goals)

- *Sturen van het proces*
- *Concept ontwerpen kunnen vergelijken*
- *Prioriteiten aangeven*

Nou dat vergelijken en optimaliseren daar doe je het voor, dus dat is zeker een verschil tussen de huidige en nieuwe situatie. Zo kan je er ook op sturen dat je de beste verhouding bvo en go krijgt, als je dat in het traditionele proces gaat doen, dat gaat hem niet worden. Dat gaat een architect nooit voor elkaar krijgen. In een prijsvraag zou je dan ook misschien een hoger bod kunnen geven. Dus je krijgt een optimaal model aan de voorkant, die getoetst is aan de randvoorwaarden met een zo goed mogelijk BVO/GO verhouding.

Dat van die ranking begrijp ik niet helemaal, hoe ik dat nu begrijp suggereert dat dat andere zaken die je hebt ingevoerd omtrent regelgeving of iets een langere rangorde kan geven. Hier zitten best wel een aantal parameters in die vrij zwart-wit zijn, wind bijvoorbeeld: het voldoet of het voldoet niet. Het zijn eisen. Daglicht moet het ontwerp gewoon aan voldoen.

Dus als ik het goed begrijp zou je het niet van toegevoegde waarde vinden om te zeggen; oké daglicht vinden we erg belangrijk voor dit specifieke project, dus dat geef ik een hoge rang en daar wil ik op door ontwikkelen, daar moet mijn project goed op scoren?

Ja oké, dus jij bedoelt dat je hem dan nog boven de norm optimaliseert. Ja dan moet je ze allemaal op het zuiden doen. Kan je daar dan ook op optimaliseren? Ja dan vind ik het wel interessant, als ik kan zeggen ik wil optimaliseren op lichtinval, ik wil zo veel mogelijk zuidgeoriënteerd woningen hebben. En dan kun je ook zeggen met geluid, dat vind ik belangrijk voor dit project en hij voldoet, hoe kun je je model nog sterker maken. Als dat allemaal kan dan zeg ik gelijk doen.

Nou dat kan niet volledig automatisch, maar het idee is dat je er op deze manier op kan sturen, kan ik dan dus concluderen dat je het dus wel van toegevoegde waarde vindt om de mogelijkheid te hebben om gebruik te maken van rankings?

Ja als je dan vervolgens erop kan sturen dat je je ontwerp daarop doorontwikkeld, ja dan is het top. Want daar wordt je model nog beter van. Dan zul je gaan zien dat dat blok anders gepositioneerd wordt. Voor het goed op kunnen bouwen van een model, moet je ook weten: hoe gaan we bouwen? En hoe ga je het ontsluiten?

Nauwkeurigheid kosten inschatten

*3) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat dit betekent voor de nauwkeurigheid waarin de kosten ingeschat kunnen worden?*

(Development goals)

- *Nauwkeurigheid kosten inschatten (bouwkosten (invloed geluid), advieskosten, loonkosten (doorlooptijd)*

Ja ik verwacht wel dat je de kosten nauwkeuriger in kan schatten, mits je nog wat dingen toe kan voegen. Ik roep er alvast twee: bouwmethodiek en ontsluitingen. Er zit altijd heel veel rework in, dus dat maakt je inschatting onbetrouwbaar. Je gaat minder kosten maken, minder fouten, dus minder kosten. Je moet natuurlijk alsnog nog een hele boel onderzoeken doen voor je vergunningen, maar ja het klopt je gaat minder uitgeven.

Wat zou deze kennis van geluidbelasting op de gevel denk je doen met de nauwkeurigheid van je bouwkosteninschatting voor de gevels (dove gevels bijvoorbeeld)?

Ja je kan normaal allerlei maatregelen treffen om toch aan de hoge geluidbelasting te kunnen doen, binnen heb ik het dan voornamelijk over he. Je moet ook altijd een luwe zijde hebben, waar je een slaapkamer kan situeren. Buitenruimtes, anders krijg je van die verglaasde bakken of hele hoge glazen panelen, suskasten, of dat er niks open kan. Je kan een heel maatregelpakket maken om wel te kunnen voldoen aan de eisen, maar die kosten geld. Sommige maatregelen kun je bij bepaalde situaties niet toepassen omdat dan het binnen geluidseis van 35 dB niet gehaald wordt. Ik denk dat je die kosten met dit programma en de matrix zeker beter in kan schatten. Wellicht dat hier een deel dove gevel moet komen, dat is eigenlijk gewoon een tweede gevel die er dan moet komen, dan is het inderdaad wel interessant om te zien hoeveel vierkante meter dove gevel je dan moet realiseren.

Daarnaast ga je ook gewoon beter nadenken over je ontwerp met deze kennis denk ik. Het stelt je in staat een ander soort gesprek te voeren en meer te sturen om die kosten te drukken. Dus dan heb ik het erover sturen op minder geluidbelasting gevels bijvoorbeeld, om zo min mogelijk geluidsmaatregelen toe te hoeven passen. Ik denk dat je doorlooptijd korter wordt, je hebt eerder de fouten inzichtelijk dus hoeft minder vaak puzzelen dat dingen niet goed zijn. De gebouwen kunnen verkeerd staan, dat scheelt je rework en verkort dus je totale doorlooptijd. Maar goed, dan moet je de informatie wel goed invullen natuurlijk.

Denk je dat je in de nieuwe situatie de kosten van de geluidsadviseur bijvoorbeeld ook nauwkeuriger in kan schatten ten opzichte van de huidige situatie?

Ja dat denk ik wel. Maar, de geluidsadviseur heb je altijd nodig om een rapport op te stellen voor je vergunningen, dat doet hij altijd.

Rework (proces → planning laten zien)

*4) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework*

(Development goals)

- *Kans op rework verminderen*

Nou door dit te doen, als je teruggaat naar het traditionele proces we geven een architect een opdracht… ik maak het even heel plat ja; die architect is in het leven geroepen om een handtekening te zetten, een mooie gevel te maken. Die denkt van buiten naar binnen en van boven naar beneden. Terwijl als wij gaan bouwen denken we precies andersom, van beneden naar boven en van binnen naar buiten. Ja en die clash kun je hiermee heel goed voorkomen. Aan de voorkant kun je de architect gewoon heel duidelijk meegeven van; we hebben er over nagedacht, dit zijn de producten die we willen hebben. Hij hoeft niet meer na te denken over het aantal woningen of hoe die plattegronden er dan uit komen te zien, maar hier zitten gewoon bouwbare volumes. En alles wat je aan de gevel veranderd, moeten we aan de binnenkant op gaan lossen, dat kost geld. Als je dan ergens aan gaat draaien gaat het ergens anders binnen ook weer verkeerd. Zo krijg je geknutsel op geknutsel, nou dat is allemaal foutenmarge (rework) en dat iedere keer bij een nieuw werk. Dat zou in deze situatie niet hoeven.

Over het algemeen lastig in te schatten wat hoeveel het zou schelen op rework, ieder project is anders en je loopt altijd tegen andere problemen aan. Maar over het algemeen denk ik dat hoe meer kennis je aan het begin van je traject hebt, hoe beter je die risico's kan inschatten en je project daarop kan sturen.

*En als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework met het oog op de geluidbelasting op gevel info*

Ja wat zou kunnen gebeuren in de huidige situatie is dat het resultaat van die studie (wijst periode geluidstudie proces case project aan op tijdlijn) dusdanig slecht is dat je terug moet (opnieuw moet beginnen met je SO fase) en dat je een aanvullend onderzoek moet doen. Ik verwacht dat je die eruit zou kunnen krijgen, maar het is niet zo dat heel vaak aanvullende onderzoeken komen, of dat onderzoeken twee keer moeten worden gedaan. Maar omdat het wel eens voor kan komen verwacht ik over het algemeen wel dat de kans op rework kleiner wordt. In dit geval zou het dus 2 tot 3 maanden kunnen schelen als tijdens die geluidstudie blijkt dat de positionering van de gebouwen gewoon niet goed is. Het liefst wil die geluidstudie in je initiatieffase al weten, dat je het voor je architectenselectie (iteratie 2) al hebt gedaan. Dan is het gewoon een voorwaarde die meegenomen wordt in het ontwerp.

<u>Concluderend</u>

5) Heb je nog vragen, opmerkingen, suggesties over/voor de matrix?

- **Bouwmethodiek**: Als het heel hoog wordt, dan je op een gegeven moment overwegen om te gaan prefab-en, of in complexe situaties waar je er heel moeilijk bij kan komen, dat heb je veel in binnenstedelijke gebieden. Of tunnelen, breedplaat, dat is wel van belang om te weten hoe je ontwerp wordt opgebouwd. Wat wij doen, we nemen gewoon een projectmanager mee en van joh hoe gaan we dit bouwen? Is het bouwbaar of is het niet bouwbaar? Bij een ander project waar ik aan werk wilde we gaan prefab-en omdat we binnen een bepaalde tijd klaar wilde zijn, maar dat is wel

duurder, nu komen we erachter dat het project toch niet helemaal financieel haalbaar is, dus zijn we hem om gaan zetten en gaan we veel meer tunnelen.

Maar nu ik er nog langer over denk, je gaat dat model dat natuurlijk niet laten kiezen he, dat is waar je de menselijke expertise nodig hebt. Maar je zou het op de een of andere manier mee willen geven van; oké we gaan tunnelen, dat het model dan geen rare blokken gaat maken die niet te tunnelen zijn zegmaar.

- **Ontsluiting:** Ontsluitingen en hoeveel stijgpunten, dat zijn de dure elementen. Is het een galerijontsluiting, is het een portiekontsluiting? Dat is heel belangrijk voor je opbouw, doe je het hele blok op één uitgang en hoeveel liften krijg je? Dat soort dingen allemaal. Een coridorontlsuiting willen de meeste mensen niet, je ziet het nog wel bij studentencomplexen, dat is gewoon een lange gang waar alle woningen aan zitten, net een hotel. Dat is natuurlijk niet voor niks, want dat is het goedkoopst om te ontwikkelen.

- **Gevelverhouding open/dicht (ramen):** Dat is belangrijk als je je architect aan gaat sturen, voor je lichtinval binnen. De Design Studio kijkt er nog niet aan (Iteratie 1). Voordat de architect gaat tekenen moet je aangeven met welke verhouding open/dicht je gaat werken.

C-9 Artifact verification interview #2

Onderwerp: Verificatie van het ontwikkelde artefact voor het gebruik tijdens de initiatieffase van het vastgoedontwikkelingsproces.

Interviewer: Menno Smit

Geïnterviewde: #2

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Verschil huidige en nieuwe proces uitleggen (door middel van gebruik Appendix D & E)

Lack of knowledge

*1) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in objectieve kennis tussen beide situaties denk je?*

(Development goals)
- *Lack of knowledge - Area; Programme; Building; Parking*
- *Lack of knowledge - Environmental (geluid)*
- *Lack of knowledge - Aantal conceptontwerpen*

Ja je hebt meer informatie in de nieuwe situatie vergelijken met de huidige situatie over de hele breedte. Ik denk dat dat wel van toegevoegde waarde is, maar het liefst heb je nog dat ie dan op basis van de input die je geeft zelf modellen maakt. Maar, ja het levert meer informatie op dus dat is altijd beter zou je zeggen. Je hebt minder onzekerheid.

Die vormfactor vind ik wel heel fijn om te weten (iteratie 2) en de oppervlaktes. Je kan zo wel snel zien hoe efficiënt een plan is, dan bedoel ik de verhouding tussen bvo/go (vorm factor), de geveloppervlakte want gevels zijn duur. Ja die parameters geven een helder beeld van hoe efficiënt een blok opbouw is.

Ja die environmental vind ik moeilijk, je kan zien hoe meer rood hoe ongunstiger het is… je moet echt die vertaling hebben naar wat houdt dat dan precies in en wat voor maatregelen zijn er nodig enzovoorts.

Structuur

*2) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in de manier waarop je het concept evaluatie en decision-making proces zou kunnen structureren?*

(Development goals)

- *Sturen van het proces*
- *Concept ontwerpen kunnen vergelijken*
- *Prioriteiten aangeven*

Ik denk zeker dat je gestructureerder keuzes kunt maken. We zijn nog niet zo gewend om op basis van kengetallen, ja sommige kengetallen wel, nu sturen we vooral met de BEO, maar in de BEO staat bijvoorbeeld wel de vormfactor en de oppervlakte… maar nu ik dit overzicht zo zie realiseer ik me dat we daar niet zozeer op sturen bij de ontwikkeling van appartementencomplexen. Maar om gewoon te kijken hoe efficiënt bouwblokken zijn, met verhouding geveloppervlak in relatie tot woning bijvoorbeeld dat geeft een hoop sturingsinformatie. Alleen zou je nog wel een paar slagjes dieper willen, want kijk in eerste instantie zeg je iteratie 2 ontwerp 1 heeft best veel geveloppervlakte, maar dan zie je dat er 203 woningen in zitten en in die andere een stuk minder. Maar goed, dat is misschien een vervolgstap. Nu is het een opsomming van waardes, maar de vormfactor bijvoorbeeld maakt het echt vergelijkbaar, alleen die hoeveelheid geveloppervlak zegt niet zoveel. Eigenlijk moet je dan geveloppervlak per woning moeten hebben om goed te kunnen sturen.
Maar echt als ik dit zo zie sturen we nog te weinig op wat nou een efficiënt blokontwerp is, zeker omdat elementen duur zijn, zou je willen weten bij welk ontwerp heb je de minste geveloppervlak per woning. Net zo interessant als verhouding bruto/netto. Parkeren is natuurlijk belangrijk, hoeveel plekken heb je per woning.

Dus ja je kan met de nieuwe situatie nog analytischer sturen op je ontwerpen als je meer informatie hebt. Uiteindelijk kan je dan in een vroeg stadium voor het meest efficiënte ontwerp kiezen.

In hoeverre verwacht je dat de nieuwe situatie je in staat stelt ontwerpen te optimaliseren vergeleken met de huidige situatie?

Ja zeker, want je zou bijvoorbeeld kunnen zeggen: stedenbouwkundig spreekt dit ontwerp me heel erg aan, maar bij dit ontwerp zit er weer heel weinig gevel in, kunnen we dat niet in het ontwerp wat we mooi vinden toepassen?

Wat vind je ervan dat je de mogelijkheid hebt om parameters te ranken? Om je voorkeur aan te geven in de nieuwe situatie.

Je kan dan bijvoorbeeld met een specialist een verdiepingsslag maken van hoe zorgen we dat toch de verhouding groen (groene geluidbelasting op gevel) beter wordt, dan kan je er ook kosten aan hangen en kan je het doorrekenen, wat doet het dan op je ontwerp?

Nauwkeurigheid kosten inschatten

*3) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat dit betekent voor de nauwkeurigheid waarin de kosten ingeschat kunnen worden?*

(Development goals)

- *Nauwkeurigheid kosten inschatten (bouwkosten (invloed geluid), advieskosten, loonkosten (doorlooptijd)*

Ik denk dat je je bouwkosten nauwkeuriger in kan schatten, dat lijkt me een open deur. Hoe meer je weet hoe beter je kosten kunt inschatten.

Ja je kan zeggen later als je meer modellen hebt als je een adviseur dat laat berekenen, als je dat natuurlijk allemaal in huis hebt hoef je geen adviseur in te schakelen om die berekeningen te doen. Dus hoe meer je zelf kan genereren uit je systeem, hoe aantrekkelijker dat is. Je hebt hem nog wel nodig hoor zeker, je kan hier hooguit quick-scans mee doen. Je ontwikkelproces zou er compacter van kunnen worden, dus dan heb je minder druk op je algemene kosten, daar worden onze loonkosten op verhaald. Omdat je gewoon sneller van A naar B komt.

Rework (proces → planning laten zien)

*4) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework*

(Development goals)

- *Kans op rework verminderen*

Als het goed is zou de kans op rework kleiner moeten worden denk ik, want hoe eerder je in je proces een keuze maakt voor iets, voor een ontsluiting of een blokopzet, met meer informatie, betekend dat dat je er niet later achter komt en alsnog je ontwerp af moet buigen. Dus hoe eerder je iets weet in een proces hoe beter het is en hoe minder foutmarge je dan hebt.

*En als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework met het oog op de geluidbelasting op gevel info*

Ja ook hier zou ik verwachten dat het minder is, als je deze informatie omtrent geluidbelasting op de gevel eerder hebt, dus tijdens iteratie 1, kan je een model misschien eerder afblazen waardoor je die niet mee neemt naar je architectenselectie bijvoorbeeld. Dat betekent wel dat je minder rework hebt, al helemaal als dat ontwerp later… dus in het huidige proces, niet goed genoeg had gebleken.

Concluderend

5) Heb je nog vragen, opmerkingen, suggesties over/voor de matrix?

- Geveloppervlakte per woning vind ik nog wel interessant om te weten
- Floor space index (Hoeveel bvo je per vierkante meter area kwijt kan)

C-10 Artifact verification interview #3

Onderwerp: Verificatie van het ontwikkelde artefact voor het gebruik tijdens de initiatieffase van het vastgoedontwikkelingsproces.

Interviewer: Menno Smit

Geïnterviewde: #3

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Verschil huidige en nieuwe proces uitleggen (door middel van gebruik Appendix D & E)

Lack of knowledge

*1) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in objectieve kennis tussen beide situaties denk je?*

(Development goals)
- *Lack of knowledge - Area; Programme; Building; Parking*
- *Lack of knowledge - Environmental (geluid)*
- *Lack of knowledge - Aantal conceptontwerpen*

De area heb je nu ook al een objectief beeld van he, dat kan je gewoon uitzoeken. Dat verschilt niet echt. De programmatie daar heb je zelf controle op en je weet zelf wat de kaders zijn.
Building, de relatie tussen programma en area, dan kom je vanzelf op de onderdelen van de beelding. Vierkante meter gevel die hebben we nu niet in beeld, daar houden we geen rekening mee nu, die kan nog wel eens interessant zijn. Het is wel de vraag in het huidige proces in hoeverre die informatie die we nu hebben, dus die BVO's GO's voornamelijk, in hoeverre die juist is.
Parking, dat weet je in de huidige situatie ook al, dat moet je weten want dat is heel bepalend. Of dat dan uiteindelijk ook echt gerealiseerd gaat worden is ook maar even de vraag maar goed. Maar ja als het zo vergelijkt heb je voornamelijk bij iteratie 2 wel een completer beeld ja.

En environmental, ja dat hebben we nu echt amper in beeld, daarvan kan je uit het bestemmingsplan wel sommige dingen ophalen vaak, als er een bestemmingsplan is. Dan kan je bijvoorbeeld een geluidskaart inzien, alleen die geluidskaart maakt natuurlijk niet inzichtelijk wat het effect van dat geluid is op de gevel, wat zoals ik het nu zie wel gebeurt in de nieuwe situatie. Ja… wind… daylight, dan doen we eigenlijk allemaal pas als de massastudie al grotendeels rond is, dus dat is echt wel een aanzienlijk verschil, maar goed, ervan uitgaande dat dat systeem goed werkt, dat is nog even een aanname. Ik verwacht niet dat dit 100% accuraat is, maar dat je nog steeds, ook om het bij een omgevingsdienst of brandweer er doorheen te kunnen drukken, een rapport nodig hebt van een adviseur. Ik verwacht ook dat

daar wat discrepanties tussen kunnen zitten met wat hieruit zou komen, het blijft gewoon een vak apart, maar je verkort natuurlijk wel je hele conceptfase waarbij je verschillende studies moet doen, dat weer door laat rekenen en je gaat weer terug etc.

En in hoeverre denk dat er een verschil is in het aantal concept ontwerpen dat je kan maken binnen een bepaalde tijd? En is dat van toegevoegde waarde om je kennis te vergroten?

Ja daar hebben we het volgens mij tijdens het vorige interview ook al over gehad, dat vind ik lastig in te schatten. Enerzijds denk ik dat het heel interessant is om uit veel meer conceptontwerpen te kiezen, anderzijds moet je dan denk ik heel goed bedenken hoe je die schifting gaat maken. Ik denk dat je eerst een keuze moet maken tussen modellen die je er gewoon aantrekkelijk of interessant uit vindt zien, dan blijft het behapbaar. Vervolgens kan je dan met een handje vol ontwerpen een vergelijking maken op basis van deze parameters bijvoorbeeld. Ik denk dat het op die manier zeker wel van toegevoegde waarde kan zijn.

Structuur

*2) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in de manier waarop je het concept evaluatie en decision-making proces zou kunnen structureren?*

(Development goals)

- *Sturen van het proces*
- *Concept ontwerpen kunnen vergelijken*
- *Prioriteiten aangeven*

Uhm, nou ik denk dat het vooral interessant is. Je ziet de relatie gelijk tussen de verschillende elementen en dit overzicht. En ondanks dat je weet dat die relatie er is in het huidige proces, is het heel moeilijk meetbaar te maken. Dit geeft natuurlijk wel een inzicht van, ik ga wat knutselen aan dit knopje, dan zie je gelijk wat er hier gebeurt.

Naast dat dit interessant is tijdens de initiatieffase, verwacht ik ook dat we dit goed kunnen gebruiken tijdens de SO. Want er gebeurt in deze fase gewoon (wijst SO aan) heel veel, hier (initiatief) begint natuurlijk gewoon; denken we überhaupt een plan te kunnen maken? En hier (SO) heb je grotendeels de fase waarbij je met de gemeente aan tafel gaat zitten om te bespreken wat het plan is en wat daarvoor nodig is. Daar zijn verschillende wensen van de gemeente die stedenbouwkundig vaak naar voren komen, die je in deze fase met name hebt. Je kunt je voorstellen dat de gemeente zegt nou doe er maar een laagje bij want stedenbouwkundig is dat beter, of doe maar een set back daar enz. Zeker als dat in het SO gebeurd is dat heel irritant want je moet heel de tijd je structuurplan aanpassen, dus liever doe je die aanpassingen in de initiatieffase, maar het gebeurt hier (SO) ook nog. Als ik er zo over nadenk zou ik er echt een enorme meerwaarde van inzien als ik dit zelf ook kan doen tijdens zo'n gesprek met de gemeente bijvoorbeeld, want dan kan je heel aanwijsbaar laten zien aan de gemeente van; ja gemeente jullie willen dit, maar dat betekent dan dit, op het gebied van parkeren, geluid, bezonning etc. En nu is het bijzonder irritant dat je met een ontwerp naar de gemeente gaat, je denkt dat je eruit bent en het past allemaal binnen de gestelde randvoorwaarden, en dan zeggen ze nou doe dit wat je daar hebt aangehouden toch maar anders. Dan kan je heel de boel weer aanpassen en verspringen al je rekenwaardes. Het zou zeker schelen als je dan en live die wijzigingen door kan spreken, en kan aantonen wat het verschil is. Dat bijvoorbeeld de bezonning van 10 woningen niet meer voldoet.

Ik geloof er niet in dat deze tooling het werk van een ontwikkelaar gaat vervangen, maar je kan wel keuzes maken waarbij je meer rekening houdt met risicofactoren denk ik. Dus in die zin voegt dat ook wel structuur toe aan het huidige proces.

En wat denk je dat het aangeven van een rank voor invloed heeft, hoe kijk je naar die mogelijkheid?

Ja dat is zeker van toegevoegde waarde denk ik. In basis is het goed dat je de hiërarchie bespreekt tussen de verschillende dingen. Wat wij belangrijk vinden is anders dan wat een gemeente belangrijk vindt, alleen uiteindelijk is het wel zo dat er een bepaalde hiërarchie is. Even ongeacht wat die dan is, het is wel degelijk handig om te sturen op die hiërarchie, dat doen we eigenlijk al, alleen is onze hiërarchie wel anders dan die van de gemeente. Op deze manier maak je dat inzichtelijker.

Nauwkeurigheid kosten inschatten

*3) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat dit betekent voor de nauwkeurigheid waarin de kosten ingeschat kunnen worden?*

(Development goals)

- *Nauwkeurigheid kosten inschatten (bouwkosten (invloed geluid), advieskosten, loonkosten (doorlooptijd)*

Dus dat je bijvoorbeeld een vergelijking kan maken tussen geveloppervlak en geluidbelasting, kan je dan nauwkeuriger de kosten bepalen denk je?

Ja, maar goed dat kun je natuurlijk altijd wel, je doet het in deze situatie wat eerder en anders is het een paar maanden later op basis van het rapport van een adviseur die je hebt. Dus het is niet per definitie nauwkeuriger. Nou je hebt die nauwkeurigheid wel eerder omdat je het naar voren trekt. Ik denk dat het meer ook aan de bijkomende kostenkant, je hoeft minder vaak de architect weer een nieuw schetsje te laten maken en in die zin kan je denk ik. Je hebt er beter zicht op, dat wat eruit komt, het zal best nog wel een beetje aangepast moeten worden maar in hoofdlijn moet het ontwerp goed zijn, mits de score goed is.

Wat ik hier ook wel interessant aan vindt (Iteratie 2, ontwerp 2) is dat deze heeft verreweg het meeste groen in de geluidbelasting op de gevel, maar om dat mogelijk te maken heb je wel heel die wand nodig, waardoor je ook het meeste rode gevel krijgt. En als je in het rood zit heb je vaak ook wel echt een serieus probleem, met dove gevels en dure voorzieningen die je moet treffen. Alles wat in de gele of groene deel zit dat kost niks, ja dat vertelt iets over de kwaliteit van het plan, maar daar sturen we niet op, veel meer op die kosten. Je zou met deze kennis het gebouw anders kunnen positioneren waardoor je minder voorzieningen hoeft te treffen.
Het gaat ook allemaal veel makkelijker denk ik zo'n iteratie (nieuwe situatie). In het huidige proces is het zo dat een architect gaat tekenen en dan vervolgens kijk je ernaar en dan denk je nee dat kan slimmer, passen we dat aan en ben je een paar weken met elkaar bezig. Je zal misschien best wel als je met z'n drieën of vieren ernaar kijkt wat over het hoofd zien, wat je veel sneller zou kunnen zien omdat je veel meer iteraties kan doen. Overigens denk ik ook dat je daardoor een veel sneller proces hebt.

Wat doet dat denk je met de loonkosten?

Bij ieder project is het natuurlijk wel anders, maar mijn tijd kan je wel kwantificeren in kosten, maar uiteindelijk komt het allemaal uit één grote pot. Maar goed, als ik minder lang bezig ben op dit project, kan ik die tijd besteden aan een ander project.

Ik denk dat je de initiatieffase ook veel meer in kunt drukken, dus de doorlooptijd kan verkorten. Je zet nu 3 architecten in, die werken dan wel allemaal parallel, maar dat zou veel minder nodig zijn als je hier aan de voorkant al meer opties hebt bekeken die het programma voor je heeft gegenereerd, of die je zelf hebt aangepast he of geoptimaliseerd.

Rework (proces → planning laten zien)

*4) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework*

(Development goals)

- *Kans op rework verminderen*

Het vertrekpunt voor je structuurontwerp is veel beter, want wat er vaak gebeurd bij je initiatief, dan ga je kijken naar volume, opbrengsten, kosten en de meest basale… naja wat kunnen we vinden op google over de omgevingsaspecten zeg maar, dan vervolgens bij je structuurontwerp gaan we dat intekenen als woningen en gaan we langs adviseurs van kijk er ff naar. Dus hier (eind initiatief) is in de nieuwe situatie het ontwerp kwalitatief al veel beter vergeleken met het huidige proces, daar ga ik dan even vanuit, waardoor je hier (SO) veel sneller kan. Want nu kan het zo zijn; je krijgt quickscans van je adviseur en dan kan het zo zijn dat je je ontwerp weer helemaal aan moet gaan passen omdat zoveel bouwlagen kan helemaal niet bij wijze van spreken, terwijl je dat in de nieuwe situatie tijdens je initiatieffase al kan ondervangen denk ik. Je pakt hem hier (Initiatief) en hier (SO) pluk je de vruchten ervan denk ik.

*En als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework met het oog op de geluidbelasting op gevel info*

Het valt of staat er natuurlijk mee wanneer je je adviseur aan de slag zet. Als je je adviseur hier aan de slag zet (begin SO) of hier (eind SO), dat scheelt enorm in het rework wat je moet doen als het advies negatief blijkt. Als die onderzoeken goed zijn is het een bevestiging en levert dit (nieuwe situatie) je niks extra's op… op het gebied van rework dan he, maar stel het is slecht, dan moet je terug naar de tekentafel en ga je gewoon weer een paar stappen terug de tijd in. Dan kan je zomaar een paar maanden winnen, als je het vergelijkt met een situatie waarin je het gewoon gelijk goed zou doen. Uhm… maar het is niet te kwantificeren hoe vaak dat voor komt.

Concluderend

5) Heb je nog vragen, opmerkingen, suggesties over/voor de matrix?

- Het zou natuurlijk ideaal zijn als je ook… maar dan ga je ook een koppeling maken naar de BEO, je meter prijzen, zowel bouwkosten als opbrengsten erin kan zetten. Dat je gelijk ook ziet waar je ongeveer uitkomt met het geheel, je kan er hier natuurlijk zelf ook wel de conclusie aan koppelen. Uiteindelijk is het een heel makkelijk sommetje, maar het is wel overzichtelijk als je in hetzelfde overzicht hebt.
- Misschien de inhoud, het volume. Dat kan soms nog wel eens handig zijn voor maximale bebouwingspercentages uitgedrukt in volume. Het is niet gebruikelijk want vaak heb je het gewoon op basis van bebouwingsvlak in het bestemmingsplan, dan weet je dat de footprint bijvoorbeeld maximaal 80% mag zijn. Bij een ander project willen ze nu een maximaal volume in op te schrijven zodat je vrijheid houdt in set backs en dat soort dingen. Dus dat zou ook wel een prettige parameter zijn.

- En ontsluitingsprincipes zijn ook belangrijk, dat is ook erg bepalend voor je ontwerp.

C-11 Artifact verification interview #4

Onderwerp: Verificatie van het ontwikkelde artefact voor het gebruik tijdens de initiatieffase van het vastgoedontwikkelingsproces.

Interviewer: Menno Smit

Geïnterviewde: #5

Privacy: De geïnterviewde personen zijn er mee akkoord gegaan dat de audio van het interview is opgenomen. Het interview zal anoniem worden verwerkt. De geïnterviewde heeft de mogelijkheid vragen over te slaan als hij/zij niet comfortabel is bij het beantwoorden van de gestelde vraag.

Setting:
De interviews zijn 1 op 1, fysiek afgenomen in een vertrouwde omgeving voor de geïnterviewde. Er is 60 minuten uitgetrokken voor elk interview.

Verschil huidige en nieuwe proces uitleggen (door middel van gebruik Appendix D & E)

Lack of knowledge

*1) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in objectieve kennis tussen beide situaties denk je?*

(Development goals)
- *Lack of knowledge - Area; Programme; Building; Parking*
- *Lack of knowledge - Environmental (geluid)*
- *Lack of knowledge - Aantal conceptontwerpen*

Ja dit is wel een helder verschil zeg, dit stuk hadden we gewoon niet in beeld (environmental). Met deze gegevens zou je ook vragen kunnen gaan stellen, je ziet dat deze vormfactor, die is te hoog. Normaal is dat 0,69 dus dan zou je wel vragen gaan stellen zeg maar. Het geeft een inzicht hoe realistisch het model is als je het zo bekijkt. Ik vind dit ook ingewikkeld, bij iteration 2 ontwerp 1 zit relatief veel gevel, nou dat klopt ook want het zijn losse blokken. Dus dan hadden we misschien als we dat getal hadden gezien, meegewogen in de keuze denk ik zelf. En ik vind het gek dat dit model het grootste bruto vloeroppervlak heeft met de minste woningen.

En environmental moeten we eigenlijk een framework construeren want dat oordeel vellen we eigenlijk niet. We moeten dan voor onszelf bepalen wat we belangrijk vinden. Dit is eigenlijk volgens mij heel leuk he wat we nu aan het doen zijn, dat je op deze manier het gesprek gaat voeren terwijl je naar deze informatie kijkt. Hoe belangrijk zijn die verschillende omgevingsfactoren en hoe zwaar wegen die door?

Als extra kennis zou het echt heel erg helpen, ook gewoon om het vergelijkbaar te maken puur op data. Dus je zou je presentaties moeten hebben zoals we nu hebben gedaan tijdens iteratie 2 eigenlijk he, maar dan zou je in plaats van dat je gelijk een oordeel doet, dat hebben we nu

gedaan op basis van een waardesysteem he; is het faseerbaar? Is het goed op te knippen in korrels? Kunnen we ons programma goed kwijt? Is de identiteit goed afleesbaar en heeft het dus een bepaalde verkoopwaarde? Je kan dan in de nieuwe situatie en nog betere vergelijking kunnen maken, met name ook dat geveloppervlak he. Het gaat toch een soort minimale waardeshift organiseren, want misschien is dit model (iteratie 2 ontwerp 2) minder faseerbaar maar misschien wel makkelijker bouwbaar en goedkoper waarmee je toch beter in de buurt komt van die productdoelgroep. Dit hadden we er niet zo uitgehaald, ik vind het wel echt interessant. Alleen die correlaties moet je nog wel gaan zitten vinden dan.

Hoe kijk je naar de mogelijkheid om ontwerpen te genereren?

Ja die mogelijkheid juich ik uiteraard toe, alleen niet in dit proces. Dan zouden we het op een andere manier moeten organiseren. Nu hebben we eigenlijk drie hersens gevraagd om na te denken (iteratie 2). Dan zou je het eigenlijk meer in die fase moeten pakken (iteratie 1). Dat je eigenlijk in de iteratie 1 fase zegt dan gaan we 10 verschillende varianten maken. Wat ik lastig vind is het stukje identiteit, hoe je dat meeneemt.
Ja en als je nog meer oplossingen kunt vinden kan je kijken welke past beter bij de conditie, ik zou het wel wat waard vinden als we dit zelf zouden doen zeg maar.

Structuur

*2) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), in hoeverre is er een verschil in de manier waarop je het concept evaluatie en decision-making proces zou kunnen structureren?*

(Development goals)
- *Sturen van het proces*
- *Concept ontwerpen kunnen vergelijken*
- *Prioriteiten aangeven*

Ja je weet meer, dus dat zou het wel meer gestructureerd moeten maken, maar aan de andere kant maakt het meer weten het beslissingsproces misschien ook wel lastiger. Want stel iemand is helemaal verliefd op één ontwerp, maar komt er rationeel niet uit zeg maar. Beslissingen gaan over twee dingen; enerzijds wat is waar, wat is niet waar? En anderzijds hoe ga je in een groepsproces een beslissing maken? Dus de vraag is of je in een groepsproces deze data kunt toevoegen om een gefundeerdere beslissing te nemen, en of dat wat uitmaakt als iemand toch al verliefd is geworden op een ander model? Maar goed, dit maakt je vergelijkingswaarde rationeler, ook die score, dus ik denk dat het zeker helpt. Omdat je niet alleen maar op emotie of beeld hoeft te vergelijken, maar je vergelijkt ook op leefkwaliteit factoren he. Je kunt in de nieuwe situatie ook zeggen; nou deze leef kwaliteit is gewoon aanmerkelijk beter dan die kwaliteit, wat is dan nog de waarde van het feit dat je het mooier of lelijker vindt? Als je substantieel kan zeggen ik krijg hier minder geluid op de gevel, koelere binnenruimtes, meer groen dat soort dingen voor terug. Dan is dat gesprek van tafel volgens mij en dat krijg je er emotioneel bijna niet uit, op basis van je eigen intelligentie.

Dat gesprek over die ranking is wel waardevol denk ik zelf, om aan het begin al met elkaar te bespreken wat we belangrijk vinden.

Wat je beter kan gaan doen denk ik in de nieuwe situatie is die kenniscomponenten nog beter met elkaar verknopen zeg maar, zodat je tot een nog optimalere oplossing komt. Die optimalisatieslag komt hierna pas denk ik, als je een ontwerp gekozen hebt, we kunnen breder dikker hoger, misschien kan deze dikker op de geluidsluwe kant, en dunner op de geluidbelasting kant, dus dat we binnen het blok gaan schuiven, dat gesprek zou een iteratie

hierna zijn. Om je programma aan te scherpen en nog een iteratie binnen het model te doen. Het geeft ook de mogelijkheid om extra ruimte op te zoeken in je model.

Nauwkeurigheid kosten inschatten

*3) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat dit betekent voor de nauwkeurigheid waarin de kosten ingeschat kunnen worden?*

(Development goals)

- *Nauwkeurigheid kosten inschatten (bouwkosten (invloed geluid), advieskosten, loonkosten (doorlooptijd)*

Er hebben nu vijf teams naar gekeken om tot de verschillende oplossingen te komen. Je zou eigenlijk verwachten als je het in zo'n soort systeem stopt dat je met één team die 5 verschillende oplossingen zou moeten vinden, dus dat zou al een soort verkorting zijn van het proces. Ik hoop ook dat het systeem met verassende modellen komt.

Wat je er uiteindelijk uit wil halen is niet zozeer het besparen van die adviseurskosten, maar dat je fundamenteel in het ontwerp iets doet waarmee je die kosten niet kwijt bent. Dus stel dat je voor 100% dove gevel moet maken, dat je eigenlijk kan zeggen; ik wil naar 50% dove gevel toe, wat voor model moet ik dan ontwikkelen, want een dove gevel is hartstikke duur. Daarmee ga je een soort lacune in het ontwerp invullen en fundamenteel kosten besparen. Dat is echt interessant, en dat is ook iets wat een geluidadviseur niet levert. Dus het is niet zozeer besparen, het is iets aanvullen wat nu niet geleverd wordt. Maar het gaat niet zozeer erom dat je bij wijze van 2000 euro van je adviseurskosten afhaalt, voor mijn gevoel is dat peanuts. De structurele wijziging die je voor elkaar gaat krijgen zit volgens mij in het ontwerp van de gevel en de positionering, want dan hoef je niet al die dure gevels te maken.

Het zou wel meehelpen in de keuze die je maakt aan de voorkant, dan kies je voor een model die er kosten efficiënter in zit, dat betekent dat je helemaal aan het begin van het proces gaat sturen.
Stel dat er een model uit komt, wat je echt vreselijk vindt, maar stel dat het er bouwkundig het aller gunstigste uitgekomen was dan had je toch misschien in het gesprek de overweging gehad van, we moeten wel een beetje sturen die kant op want dan zijn we al die kosten kwijt, in al die andere modellen. Als je dat aan de voorkant had geweten was het hele gesprek anders gegaan, dan had je een heel ander model gehad, een heel ander drukmiddel.

Denk je dat het ook je haalbaarheid vergroot?

In the end wel, want het wordt betaalbaar, dus dat gaat het zeker vergroten. En dat zal niet zozeer ontwerp minded zijn, maar meer op kosten zitten. Dat zou zeker helpen sturen.

Rework (proces → planning laten zien)

*4) Als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework*

(Development goals)

- *Kans op rework verminderen*

In dit geval vullen we het pas in op het einde, dus je maakt een ontwerp en dan denk je goh ik ga het even checken (de environmental parameters). Dan denk je o het klopt niet, dan baal je. Dan kun je of gaan bij plussen, maar je kunt niet meer fundamenteel de structuur veranderen. Maar misschien als we hier tijdens de initiatieffase al een heel ander model hadden gekozen, hadden we al die discussies niet op het einde gehad. Nu moeten we het op het einde uitvinden, en met de nieuwe situatie hadden we het misschien kunnen uitsluiten. Als je het had kunnen uitsluiten had je er op het einde minder gedoe mee gehad en dat zou je tijd schelen, tijd en geld. Dus dat is echt interessant.

*En als je het **nieuwe proces** met het **huidige proces** vergelijkt voor een gemiddeld binnenstedelijk vastgoedproject (appartementen), wat verwacht je dat het effect hiervan is op de kans op rework met het oog op de geluidbelasting op gevel info*

Ja dat kun je tackelen, we hebben bijvoorbeeld een project ergens waar we wat hebben zitten tekenen, dat stedenbouwkundig model zou je dan kunnen controleren en dan kun je er gelijk een streep door zetten dat dit model niet werkt, omdat er gewoon te veel omgevingsfactoren op rood staan, letterlijk. Dus daar zit echt een positief effect in, die beslissing kun je veel eerder nemen.

Als die geluidstudie naar voren komt, dan kun je sneller keuzes maken. Dat is echt wat waard. Nu maken we eigenlijk alleen maar een keuze op product/marktcombinatie versus bouwbaarheid en parkeerbalans, eigenlijk op die eerste componenten die jij opschrijft. Die environmental is een aanname.

Concluderend

5) Heb je nog vragen, opmerkingen, suggesties over/voor de matrix?

- Je zou nog een tabelletje toe kunnen voegen voor als je één waarde exact gelijk maakt, hoe je dan het gunstigst uitkomt. Dan kun je ze ook optellen.

C-12 Artifact verification interview #1 | Open & Axial coding

ID	Subject	Question	Design requirement	Response	Open coding	Axial coding
#1	Lack of knowledge	1	Area, Programme, Building, Parking	Yes you have more information in the new situation comparing with the current situation across the with. I think that is of added value. I really like the form factor (iteration 2) and the surfaces. You can quickly see how efficient a plan is, by which I mean the ratio between gfa/go (form factor), the facade surface, because facades are expensive. Yes, those parameters give a clear picture of how efficient a block construction is.	More information Added value Efficiency plan	More objective knowledge Added value
#1	Lack of knowledge	1	Environmental	Yes you have more information in the new situation comparing with the current situation across the with. I think that is of added value. Yes, I find that environmental difficult, you can see the more red the less favorable it is... you really have to have that translation into what exactly does that mean and what measures are needed and so on.	More information Added value Difficult, need translation consequences	More objective knowledge Added value
#1	Lack of knowledge	1	Quantity designs	Yes you have more information in the new situation comparing with the current situation across the with. I think that is of added value, but you would prefer it to make models yourself based on the input you provide. But, yes it provides more information so that is always better you would say. You have less uncertainty.	Valueable Less uncertainty	Added value
#1	Structure	2	Manageable	I definitely think you can make more structured choices. We are not yet used to relying on key figures, yes, some key figures are, now we mainly steer with the BEO, but the BEO does contain the form factor and the surface area, for example... but now that I see this overview like this I realize that we not so much aiming for this in the development of apartment complexes. But just to see how efficient building blocks are, with the ratio of facade surface in relation to house, for example, that provides a lot of management information. You would only want to go a few steps deeper, because at first look you say iteration 2 design 1 has quite a lot of facade surface, but then you see that there are 203 houses in it and in the other a lot less. Well, that might be a next step. Now it is a summary of values, but the form factor, for example, makes it really comparable, only that amount of facade surface does not say much. In fact, you must have facade surface per home in order to be able to steer well. But really when I see this we don't focus enough on what constitutes an efficient block design, especially because elements are expensive, you would like to know which design has the least facade surface per house. Just as interesting as the gross/net ratio. Parking is of course important, how many spaces do you have per home. So yes, with the new situation you can steer your designs even more analytically if you have more information. Ultimately, you can then opt for the most efficient design at an early stage.	More structured choices Not used to rely on key figures in decision making (significantly) See how efficient building blocks are Don't focus on efficiency enough now Use this to opt for most efficient design at early stage	Structured decision-making Building block efficiency Steer process

#1	Structure	2	Comparing, optimising	Yes, because you could say, for example: this design appeals to me very much from an urban planning point of view, but with this design there is very little facade in it, can't we apply that in the design that we like?	Positive Compare/combine aspects	Positive Compare Optimize
#1	Structure	2	Ranking	You can then, for example, make an in-depth study with a specialist of how we ensure that the green ratio (green noise load on the facade) is improved, then you can also add costs to it and you can calculate it, what does it do on your design?	Positive Use to steer design	Added value Steer optimization
#1	Cost estimate	3	Building costs	I think you can estimate your building costs more accurately, that seems obvious to me. The more you know, the better you can estimate costs.	Estimate more accurate	Positive
#1	Cost estimate	3	Advisery costs (noise advisor)	Yes, you can say later when you have more models if you have an advisor calculate that, if you have all that in-house, of course, you don't have to engage an advisor to do those calculations. So the more you can generate yourself from your system, the more attractive that is. You still need it, sure, you can at most do quick scans with it.	Less advisory costs	Positive
#1	Cost estimate	3	Lead-time (labour costs)	Your development process could become more compact, so you have less pressure on your general costs, our wage costs are recovered from that. Because you simply get from A to B faster.	Process more compact Less labour costs	Shorter lead-time Labour costs
#1	Rework	4	General	If all goes well, the chance of rework should be smaller in the new situation, I think, because the earlier in your process you make a choice for something, for an access or a block design, with more information, it means that you will not find out later and still your design has to bend. So the sooner you know something in a process, the better it is and the less margin of error you have.	Change of rework smaller	Leww rework
#1	Rework	4	Environmental (noise)	Yes, here too I would expect it to be less, if you have this information about noise exposure on the facade sooner, so during iteration 1, you may be able to blow off a model earlier, so that you do not include it in your architect selection, for example. That does mean that you have less rework, especially if that design later... so in the current process, hadn't turned out to be good enough.	Less rework Blow off model earlier	Leww rework Cancel design
#1	General	5	Suggestions / remarks	**Facade serface per home** is a parameter that I would find interesting **Floor Space Index** (How much GFA you can fit per square meter site area)		

C-13 Artifact verification interview #2 | Open & Axial coding

ID	Subject	Question	Design requirement	Response	Open coding	Axial coding
#2	Lack of knowledge	1	Area, Programme, Building, Parking	Area doesn't change much I think, you can get the square meters from the land registry in the current process. Then it comes down to what is the buildable part? This is prescribed by the municipality, so you must have the zoning plan for that. You should always know this 100%. Program, number and type of homes can all change throughout the process, which is mainly part of your preconditions from the municipality. But in the end you will always discuss this when you have a design with the customer and the municipality, does that fit completely within the housing vision, what we want? I think the difference is mainly in the Building and Environmental category, I expect that I really have a better objective picture of that in the new process, if that were disappointing I really get a bit sad, I would be really disappointed. Parking, you really need to know that in the current process, because that is a very determining factor. I don't think that changes much, yes it would be nice if you could play with that a bit to see how it changes when you turn some knobs.	Building and Evironmental Better objective picter	More objective knowledge Added value
#2	Lack of knowledge	1	Environmental	The environmental parameters, in the current process you know on the basis of knowledge and experience. The moment you have a first draft, you can apply a sound model to it. You know there is a busy road there, that will be about fine. You now have existing sound cards, but then of course you cannot determine how many decibels that will give on the facade of the design, so that is very interesting about the new situation. This (new situation) is a bit of a simplified version of a sound study by a sound consultant, who would only include nest noise and possibly the airport. I think it is important that you do this assessment as quickly as possible in the process (sound), something has to come first, and then comes the analysis. So I think it is certainly of added value to have this knowledge (sound) so quickly in the process, in order to look for an optimum so to speak. Ideally, I would like to have this knowledge by iteration 1, so that I can make a more targeted application to the architects (iteration 2).	Currently knowledge and experience Simplified sound study advisor Use as quickly as possible Added value this knowledge	More objective knowledge Added value
#2	Lack of knowledge	1	Quantity designs	You mean the tool is going to generate designs? Yes, I think that can lead to new insights. It's always better to have multiple models anyway... but, then you have to filter for them first, so don't sit down and compare all those 80 models, that's a bit of a waste of your time.	New insights More always better Need to filter them	Added value Process organization
#2	Structure	2	Manageable	Yes, if you can then steer the process so that you can further develop your design on that basis, then that's great. Because that makes your model even better. Then you will see that that block is positioned differently. To be able to properly build a model, you also need to know: how are we going to build? And how are you going to access it?	Steer process to further develop design	Steer process

#2	Structure	2	Comparing, optimising	Well, that's what you do it for, so that's definitely a difference between the current and new situation. In this way you can also aim for the best ratio of GFA and go, if you are going to do that in the traditional process, that will not be it. An architect will never be able to do that. In a competition you might be able to give a higher offer. So you get an optimal model at the front, which is tested against the preconditions with the best possible GFA/GO ratio.	Positive difference Optimize form factor Make better offer during tender	Positive Optimize
#2	Structure	2	Ranking	That about that ranking I don't quite understand, how I understand that now suggests that other things you've entered regarding regulations or something can give a longer ranking. This contains quite a number of parameters that are quite black and white, for example wind: it satisfies or it does not. They are requirements. The design simply has to comply with daylight. Yes okay, so you mean that you optimize it above the norm. Yes, then you have to do them all on the south. Can you optimize for that? Yes, then I do find it interesting, if I can say I want to optimize the incidence of light, I want to have as many south-oriented homes as possible. And then you can also say with sound, I think that's important for this project and it suffices, how can you make your model even stronger. If all that is possible then I say do it right.	Valuable to steer for optimization	Added value Steer optimization
#2	Cost estimate	3	Building costs	Yes, I do expect that you can estimate the costs more accurately, provided you can add some things. I will mention two of them: construction method and access. There is always a lot of rework involved, so that makes your estimate unreliable. You will incur less costs, fewer mistakes, so less costs. Of course you still have to do a lot of research for your permits, but yes it is correct you will spend less. Yes, you can normally take all kinds of measures to be able to deal with the high noise load, indoors I am mainly talking about he. You should also always have a lee side where you can place a bedroom. Outdoor areas, otherwise you will get those glazed containers or very high glass panels, suspense cabinets, or that nothing can open. You can make a whole package of measures to meet the requirements, but they cost money. Some measures cannot be applied in certain situations because the indoor noise requirement of 35 dB is then not met. I think you can certainly estimate those costs better with this program and the matrix. Perhaps a part of the deaf facade should come here, that is actually just a second facade that has to come, then it is indeed interesting to see how many square meters of deaf facade you have to realize.	Positive Rework makes estimate unreliable Estimate costs expensive facade better	Positive Rework unreliable Cost-effiecient
#2	Cost estimate	3	Advisery costs (noise advisor)	Yes I think so. However, you always need the sound consultant to prepare a report for your permits, he always does.	Positive Still need advisor's report for permits	Positive Still needed

#2	Cost estimate	3	Lead-time (labour costs)	In addition, I think you will also think better about your design with this knowledge. It allows you to have a different kind of conversation and send more to cut those costs. So I'm talking about steering towards less noise-affected facades, for example, in order to have to apply as few noise measures as possible. I think your lead time will be shorter, you will have insight into the errors sooner, so you don't have to puzzle as often that things are not right. The buildings can be in the wrong position, which saves you rework and therefore shortens your total turnaround time. However, you have to fill in the information correctly.	Shorter lead time Less rework therore shorter lead time Need to fill in information correctly	Shorter lead-time Less rework Reliability data
#2	Rework	4	General	Well by doing this, if you go back to the traditional process we give an architect a commission... I'm going to make it very flat yes; that architect was created to put a signature, to make a beautiful facade. He thinks from the outside in and from the top down. While when we start building, we think exactly the other way around, from the bottom up and from the inside out. Yes and you can avoid that clash very well with this. At the front you can simply tell the architect very clearly; we've thought about it, these are the products we want. He no longer has to think about the number of homes or what those floor plans will look like, but there are simply buildable volumes here. And everything you change on the facade, we have to fix on the inside, that costs money. If you turn on something, it will go wrong somewhere else inside. This is how you get tinkering after tinkering, well that's all margin of error (rework) and that every time with a new work. That wouldn't be necessary in this situation. In general it is difficult to estimate how much it would matter to rework, every project is different and you always run into different problems. But in general I think that the more knowledge you have at the start of your process, the better you can assess those risks and steer your project accordingly.	Avoid architect-developer/constructor clash Steer process Less rework Hard to estimate rework difference More knowledge--> better steering risks	Less rework Steering
#2	Rework	4	Environmental (noise)	Yes, what could happen in the current situation is that the result of that study (indicates period sound study process case project on timeline) is so bad that you have to go back (start again with your SO phase) and that you have to do additional research . I expect you could get that out, but it's not that additional studies come in very often, or that studies have to be done twice. But because it can sometimes happen, I generally expect that the chance of rework will decrease. In this case, it could therefore be 2 to 3 months difference if it turns out during that noise study that the positioning of the buildings is simply not right. Ideally, the sound study in your initiation phase would like to know that you have already done it for your architect selection (iteration 2). Then it is simply a precondition that is included in the design requirements.	Noise study report currently could lead to rework Prevent in new situation	Less rework

#2	General	5	Suggestions / remarks	**Construction method:** If it gets very high, then at some point you consider going to prefab, or in complex situations where it is very difficult to reach, you have that a lot in inner-city areas. Or tunneling, wide plate, that is important to know how your design is constructed. What we do, we just take a project manager with us and dude how are we going to build this? Is it buildable or is it not buildable? On another project I was working on, we wanted to prefab because we wanted to be ready within a certain time, but that is more expensive, now we find out that the project is not completely financially feasible, so we turned it down and we're going to tunnel a lot more. But now that I think about it even more, you're not going to let that model choose that, of course, that's where you need the human expertise. But you would like to give it somehow of; ok we're going to tunnel, so that the model doesn't make weird blocks that can't be tunneled so to speak. **Buildign access:** Access and how many climbing points, those are the expensive elements. Is it a gallery access, is it a porch access? That is very important for your build up, do you do the whole block on one exit and how many lifts do you get? All that sort of thing. Most people don't want a corido exit, you still see it in student complexes, that's just a long corridor with all the houses attached, just like a hotel. This is of course not for nothing, because that is the cheapest to develop. **Façade ratio open/closed (windows)**: This is important if you are going to manage your architect for the incidence of light inside. The Design Studio is not looking at it yet (Iteration 1). Before the architect starts drawing, you must indicate the open/close ratio you will be working with.		

C-14 Artifact verification interview #3 | Open & Axial coding

ID	Subject	Question	Design requirement	Response	Open coding	Axial coding
#3	Lack of knowledge	1	Area, Programme, Building, Parking	You already have an objective picture of the area, you can just figure that out. That's not really different. You have control over the programming and you know what the frameworks are. Building, the relationship between program and area, then you automatically come to the parts of the image. We don't have that square meter of facade in our picture now, we don't take that into account now, it could be interesting. The question in the current process is to what extent the information we now have, i.e. those BVOs GOs mainly, to what extent it is correct. Parking, you already know that in the current situation, you should know that because that is very decisive. Whether this will actually be realized in the end remains to be seen. But yes, if it compares like this, you do have a more complete picture, especially with iteration 2.	Building More complete picture	More objective knowledge Added value
#3	Lack of knowledge	1	Environmental	And environmental, yes, we really don't really have that in mind now, you can often pick up some things from the zoning plan, if there is a zoning plan. Then you can, for example, view a sound card, only that sound card does not, of course, provide insight into the effect of that sound on the facade, which, as I see it now, does happen in the new situation. Yes... wind... daylight, then we actually only do it when the mass study has already been largely completed, so that is really a considerable difference, but well, assuming that system works well, that is just an assumption. I don't expect this to be 100% accurate, but that you still need a report from an advisor, also to be able to print it at an environmental service or fire department. I also expect that there may be some discrepancies with what would come out of this, it just remains a subject in its own right, but of course you shorten your entire concept phase where you have to do different studies, let it calculate again and you go back etc.	Don't really have that know How accurate? Still need advisor Shorten concept phase (rework)	More objective knowledge Reliability data
#3	Lack of knowledge	1	Quantity designs	If I remember correctly, I think we already talked about that during the previous interview, I find that difficult to estimate. On the one hand I think it is very interesting to choose from many more concept designs, on the other hand I think you have to think very carefully how you are going to make that selection. I think you should first make a choice between models that you just find attractive or interesting, then it remains manageable. You can then make a comparison with a handful of designs based on these parameters, for example. I think it can certainly be of added value that way.	Difficult to estimate Valuable to have more Think carefully about selection process Added value	Added value Process organization

#3	Structure	2	Manageable	Besides that this is interesting during the initiative phase, I also expect that we can use this well during the SO. Because a lot is happening in this phase (SO points out) a lot, here (initiative) of course just starts; do we think we can even make a plan? And here (SO) you largely have the phase where you sit down with the municipality to discuss what the plan is and what is needed for it. There are various wishes of the municipality that often come to the fore in urban planning, which you have in particular in this phase. You can imagine that the municipality says well add a layer because urban planning is better, or just do a set back there, etc. Especially if that happened in the SO, that is very annoying because you have to adjust your structure plan all the time , so you prefer to make those adjustments in the initiative phase, but it also happens here (SO). If I think about it like this, I would really see an enormous added value if I could also do this myself during such a conversation with the municipality, for example, because then you can demonstrate to the municipality of; yes municipality you want this, but that means this, in terms of parking, noise, sun exposure etc. And now it is very annoying that you go to the municipality with a design, you think you are out and it all fits in the preconditions set, and then they say do this what you have kept there, but differently. Then you can adjust the whole thing again and jump all your calculation values. It would certainly help if you could then discuss those changes live, and show what the difference is. That, for example, the insolation of 10 homes is no longer sufficient.	Structure conversation municipality during SO Make clear things are not possible	Steer process Conversation
#3	Structure	2	Comparing, optimising	Um, well I guess it's mostly interesting. You can immediately see the relationship between the different elements and this overview. And even though you know that that relationship is there in the current process, it is very difficult to make measurable. This of course gives an insight, I'm going to tinker with this button, then you'll immediately see what happens here.	Interesting See relationships between parameters better Twist parameters	Positive Compare Optimize
#3	Structure	2	Ranking	I think that certainly adds value. Basically it is good that you discuss the hierarchy between the different things. What we find important is different from what a municipality finds important, only in the end there is a certain hierarchy. Regardless of what it is, it is indeed useful to steer by that hierarchy, we actually already do that, only our hierarchy is different from that of the municipality. In this way you make it more transparent.	Adds value Discuss hierarchy Steer More transparant	Added value Steer optimization
#3	Cost estimate	3	Building costs	What I also find interesting about this (Iteration 2, design 2) is that it has by far the most green in the noise load on the facade, but to make that possible you need the whole wall, so you also have the most red facade. And if you're in the red, you often have a really serious problem, with deaf facades and expensive facilities that you have to take. Everything that is in the yellow or green part costs nothing, yes that says something about the quality of the plan, but we do not aim for that, much more on those costs. With this knowledge you could position the building differently so that you have to make fewer facilities.	Facade expensive Use knowledge to position buildign differently, aim for less facade facilities	Positive Cost-efficient

#3	Cost estimate	3	Advisery costs (noise advisor)	Yes, but of course you can always do that, in this situation you do it a little earlier and otherwise it is a few months later based on the report of an advisor that you have. So it's not necessarily more accurate. Well you do have that accuracy sooner because you pull it forward. I think it's also more on the additional cost side, you don't have to have the architect make a new sketch as often and in that sense I think you can. You have a better view of what comes out, it will still have to be adjusted a bit, but in the main the design should be good, provided the score is good.	Its earlier accurate More on architect cost side, less rework Design is better earlier	Positive Not priority
#3	Cost estimate	3	Lead-time (labour costs)	I think it's all much easier with such an iteration (new situation). In the current process, an architect starts drawing and then you look at it and then you think no, that can be done smarter, we adjust that and you spend a few weeks working together. You might miss something if you watch it with three or four people, which you could see much faster because you can do a lot more iterations. By the way, I also think that you have a much faster process as a result. It is of course different for every project, but you can quantify my time in costs, but in the end it all comes from one big pot. Anyway, if I spend less time on this project, I can spend that time on another project. I think you can also push the initiation phase a lot more, so you can shorten the lead time. You now use 3 architects, they all work in parallel, but that would be much less necessary if you have already looked at more options here at the front that the program has generated for you, or that you have adapted or optimized yourself.	Improve design faster could quantify that lead-time in labour costs Less need for 3 architects if you looked at possibilties yourself better earlier.	Shorter lead-time Labour costs
#3	Rework	4	General	The starting point for your structural design is much better, because what often happens with your initiative, then you look at volume, revenues, costs and the most basic... well, what can we find on google about the environmental aspects, then at your structure design, we are going to sign that up as homes and we will visit advisors from have a look at it. So here (final initiative) in the new situation the design is qualitatively much better compared to the current process, I'm going to assume that, so you can do this (SO) much faster. For now it may be; you will receive quick scans from your advisor and then you may have to adjust your design completely again because so many building layers is not possible at all, so to speak, while you can already overcome that in the new situation during your initiation phase, I think. You take it here (Initiative) and here (SO) you reap the benefits I think.	Better starting point Quality design is higher at end initiative Assume SO is faster then Less rework	Higher quality Less rework

#3	Rework	4	Environmental (noise)	It is of course not that difficult when you get your advisor to work. If you put your advisor to work here (start SO) or here (end SO), that makes a huge difference in the rework you have to do if the advice turns out to be negative. If those investigations are good, it is confirmation and this (new situation) does not give you anything extra... in terms of rework then hey, but if it is bad, then you have to go back to the drawing board and just go a few more steps back in time. Then you can just win a few months, if you compare it with a situation in which you would just do it right right away. Uhm... but it's impossible to quantify how often that happens.	Only if advice is bad, more rework (current situation) New situation prevent rework Hard to quanitfy rework currently	Less rework
#3	General	5	Suggestions / remarks	It would of course be ideal if you also... but then you also make a link to the BEO, you can put **meter prices, both construction costs and revenues in it**. That you immediately see where you roughly end up with the whole, you can of course also link the conclusion to it yourself. Ultimately it is a very easy sum, but it is clear if you have the same overview. Maybe the **volume**: This can sometimes be useful for maximum building percentages expressed in volume. It is not common, because often you just have it based on the building area in the zoning plan, then you know that the footprint may be a maximum of 80%, for example. On another project they now want to write down a maximum volume so that you have freedom in set backs and that sort of thing. So that would also be a nice parameter. And **disclosure principles** are also important, which is also very decisive for your design.		

C-15 Artifact verification interview #4 | Open & Axial coding

ID	Subject	Question	Design requirement	Response	Open coding	Axial coding
#5	Lack of knowledge	1	Area, Programme, Building, Parking	Yes, this is a clear difference. With this data you could also start asking questions, you see that this form factor is too high. Normally that is 0.69 so then you would start asking questions. It gives an insight into how realistic the model is if you look at it that way. I also find this complicated, with iteration 2 design 1 there is relatively a lot of facade, well that's also true because they are separate blocks. So maybe if we had seen that number, we would have weighed in the choice, I think. And I think it's crazy that this model has the largest gross floor area with the fewest homes. As extra knowledge it would really help a lot, also just to make it comparable purely on data. So you should have your presentations like we did during iteration 2 actually, but then instead of making a judgment right away, we've now done that based on a value system huh; is it phased? Is it good to cut into granules? Can we get rid of our program properly? Is the identity easy to read and does it therefore have a certain sales value? You can then make an even better comparison in the new situation, especially that facade surface. It is going to organize a kind of minimal value shift, because perhaps this model (iteration 2 design 2) is less phaseable, but perhaps easier to build and cheaper, so that you come closer to that product target group. We wouldn't have picked it up like that, I think it's really interesting. You just have to sit down and find those correlations.	Clear difference Analyse more critical Helpful Compareble based on data Building (facade)	More objective knowledge Added value
#5	Lack of knowledge	1	Environmental	, we just didn't have this piece in view (environmental). And environmental we actually have to construct a framework because we don't actually make that judgment. We then have to decide for ourselves what is important to us. I actually think this is really nice, what we're doing right now, that you're going to have the conversation in this way while you're looking at this information. How important are these different environmental factors and how much do they weigh?	Didn't have this Enables conversation, what is important?	More objective knowledge Added value
#5	Lack of knowledge	1	Quantity designs	Yes, of course I welcome that possibility, just not in this process. Then we would have to organize it in a different way. Now we actually asked three brains to think (iteration 2). Then you should actually take it more in that phase (iteration 1). That you actually say 1 phase in the iteration, we will make 10 different variants. What I find difficult is the piece of identity, how you take it with you. Yes and if you can find more solutions you can see which one suits the condition better, I would think it would be worth something if we would do this ourselves.	Welcome possibility Organize process differently How consider identity More solutions	Added value Process organization

#5	Structure	2	Manageable	Yes, you know more, so that should make it more structured, but on the other hand, knowing more might also make the decision-making process more difficult. Because suppose someone is completely in love with one design, but can't figure it out rationally. Decisions are about two things; on the one hand what is true, what is not true? And on the other hand, how are you going to make a decision in a group process? So the question is whether you can add this data in a group process to make a more informed decision, and whether it matters if someone has already fallen in love with another model? But hey, this makes your comparison value more rational, that score too, so I think it definitely helps. Because you don't just have to compare on emotion or image, but you also compare on quality of life factors. You can also say in the new situation; well this quality of life is simply considerably better than that quality, what is the value of the fact that you find it more beautiful or uglier? If you can say substantial, I get less noise on the facade, cooler interior spaces, more greenery, that sort of thing. Then I think that conversation is off the table and you can hardly get it out emotionally, based on your own intelligence.	More structured Decision-making maybe more difficult (due to knowledge) Add data in group process Makes decision process more rational	Structured decision-making Steer process Conversation
#5	Structure	2	Comparing, optimising	I think what you can do better in the new situation is to link those knowledge components even better with each other, so to speak, so that you arrive at an even more optimal solution. I think that optimization will only come after this, when you have chosen a design, we can be wider, thicker, higher, maybe it can be thicker on the low-noise side, and thinner on the noise load side, so that we move within the block, that conversation would be a iteration after that. To fine-tune your program and do another iteration within the model. It also gives you the option to find extra space in your model.	Link knowledge components better Optimizing afterwards (next iteration) Find extra space in model	Positive Compare Optimize
#5	Structure	2	Ranking	I think that conversation about that ranking is valuable, to discuss with each other at the beginning what we find important.	Valuable Discuss at beginning what is important	Added value
#5	Cost estimate	3	Building costs	It would help in the choice you make at the front, in the new situation you could choose a model that is more cost-efficient, which means that you will steer at the very beginning of the process. Suppose a model comes out, which you really think is terrible, but suppose it had come out the most favorable from an construction-technical point of view, then you might have considered during the conversation, we have to steer a bit in that direction because then we lost all those costs, in all those other models. If you had known that up front, the whole conversation would have gone differently, you would have had a completely different model, a completely different means of pressure.	Allow you to choose most cost efficient model Steer at beginning process Possibility to merge best parts of designs	Positive Cost-efficient

#5	Cost estimate	3	Advisery costs (noise advisor)	What you ultimately want to get out of it is not so much saving those consultancy costs, but that you do something fundamental in the design that does not lose those costs. So suppose you have to make a 100% deaf facade, which you can actually say; I want to go to 50% deaf facade, what kind of model should I develop, because a deaf facade is very expensive. This will fill in a kind of gap in the design and fundamentally save costs. That's really interesting, and that's something a sound consultant doesn't deliver. So it's not so much saving, it's replenishing something that is not being delivered now. But it's not so much about deducting 2000 euros from your consultancy costs, in my opinion that's peanuts. I think the structural change that you will achieve is in the design of the facade and the positioning, because then you don't have to make all those expensive facades.	Saving advisory costs not the aim Aim to fundamentally change design and save costs Find gap in design and save costs. Dont make expensive facade	Not priority
#5	Cost estimate	3	Lead-time (labour costs)	Five teams have now looked at the different solutions. You would actually expect if you put it in such a system that you would have to find 5 different solutions with one team, so that would already be a kind of shortening of the process. I also hope that the system will come up with surprising models.	Shortening process Hope for surprising models	Shorter lead-time
#5	Rework	4	General	In this case we only fill it in at the end, so you make a design and then you think gosh I'm going to check it (the environmental parameters). Then you think oh it's not right, then you're disappointed. Then you can either go with pluses, but you can no longer fundamentally change the structure. But maybe if we had already chosen a completely different model here during the initiation phase, we would not have had all those discussions in the end. Now we have to figure it out in the end, and with the new situation we might have ruled it out. If you could have ruled it out you would have had less hassle with it in the end and that would save you time, time and money. So that's really interesting.	Less discussions at the end, prevent problems Save time and money (rework)	Less rework Steering
#5	Rework	4	Environmental (noise)	Yes, you can tackle that, for example we have a project somewhere where we have been drawing something, you could then check that urban model and then you can immediately draw the line that this model does not work, because there are simply too many environmental factors on it. red, literally. So there really is a positive effect in that, you can make that decision much earlier. If that noise study would be conducted earlier on in the process, you can make choices more quickly. That's really worth something. Now we really only make a choice on product/market combination versus buildability and parking balance, actually on those first components that you write down. That environmental is an assumption.	Scrap bad designs earlier Prevent rework	Less rework Cancel design
#5	General	5	Suggestions / remarks	You could add another table if you make one value exactly equal, whichever suits you best. Then you can also add them up.		

C-16 Artifact verification interview: Axial coding overview

Question	Design requirement	Axial coding	Count
1	Area, Programme, Building, Parking	More objective knowledge Added value	4 4
1	Environmental	More objective knowledge Added value Reliability data	4 3 1
1	Quantity designs	Added value Process organization	4 3
2	Manageable	Structured decision-making Steer process Conversation Building block efficiency	2 4 2 1
2	Comparing, optimising	Positive Compare Optimize	4 3 4
2	Ranking	Added value Steer optimizarion	4 3
3	Building costs	Positive Rework unrealiable Cost-efficient	4 1 3
3	Advisery costs (noise advisor)	Positive Still needed Not priority	3 1 2
3	Lead-time (labour costs)	Shorte lead-time Labour costs Less rework Reliability data	4 2 1 1
4	General	Less rework Steering Higher quality	4 2 1
4	Environmental (noise)	Less rework Cancel design	4 2

C-17 Artifact verification: Suggestions from the verification interviews

Interviewee #1
Facade surface per home is a parameter that I would find interesting
Floor Space Index (How much GFA you can fit per square meter site area)

Interviewee #2
Construction method: If it gets very high, then at some point you consider going to prefab, or in complex situations where it is very difficult to reach, you have that a lot in inner-city areas. Or tunnelling, wide plate, that is important to know how your design is constructed. What we do, we just take a project manager with us, and dude how are we going to build this? Is it buildable or is it not buildable? On another project I was working on, we wanted to prefab because we wanted to be ready within a certain time, but that is more expensive, now we find out that the project is not completely financially feasible, so we turned it down and we're going to tunnel a lot more.
But now that I think about it even more, you're not going to let that model choose that, of course, that's where you need the human expertise. But you would like to give it somehow of; ok we're going to tunnel, so that the model doesn't make weird blocks that can't be tunnelled so to speak.

Building access: Access and how many climbing points, those are the expensive elements. Is it a gallery access, is it a porch access? That is very important for your build up, do you do the whole block on one exit and how many lifts do you get? All that sort of thing. Most people don't want a corridor exit, you still see it in student complexes, that's just a long corridor with all the houses attached, just like a hotel. This is of course not for nothing, because that is the cheapest to develop.

Façade ratio open/closed (windows): This is important if you are going to manage your architect for the incidence of light inside. The Design Studio is not looking at it yet (Iteration 1). Before the architect starts drawing, you must indicate the open/close ratio you will be working with.

Interviewee #3
It would of course be ideal if you also… but then you also make a link to the BEO, you can put meter prices, both construction costs and revenues in it. That you immediately see where you roughly end up with the whole, you can of course also link the conclusion to it yourself. Ultimately it is a very easy sum, but it is clear if you have the same overview.

Maybe the volume: This can sometimes be useful for maximum building percentages expressed in volume. It is not common, because often you just have it based on the building area in the zoning plan, then you know that the footprint may be a maximum of 80%, for example. On another project they now want to write down a maximum volume so that you have freedom in setbacks and that sort of thing. So that would also be a nice parameter.

And disclosure principles are also important, which is also very decisive for your design.

Interviewee #5
You could add another table if you make one value exactly equal, whichever suits you best. Then you can also add them up.

C-18 Artifact verification: Hypothetical labour cost increase due to rework

Interviewees #2 and #3 discussed the consequences of a negative noise pollution report during question 4 of the semi-structured verification interview. During the interview they both stated that a negative result could have led to rework. In case the building would have had to move due to noise pollution on the façade, this would have meant that the SO-phase could have started over again (approximately 8 weeks, see Appendix E-3.7). This scenario has been analysed by the researcher and resulted in the following analysis.

The calculations in the figure below are based on the following assumptions:

- Hourly rate real estate developers and concept designers: €85,00
- Number of hours per week worked on the project on average: 13,33 hours
- The dates on which the developers have worked on the project are determined (assumed) based on classified documentation.

	Month	Week	Developer 1	Developer 2	Developer 3	Design iteration 1	Design iteration 2
2019		28		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		29		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		30		€ 1.133,33	€ 1.133,33	€ 3.400,00	
	Jul	31		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		32		€ 1.133,33	€ 1.133,33		
		33		€ 1.133,33	€ 1.133,33		
		34		€ 1.133,33	€ 1.133,33		
	Aug	35		€ 1.133,33	€ 1.133,33		
		36		€ 1.133,33	€ 1.133,33		
		37		€ 1.133,33	€ 1.133,33		€ 1.200,00
		38		€ 1.133,33	€ 1.133,33		€ 1.200,00
	Sep	39		€ 1.133,33	€ 1.133,33		€ 1.200,00
		40		€ 1.133,33	€ 1.133,33		€ 1.200,00
		41		€ 1.133,33	€ 1.133,33		€ 1.200,00
		42		€ 1.133,33	€ 1.133,33		€ 1.200,00
		43		€ 1.133,33	€ 1.133,33		€ 1.200,00
	Okt	44		€ 1.133,33	€ 1.133,33		€ 1.200,00
		45		€ 1.133,33	€ 1.133,33		€ 1.200,00
		46		€ 1.133,33	€ 1.133,33		€ 1.200,00
		47		€ 1.133,33	€ 1.133,33		
	Nov	48		€ 1.133,33	€ 1.133,33		
		49		€ 1.133,33	€ 1.133,33		
		50		€ 1.133,33	€ 1.133,33		
		51		€ 1.133,33	€ 1.133,33		
	Dec	52					
2020		1					
		2		€ 1.133,33	€ 1.133,33		
		3		€ 1.133,33	€ 1.133,33		
		4		€ 1.133,33	€ 1.133,33		
	Jan	5		€ 1.133,33	€ 1.133,33		
		6		€ 1.133,33	€ 1.133,33		
		7		€ 1.133,33	€ 1.133,33		
		8		€ 1.133,33	€ 1.133,33		
	Feb	9			€ 1.133,33		
		10			€ 1.133,33		
		11					
		12					
	Mrt	13					
		14					
		15					
		16					
		17					
	Apr	18					

Total loan costs developers € 72.533,33

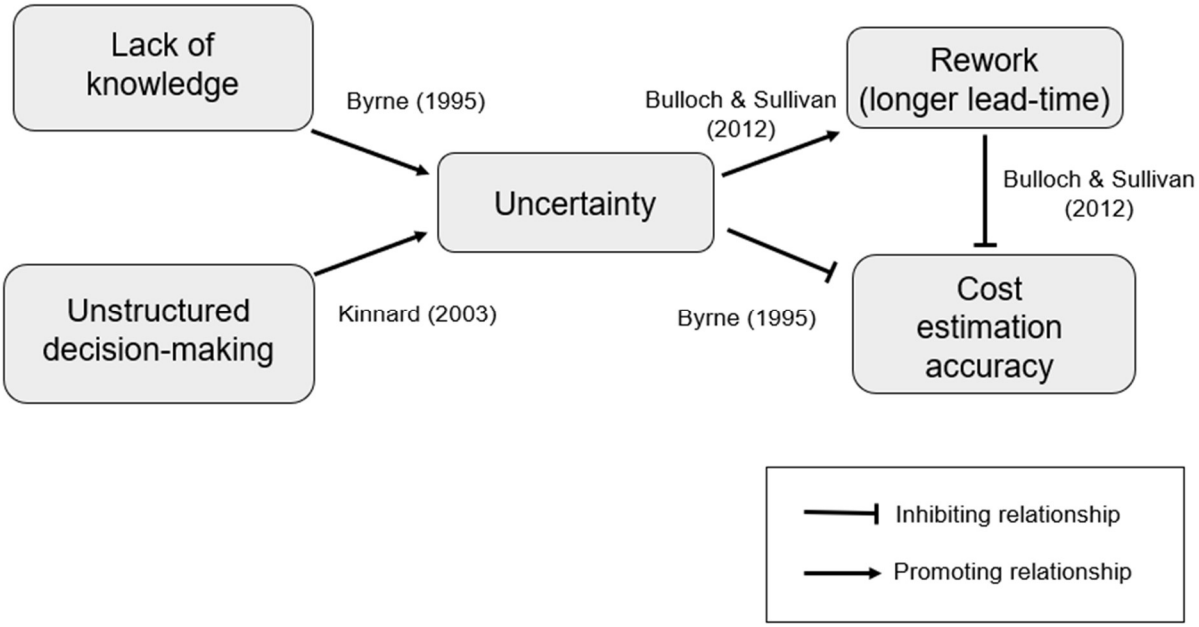
	Month	Week	Developer 1	Developer 2	Developer 3	Design iteration 1	Design iteration 2
2019		28		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		29		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		30		€ 1.133,33	€ 1.133,33	€ 3.400,00	
	Jul	31		€ 1.133,33	€ 1.133,33	€ 3.400,00	
		32		€ 1.133,33	€ 1.133,33		
		33		€ 1.133,33	€ 1.133,33		
		34		€ 1.133,33	€ 1.133,33		
	Aug	35		€ 1.133,33	€ 1.133,33		
		36		€ 1.133,33	€ 1.133,33		
		37		€ 1.133,33	€ 1.133,33		€ 1.200,00
		38		€ 1.133,33	€ 1.133,33		€ 1.200,00
	Sep	39		€ 1.133,33	€ 1.133,33		€ 1.200,00
		40		€ 1.133,33	€ 1.133,33		€ 1.200,00
		41		€ 1.133,33	€ 1.133,33		€ 1.200,00
		42		€ 1.133,33	€ 1.133,33		€ 1.200,00
		43		€ 1.133,33	€ 1.133,33		€ 1.200,00
	Okt	44		€ 1.133,33	€ 1.133,33		€ 1.200,00
		45		€ 1.133,33	€ 1.133,33		€ 1.200,00
		46		€ 1.133,33	€ 1.133,33		€ 1.200,00
		47		€ 1.133,33	€ 1.133,33		
	Nov	48		€ 1.133,33	€ 1.133,33		
		49		€ 1.133,33	€ 1.133,33		
		50		€ 1.133,33	€ 1.133,33		
		51		€ 1.133,33	€ 1.133,33		
	Dec	52					
2020		1					
		2		€ 1.133,33	€ 1.133,33		
		3		€ 1.133,33	€ 1.133,33		
		4		€ 1.133,33	€ 1.133,33		
	Jan	5		€ 1.133,33	€ 1.133,33		
		6		€ 1.133,33	€ 1.133,33		
		7		€ 1.133,33	€ 1.133,33		
		8		€ 1.133,33	€ 1.133,33		
	Feb	9		€ 1.133,33	€ 1.133,33		
		10		€ 1.133,33	€ 1.133,33		
		11		€ 1.133,33	€ 1.133,33		
		12		€ 1.133,33	€ 1.133,33		
	Mrt	13		€ 1.133,33	€ 1.133,33		
		14		€ 1.133,33	€ 1.133,33		
		15		€ 1.133,33	€ 1.133,33		
		16		€ 1.133,33	€ 1.133,33		
		17			€ 1.133,33		
	Apr	18			€ 1.133,33		

Total loan costs developers € 90.666,67

cost increase 25,00%

Appendix D – Development validation | Expert panel artifact review session transcription

1) Do you recognize the problem(s) described in the problem description (causal network)?



Researcher: ***Herkennen jullie het probleem (de uitdaging)?***
Expert #1: Ja, er is altijd onzekerheid en sommige dingen weet je niet meteen. Dan moet je eerst iets verzinnen en ga dan maar aan de slag. Dan komt er een ontwerp uit en dat wordt dan getoetst en dan denk je ja, dat moet dan net even iets anders.
Soms weet je al vrij snel van hier gaat wel iets van een probleem uit komen, maar ja daar moet dan toch even een expert naar kijken. Ik bedoel, ik kan zelf geen geluidsberekeningen maken. Ja nu dan misschien wel met deze toepassingen, maar anders heb je gewoon echt je adviseur nodig en dat doe je dan inderdaad zoals je aan gaf net nadat je een keuze hebt gemaakt.

Expert #2: Zeker, ja natuurlijk

Expert #3: Je weet ook meestal niet wat de optimalisatie is. Bij het case project als ik dat zo zie, je hebt gewoon 3 ontwerpen je maakt je keuze en je gaat gewoon door. Maar misschien had nu met deze informatie een ander design wel veel beter geweest en had je misschien wel meer kunnen verdienen en betere producten, maar goed dat weet je nooit.

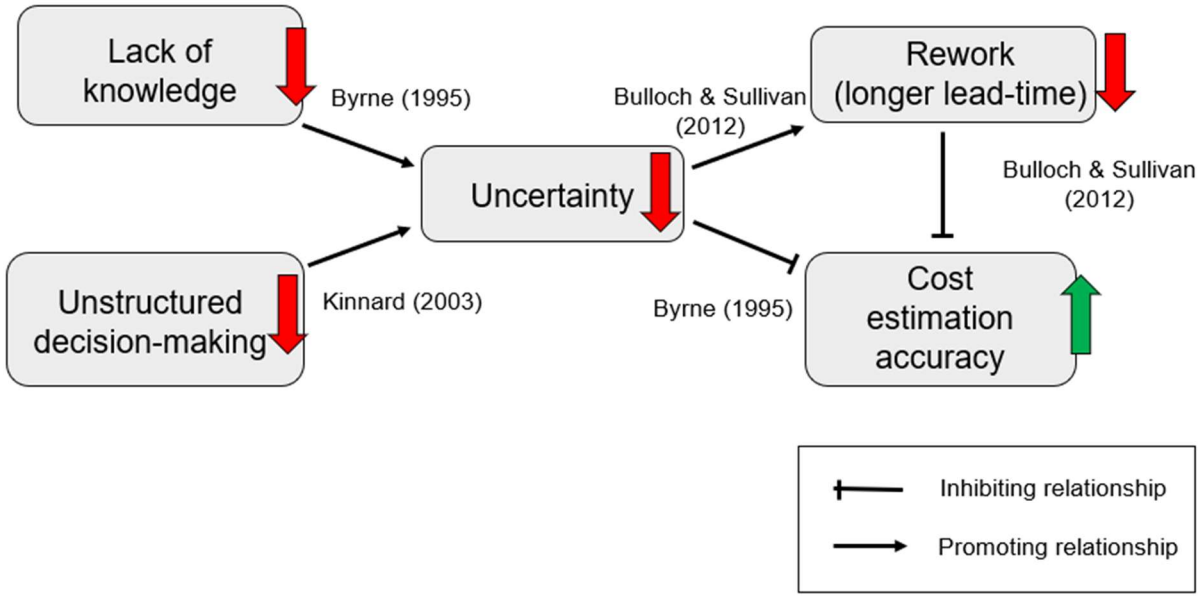
Expert #2: Dat is het hele vraagstuk voor dat Spacemaker, dat is wat je probeert op te lossen; veel minder op basis van gevoel en veel meer op basis van objectieve kennis beslissingen maken.
Researcher: Herkennen jullie ook dat die onzekerheid leidt tot rework?

Expert #1 #2 #3: Ja, zeker.

Expert #1: Dat is ook een beetje ons werk. Ik denk ook dat het een utopie is dat je meteen een soort bouwaanvraag kan maken, dat zou het meest extreme zijn dat je alles erin stopt en dat er meteen een bouwaanvraag uit rolt. Je wil dat rework zo min mogelijk hebben, maar je weet

ook dat het onderdeel is van het proces. Dit kan wel helpen denk ik om iets sneller te elimineren, want dat hebben we dan opgelost of dat zit wel ok.

2) Do you think that the development needs would contribute to the problem solving?

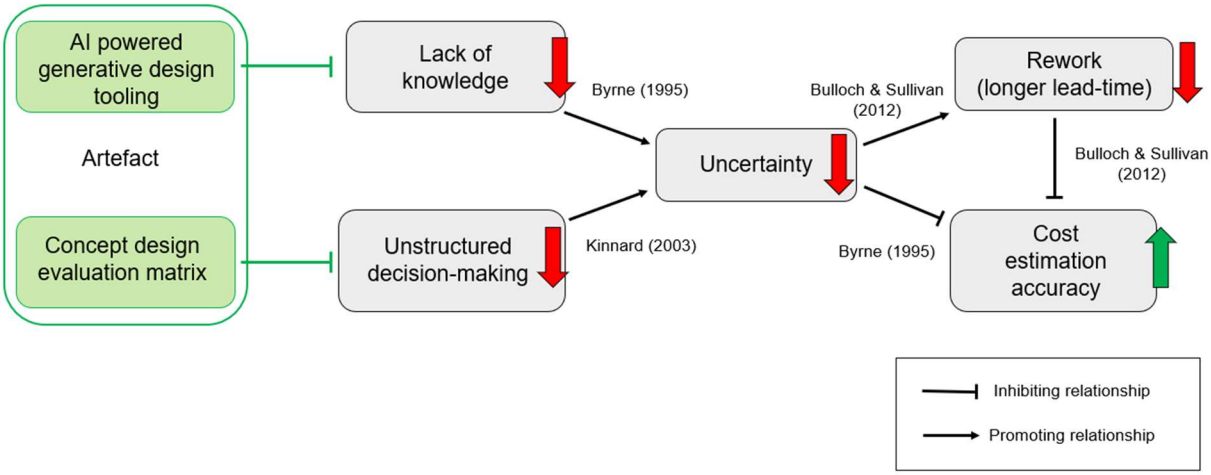


<u>Researcher</u>: Dragen de gestelde ontwikkeldoelen bij aan het verminderen van het probleem (de uitdaging)?

<u>Expert #2</u>: Ja hoe dit overzicht er nu uit ziet met die pijlen, en wat je net vertelde is het antwoord ja.

<u>Expert #3</u>: Ja lijkt me duidelijk, ik heb er niet zo veel aan toe te voegen.

3) Does the artifact satisfy the development needs?



<u>Researcher</u>: Voldoet het artifact, dus de matrix en de AI powered generative design tooling, aan de gestelde ontwikkeldoelen?
Dus dat je gestructureerder keuzes kunt maken en je gebrek aan kennis verminderd, waardoor de onzekerheid minder wordt, daardoor de kans op rework kleiner wordt en die factoren samen

(uncertainty en rework) er dan beide voor zorgen dat de kosteninschatting die je aan het begin maakt nauwkeuriger blijkt te zijn.

Expert #3: Ja.

Expert #1: Ik ben ook wel benieuwd, je hebt nu dit nagemaakt (wijst ontwerpen aan) en daar hebben ze een ontwerp uit gekozen, maar was dat ook de beste variant volgens de parameters? Want dat kan je wel achteraf bekijken nu, en vinden we daar dan iets van?

Expert #3: Mijn idee zegt dat het zou kunnen helpen, maar tegelijkertijd zeggen deze cijfers mij niet zo veel (environmental percentages)? Zou jij nou op basis van deze cijfers een keuze kunnen maken?

Expert #2: Wat bezonning? Ja zeker, je wil degene met de minste bezonning onder de 2 uur, met de meeste zon.

Expert #3: Ik vind het zo op het eerste oog toch lastig om een besluit te nemen

Expert #2: Ja je zou het willen kwantificeren

Expert #3: Deze heeft weer heel veel zon tussen 2 en 7 uur

Expert #1: Ja dan moet je toch even in die getallen duiken, je hebt die afbeeldingen er natuurlijk ook wel bij he dat scheelt.

Expert #3: Je krijgt heel veel extra informatie, maar kan je dan op basis van die informatie echt een keus maken?

Expert #2: Nou ja ik vind hier deze, geveloppervlak, heeft wel echt een impact. Want dat is natuurlijk een grote kostenpost.

Expert #1: Ja, maar vanuit een woning kun je ook zeggen het is een kwaliteit. Maar, als je bouwkosten prefereert wil je inderdaad zo min mogelijk gevel hebben.

Expert #3: Maar dan moet je ook naar het aantal woningen kijken

Expert #1: Ohja, dan zou je het willen weten per het aantal woningen bijvoorbeeld

Expert #3: Je kan ook keuzestress krijgen, van hoe ga je dit nou doen, want misschien is de ene wel beter in geluid, maar de andere beter in bezonning. Wat weegt nou zwaarder?

Expert 1: Ja, maar daar moet jij een keuze in maken

Expert #3: Ja, je weet het in ieder geval wel beter, want vroeger wist je dat niet, dan ging je maar door. Eigenlijk wat de conclusie hiervan is je hebt meer data, dus je kan beter de keuzes maken.

Expert #1: En misschien zeg je wel groen en oranje (waardes bij environmental parameters) vind ik altijd ok, maar hier zit het ontwerp in de rode zone, dat is bij het tweede model wel heel erg hoog. Die vind ik dan niet goed en die valt af. Ik noem maar wat even he, als je dat laat preveleren.

Expert #3: Maar even terug naar de stelling, als je meer informatie hebt kan dat tot een betere keuze leiden.

Expert #2: Nou als ik twijfel tussen twee ontwerpen dan kan het zeker helpen in het maken van mijn keuze omdat dit veel meer te maken heeft met je kostenkant en dan...

Expert #3: Dus je kan gestructureerder keuzes maken? Je onzekerheid neemt af?

Expert #2: Ja, dat denk ik wel.

Expert #1: Nou bijvoorbeeld form factor vind ik een hele interessante. Dat vind ik dan meer prefereren boven geluid, maar vervolgens moet je nog voor jezelf kijken wat vind ik nou belangrijker en wat vind ik nou minder belangrijk.

Expert #3: Ja

Expert #1: Maar nu in het huidige proces is het helemaal een beetje een soort van onbekende en met dit wat jij voorstelt krijg je het wel eerder in het vizier in je proces, en kan je je keuze objectiever maken.

Researcher: En wat denken jullie dat dat voor gevolgen heeft voor je rework en nauwkeurigheid van je kosten?

Expert #1: Nou hoe eerder je het weet, hoe sneller je tot erachter komt of het een probleem vormt of niet. Want stel dat je die onbekende pas in het VO achter komt (in het huidige proces), moet je weer helemaal terug naar de tekentafel en ben je dus echt heel veel tijd kwijt, en ook heel veel adviseurs zijn dan heel veel tijd kwijt. De architect, maar ook de geluidsadviseur, dat heeft ook weer misschien invloed op je daglicht dus daar moeten dan ook weer studies voor gedaan worden.

Expert #3: Of je krijgt een slechter product, een duurder product. Dus dat je het accepteert dat het niet optimaal is.

Researcher: En denk je dan dus, want je hebt het net over rework, dat je kosteninschattingen ook nauwkeuriger worden?

Expert #1: Ja je komt sneller tot de optimale prijs, of die dan nauwkeurig is hangt af van de kostendeskundige, maar ik denk wel dat hij sneller weet wat hij moet gaan rekenen en dat je minder snel gaat afwijken van het oorspronkelijke ontwerp. Kijk als je al deze keuzes goed in beeld hebt en je maakt op basis daarvan keuzes, dus dan zit je vorm factor zit goed, je geluid en daglicht heb je even naar gekeken, je zon. Daar hoef je dan eigenlijk niet meer over na te denken, dus dat zou je tijd winnen in het vervolgtraject en dus ook die loonkosten schelen zoals je als doel aangaf.

4) Do you have any remarks or suggestions?
-

Overige interessante opmerkingen/ discussie tijdens meeting:

- Expert #3: *moet je die adviseur nog steeds inschakelen dan als je dit gebruikt? Je hebt het hier toch al uitgerekend een beetje?*
  Expert #1: Voor je vergunningen wel. Voor je besluit om een bepaalde gebouwvorm te nemen is deze berekening misschien wel voldoende. Dat er dan nog een keer een geluidsadviseur conform de NEN iets moet doen voor je bouwaanvraag dat volgt dan wel.

- Expert #3: *Het lijkt mij wel heel interessant om nog met het programma en deze gegevens te checken of er nog een 4^{e} design zou zijn wat nog veel beter is.*

Expert #1: Ja dat is natuurlijk de vraag, en je moet wel iets invoeren om dit vervolgens uit te kunnen rekenen, maar je trekt dit (environmental parameters) wel gewoon naar voren ten opzichte van het traditionele proces.
Expert #2: Zeker, de echte onderzoeken bedoel je? Ja

- (Tijdens uitleg hypothetische extra kosten door rework i.v.m. negatief geluidsrapport):
  Expert #2: Wij hebben nu een project waarbij nu blijkt dat appartementen niet eenzijdig georiënteerd mogen zijn vanwege de geluidsbelasting van de haven. Data betekend dat we aan die zijde in plaats van iets van vier woningen, maar twee woningen mogen maken. Dat slaat nergens op, het ontwerp wat je daar mee gaat krijgen, we sturen alsnog wel op die vier of vijf woningen, alleen moet je dan wel de gemeente mee krijgen. Stel nou dat je dit had gebruikt dan had je op voorhand alleen maar ontwerpen gemaakt op basis van de uitganspunten die wel mogen. Dat zou denk ik gewoon heel veel werk schelen, maar dan zouden we er misschien nooit aan beginnen.
  Maar dit klopt wel denk ik.

- (Tijdens uitleg hypothetische extra kosten door rework i.v.m. negatief geluidsrapport):
  Expert #2: Nadat je dan zou constateren dat het ontwerp niet goed is zou je dan toch de architect opnieuw een ontwerp moeten maken? Dan zou je daar ook je architect kosten en geluidsadviseur kosten bij mee kunnen rekenen. Daar maak je natuurlijk ook wel afspraken over, maar even ervan uitgaande dat jij als ontwikkelaar de architect verkeerd op pad hebt gestuurd omdat je iets niet scherp had, dan gaat de architect ook zeggen van ‘’ik ben zoveel meer uur kwijt dus dat gaat geld kosten’’.