Flexibility in urbanism
Research on flexibility and transformation design for the Binckhorst

TU Delft - MSc Urbanism - Graduation report
Maarten Bouten
Executive summary

A shift is taking place in planning culture from a rational planning approach, which is mainly about production, to a dynamic city approach which is more about the transformation and development of existing urban areas. Flexibility is a relevant subject in this. This graduation project has been aimed at developing an insight in flexibility in urbanism and using this in developing a transformation design for the Binckhorst in The Hague. This has been done with literature research, case studies and research by design.

The definition of flexibility is the ability to adapt to changing and differentiated circumstances. Flexibility means finding a balance between freedom and fixation in many aspects in the design and development process. It means providing long term guidelines for quality and security and stimulating dynamics. The two reasons to use flexibility are as a reaction on uncertainty and on differentiation.

The Binckhorst in The Hague is an (100 hectare) industrial area near the centre of The Hague which has an isolated position and incomplete urban structure. Because of its position in the city it has much potential to develop into an intense mixed use urban area.

The design provides a framework which improves internal and external connections and uses the qualities of the Binckhorst to facilitate and stimulate the redevelopment of the area. This structure of streets, squares, parks and public transport enables a gradual transformation from the existing to a new situation. The design on a lower scale in the area is made to provide principles but leaves room for interpretation and design in a later phase of the project.

This is the graduation report of Maarten Bouten. The graduation is performed at the Urbanism department of the Faculty of Architecture, TU Delft.

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March 2008
Flexibility in urbanism

Maarten Bouten
Preface

In this report the work I have done on my graduation project is presented. All this has a background in my interest in developing an understanding of the complexity in the working of our urban environment. This graduation project therefore has been a joyful exploration of dynamics and change in the urban environment. It also has been a struggle with the concept flexibility in urban planning and design.

The report can be read in three ways. First one can keep it to reading the executive summary, which is the shortest representation of the content of the project. Second the main elements of the report can be read, which are the introduction (p. 10-15), the conclusions of the research (p. 98-100), the analysis (p. 104-105) the assignment for the design (p. 128-129), the design concept (p. 132-145) and the evaluation and conclusions (p. 200-203). Those are highlighted with larger orange marks around the page numbers of those pages. Third one can read the whole report for the ones that are interested in parts of the research and design in more detail.

I am very grateful to my mentors who have provided inspiration and structure in my journey. Also thanks to Myron, Yvonne, Conrad, Gijsje, Leen, Gerbert, Marijn and Fleur who have contributed with discussions and comments.

Maarten Bouten, March 2008
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1. Introduction

1.1 Motive
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1.7 Structure
1. Introduction

In this introduction the foundation of this graduation project is explained. This provides insight in the background and the structure with which the project has been done.

1.1 Motive

The motive for this graduation project is a paradigm shift that is currently taking place in our planning culture (in the Netherlands). The culture of ‘maakbaarheid’ of the mid 20th century, which changed to a more entrepreneurial approach in the 1980s and 1990s is now changing into a new paradigm of the acknowledgement of the dynamic city (Schrijnen, 2005). This change follows the diversification, but merely the speed of change that is now characterizing our society. This speed of change for technological, economic, social and cultural aspects make that traditional long term planning and predicting mechanisms become increasingly insufficient. Planning and design professionals are confronted with this, recognizing this and sometimes act on this. This requires and stimulates to develop new approaches in urbanism. Both in practical and in scientific ways (Batty, 2006) this is no taking place.

One of the subjects that is useful in this development is flexibility. Flexibility is an ambiguous concept that is already longer being used. It is used in many different ways however and can have multiple meanings. This made Voogd (1995) oppose the concept because of its, in his opinion, unclarity when used. Others (Thomas et al, 1983) used the concept to study the differences in planning systems and designers used it do develop structuring and sometimes utopian concepts. That dynamics and flexibility is needed to be able to react on changes that take place is something that is more and more recognized (Wigmans 2003, Drewe 1993, Bruil 2004) and also used by urban designers (Khandekar 2004, Landry 2000, Kuenzli & Lengkeek 2004, Veldhuis 2007).

To be able to use flexibility effectively and also better understand dynamics in our profession it is needed to develop our understanding of flexibility further. Small steps have occasionally already been done for this for both theoretical (de Jong 2002, Voordt van de 2004) and methodological (Reitsma 2006) aspects. Many professionals are currently also dealing with this in recent projects that are being developed. A further academic step in both theory and methodology would be in line with this and could stimulate both academic and practical debate and developments.

The location I chose for my design project is the Binckhorst in The Hague. The Binckhorst is an area that was
at the edge of the city 100 years ago, but now has a central position in the city. This location, where currently multiple industrial and business functions are located, therefore has the potential to develop into more intensively used mixed use urban area. Because of its size and development potential it can be seen in a line with other large scale urban projects (Laakhaven, Kop van Zuid, Paleiskwartier, o.a.) that have been initiated and realized in the last decades. Because of the changing ideas about planning and redevelopment processes however, this might be one of a new generation of projects that are currently being undertaken. In the context of my total graduation project I have used the Binckhorst to study the use of flexibility in the development of a transformation design and strategy for a large urban project.

1.2 Problem definition
Complexity and flexibility
Because of among others globalization and an increasing speed in technological and economic changes, the environment an urbanist has to work in, becomes more complex. With this complexity and an increasing speed of change, uncertainty about the future increases. This requires an approach which can deal with this. Flexibility therefore becomes a more important issue, also in urbanism. Flexibility is already being used in different ways in urbanism. But for an urbanist to be able to deal with flexibility effectively, more clarity, understanding, methods and tools have to be developed.

Organization of large urban projects
Large urban projects are executed in different forms. Urban renewal projects, transformation of industrial areas and strategic projects for the competitiveness of the contemporary city. In these projects the market plays an increasing role and coordination more and more shifts from municipalities to private parties. The municipality however still has a responsibility to make sure that sustainable urban areas are realized. And often a lot of public money is invested in these projects. The issue is thus, how a way of working can be developed in which on the one hand the municipality can realize a vision on the city, but on the other hand private parties (of different size) can play a role and contribute to the (constant) development of the city.

1.3 Aims
The aim of this project is to develop an understanding of how an urbanist can deal with flexibility effectively. This requires a theoretical approach and the development of methods and tools. The theory is aimed at developing an understanding about the meaning and relevance of flexibility. The development of methods is aimed at the translation of this insight to new methods and approaches that are different from conventional ways of planning and design.

The results of this will be used and evaluated in the development of a transformation design and strategy for the Binckhorst.

The development of new flexible architectural solutions, legal-organisational or financial-organisational solutions are not within the specific scope of this project.

1.4 Questions
Questions have been formulated for both the research and the design phase. The research questions have been used to acquire the information that was needed to reach the aims mentioned above. They have been used in the research and resulted in this project report.

Research questions:
1. In which way is flexibility defined?
2. What role does flexibility play in urbanism?
3. What methods, approaches or instruments can be developed for urbanism, to use flexibility in a structured and effective way?
4. What role does flexibility currently play in the development strategies of large urban projects in the Netherlands?

Also the design phase contributes to the aim for this project and design questions have been formulated for it.

Design questions:
1. In which way should flexibility be used in the case of the Binckhorst?
2. In what way can flexibility be applied in the strategy and design for the redevelopment of the Binckhorst?
3. What role should the Binckhorst play in the city and what type of area should it be developed into?
4. What is the Binckhorst currently like and what role should this play in the transformation?
5. What redevelopment strategy is desired, to reach the goals in Q3&Q4?
6. What design is desired to reach the goals in Q3&Q4?

1.5 Methods

Research
The research questions have been answered with literature research, case study research and study by design. With the first a general understanding of the concept flexibility has been developed. With this general insight the meaning of flexibility in urbanism has been studied. After this relatively theoretic and abstract phase the term flexibility has been evaluated in the way it is used by authors on urbanism related subjects and in multiple examples. With the insight gained by that multiple issues that are related to flexibility have been identified and explained. Continuing on this, methods for how to use flexibility as an urban planner and designer were explained.

To further develop an insight about the use of flexibility and about the development process of large urban projects three case studies have been done. In these case studies observations have been made about the use of flexibility.

With the preliminary conclusions of the research as a basis, a design project has been done. In this design project the conclusions were used, tested and developed further. With the conclusions of both the design and the research the final conclusions and framework about flexibility has been made.

Design
For the design project an analysis of the Binckhorst has been made. This has been done in an extensive way which resulted in the 'Documentation Binckhorst' and in a more focused way which can be found back in the section 'analysis'. On the basis of this analysis, the preliminary research conclusions and the formulation of an assignment a transformation design has been made for the Binckhorst. In this design not only the assignment for the Binckhorst, but also the strategy for the transformation and a constant evaluation of design products and steps have done. The results of this can be seen in the section ‘design’ and have been used to develop the final framework on flexibility.

Cyclic process
The research and design have influenced each other more than initially expected. This resulted in a cyclic development process in which findings that were done in the design lead to new insights for the research and vice versa.
1.6 Relevance
This project aims at the development of a better understanding and more insight in the concept flexibility. This is useful to be able to use the term more conscious, but is mainly useful for a better understanding and illustration of a more dynamic planning and design paradigm in urbanism. The insight in flexibility can help the urban planner and designer to think and act in a more effective way in the case of a dynamic context. The insight in flexibility will also make it possible to use the concept in an effective way as one of the tools of the urban planner and designer.

In the case of large urban projects the urban planner and designer will, with this insight in flexibility, be better equipped to deal with complexity, uncertainty, change and diversity, which will result in more effective projects that better meet the demands of today’s society.

1.7 Structure
The structure of the project as it has been executed is shown in figure 12a. The foundation for the project has been the thesis plan. With the thesis plan as a basis the research on flexibility has been done. In this research, criteria and a method for the case studies have been formulated. The research and the case studies resulted in conclusions from the research and recommendations for the design project.

Together with the analysis the research conclusions were the basis for the formulation of an assignment for the design project. The experience and results from the design project, together with the research conclusions have been the basis for the development of the final framework on flexibility.
2. **Research**

2.1 Introduction

2.2 Introduction to flexibility

2.3 Flexibility in urbanism

2.4 Authors on flexibility in urbanism

2.5 Examples on flexibility in urbanism

2.6 Issues and methods for the use of flexibility

2.7 Case studies

2.8 Conclusions and recommendations
2.1 Introduction
This research chapter is aimed at developing an answer to the research questions presented in the introduction. This is done in multiple sections. Section 2.2 goes into the general meaning and definition of flexibility. With this background flexibility in urbanism is studied in section 2.3 from a theoretical perspective and in 2.4, 2.5 from a more practical perspective. This results in an identification of issues that are related to flexibility in urbanism and methods that use the concept flexibility in section 2.6. After that flexibility is studied in three large urban projects in 2.7. The conclusions, observations and recommendations from this chapter are than brought together in section 2.8.

This research chapter will provide input for the design project. The research and design together will be the basis for the concluding ‘Framework on flexibility’.
2.2 Introduction to flexibility

2.2.1 Introduction
In this section the position of flexibility will be investigated by building up a framework about where, why and how it is used, what it means and which concepts are related to it. In this way an understanding about flexibility will be developed and further specific research about the position of flexibility can be conducted. Parts of the introduction are on themselves by no means directly related to the field of urbanism, but are necessary to shape a background and framework, from where further research on flexibility in urbanism can be conducted. In this section research question 1: ‘In which way is flexibility defined?’ will be answered.

2.2.2 Flexibility in general
Flexibility is a concept that has a broad general meaning and has different uses and meanings in different disciplines. Comparing and systemizing these different meanings can help to understand the concept of flexibility as a whole. The general meaning of flexibility is sometimes described as (wikipedia.org, 2007):

1. Ability to bend (in a physical sense); and
2. Ability to change and adapt to different circumstances.

The second part of the definition might be the most general definition, because bending could also be described as physical change or adaptation. Many more specific definitions, which could also be added to the list above can be found. This shows that one general definition is not specific enough for all the different meanings flexibility can have in different disciplines. On the other hand summing up all the different specific meanings makes it to broad to use as a general definition. Examples of disciplines where the concept flexibility is being used and the specific meaning it has in these cases are worked out in section 2.2.3.

A second general definition of flexibility that is being used doesn’t describe flexibility as a quality, but as the quality of an activity.

“The ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed” (http://www.sei.cmu.edu/str/indexes/glossary/flexibility.html)
or

"Flexibility is the ability to change or react with little penalty in time, effort, cost or performance.” (http://www.ifm.eng.cam.ac.uk/dstools/paradigm/flexib.html)

Here flexibility is defined as the cost or effort involved with change or adaptation.

2.2.3 Flexibility in different disciplines
To be able to distinguish the different meanings of flexibility in different disciplines, the used perspective on the discipline is sometimes taken relatively general. This might not always correspond with reality, where sub disciplines can differ from the general perspective on the discipline. An object like a factory or a car might also have different meanings for different disciplines.

For engineering a car is a physical installation which delivers a certain performance. For a product designer a car is a system that fulfills certain needs for a user or multiple users. For an economist a car is a resource that represents a certain value in an economic system. For an employee a car is a reward for his labor. In the following text these different meanings are intended to be discussed separately.
Engineer

**Discipline:** Engineering is the design, analysis and/or construction of works for practical purposes. Engineers use imagination, judgment, and reasoning to apply science, technology, mathematics, and practical experience. The result is the design, production, and operation of useful objects or processes. The broad discipline of engineering encompasses a range of specialized sub disciplines that focus on the issues associated with developing a specific kind of product, or using a specific type of technology. (Wikipedia, Engineering)

**Use:** In the context of engineering design one can define flexibility as the ability of a system or design to respond to potential internal or external changes affecting its functioning, in a timely and cost-effective manner. (Wikipedia, Flexibility (engineering)) A system is in this case often a physical installation or process which delivers value by performing functions. It is considered flexible when it responds or deals with changes in a way that the delivery of value or the performance doesn’t decrease. Internal changes can for example be heating up, which can cause the response of shutting down or activating a cooling subsystem. External changes can be a changing input of resources (labor, material, heat), which does or doesn’t change the performance of the system.

**Meaning:** in engineering flexibility relates to physical technical installations, which perform activities and deliver value. Flexibility refers to the ability of the installation to change its internal working and keep delivering its output value.

Product design

**Discipline:** Product Design can be defined as the idea generation, concept development, testing and manufacturing or implementation of a physical object or service. Product designers are equipped with the skills needed to bring products from conception to market. (Wikipedia, Product Design) This involves technical as well as social, cultural, psychological, commercial and managerial aspects.

**Use:** flexibility is often used as a quality of products that can perform different functions or can perform one function in different ways, to serve differentiated wishes of users. In the last case it is often possible for the user to change the product to his/her needs. An example is a mobile phone, of which the front-cover or the ring-tone can be changed to the wishes of the user. A mobile phone which only has one color and one ring-tone might function very well for a specific group of users, but is not adaptable to different wishes and therefore, compared to other phones, not flexible. Another example of a flexible product is a multi-tool or a pocket knife, which can be used for different goals (screwing, cutting, punching, sawing and open bottles).

**Meaning:** in the discipline of product design, flexibility refers to the ability of a product to serve differentiated needs of users. The cost of the ability to perform different functions are not considered in this definition.

Physics

**Discipline:** Physics is the science concerned with the fundamental laws of the universe and their precise formulation in a mathematical framework. Physics attempts to describe the natural world by the application of logic and the scientific method, through a process which includes both modelling by theoreticians and detailed observations and experiments. (Wikipedia, Physics) Properties of materials are studied as part of this broad ranging discipline.

**Use:** in physics in the case of materials, flexibility is a property of materials or objects that can bend or
deform without breaking. This is also called elasticity of materials.

Meaning: in physics in the case of materials, flexibility refers to deformation without breaking.

**Physiology**

Discipline: Physiology is the study of the mechanical, physical, and biochemical functioning of living organisms. (Wikipedia, Physiology)

Use: in the physiology of for example the human body, flexibility refers to what we normally call movement of any part of the body. The ability to move parts of a body is called flexibility.

“Flexibility is the ability to perform a joint action through a range of movement. In any movement there are two groups of muscles at work:
- protagonistic muscles which cause the movement to take place and
- opposing the movement and determining the amount of flexibility are the antagonistic muscles” (http://www.brianmac.demon.co.uk/mobility.htm)

The measurement of the achievable distance between the flexed position and the extended position of a particular joint or muscle group is called its “flexibility”. Flexibility refers to the range of movement possible in the joint or muscle group. In this sense, the flexibility of a joint depends on many factors, particularly the length and looseness of the muscles and ligaments due to normal human variation, the shape of the bones and cartilage that make up the joint. (Wikipedia, Flexibility)

In the flexibility of the human body, three types of flexibility can be distinguished. (Appleton, referring to Kurz):

- Dynamic flexibility: (also called kinetic flexibility) is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through its full range of motion in the joints.

- Static-active flexibility: (also called active flexibility) is the ability to assume and maintain extended positions using only the tension of the agonists and synergists while the antagonists are being stretched. For example, lifting the leg and keeping it high without any external support (other than from your own legs’ muscles). Active flexibility is influenced by sports training and is limited to the amount of passive flexibility.

- Static-passive flexibility: (also called passive flexibility) is the ability to assume extended positions and then maintain them using only your weight, the support of your limbs, or some other apparatus (such as a chair). Note that the ability to maintain the position does not come solely from your muscles, as it does with static-active flexibility. Being able to perform the splits is an example of static-passive flexibility.

Meaning: in physiology, flexibility means the ability to move, or the range of movement of a joint or muscle system.

**Management**

Discipline: Management is the act of directing and controlling a large group of people for the purpose of coordinating and harmonizing the group towards accomplishing a goal beyond the scope of individual effort. Management encompasses the deployment and manipulation of human resources, financial resources, technological resources, and natural resources. (Wikipedia, Management)
Use: in management, flexibility is used to describe the way resources can be deployed. The time aspect in management is dealt with in the sub discipline planning. Planning influences the way resources are distributed over time and involves processes. In processes, flexibility is often an important aspect, because it involves planning of uncertain futures. Flexibility refers to the relation between how much of a process is fixed and how much is left open within a certain margin, to allow changes in the future. These changes can be internal changes which react on internal differences from the plan, which shouldn’t influence the output. They can also be external changes, like changing demands, needs or conditions.

Meaning: flexibility means the relation between total freedom and total determination in processes. So in this case flexibility is a degree.

Public administration/ law

Discipline: in the case of processes and systems, these disciplines have similarities with management. They are however mostly not about directing resources, but setting boundaries (regulations) between which resources can be directed. This regulation can be done by instructions, policies or laws.

Use: in the case of regulations, flexibility often doesn’t refer to the degree of freedom or the relation between freedom and determination, but directly to freedom. A call for more flexibility often comes forward from a situation where regulations are experienced as restrictions. And although many regulations have good reasons the abandoning of regulations indeed brings more freedom. But if the right balance between freedom and restriction is gone, that might result in problematic situations.

Meaning: freedom from restrictions.

<table>
<thead>
<tr>
<th>Forms of flexibility</th>
<th>Quantitative flexibility</th>
<th>Qualitative flexibility</th>
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<tbody>
<tr>
<td>External flexibility</td>
<td>Employment status:</td>
<td>Production system:</td>
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<td></td>
<td>• permanent contracts</td>
<td>• subcontracting</td>
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<td>productive (and/or geographical) flexibility</td>
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<td>Internal flexibility</td>
<td>Working time:</td>
<td>Work organization:</td>
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<td>• reduction of working hours</td>
<td>• job enrichment/job rota-</td>
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<td>• overtime/part-time work</td>
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<td>• night and shift-work</td>
<td>• teamwork/ autonomous work</td>
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<td>• weekend work</td>
<td>• multitasking, multiskilling</td>
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<td>• compressed working</td>
<td>• project groups</td>
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<td>hours</td>
<td>• responsibility of workers over: planning, budget, innovation, technology</td>
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<td></td>
<td>• irregular/unpredictable working times</td>
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Figure a. Forms of flexibility in the labor market
**Labor market**

*Discipline:* the labor market is the supply and demand of labor by individuals to organizations. Employer and employee together individually, collectively or culturally come to an agreement under which conditions certain labor is done.

*Use:* flexibility is more and more used to arrange changing labor relations. Jobs are not only changing from life time employment to temporary jobs, but also different ways of organizing the daily conditions of working emerge. In a study of the European Foundation for the Improvement of Living and Working Conditions (European Union) this resulted in a framework (figure 34a) identifying four types of flexibility in the labor market. (Goudswaard, 2000)

Figure 19a identifies different forms of flexibility that are used in the labor market. The external flexibility for an organization can be present in two ways. First the way employees are contracted: flexible regulations on labor contracts allow the employer to employ or fire people in a way that fits the demand of the organization. This flexibility however doesn’t directly benefit the employee, who in the best case might find a temporary job more easily. The second way of external flexibility is the way the production system of an organization is organized: does it perform everything itself internally, or does it buy products or services and uses for example outsourcing. These options make it possible for the organization to organize the production process in a flexible way. The internal flexibility of organizations on the labor market also has two aspects. First the way how the amount of working hours is realized. Adapting this to the differentiating need for labor in the organization and the differentiating supply of labor by the individual employee can bring flexibility for both the individual and the organization. Flexible arrangements for the way the total hours per year are realized might bring benefits for as well the organization as the employee. The second way internal flexibility is used is in the way people work. Can they perform multiple tasks, can they work in different settings? A (hierarchical and specialization) differentiation in this is always present in organizations, but also differentiation within one person can result in flexibility in production that can be realized in an organization.

That the concept flexibility is useful in the labor market becomes clear from the many times it is being used (http://www.flexibility.co.uk/flexwork/index.htm). It has therefore resulted in various ways in which flexibility is used. For example: flexible labor contracts, flexible working hours, flexibility in working locations and technologies to support flexible working.

*Meaning:* in the labor market flexibility is used in distinctive ways. A regulative way: freedom for the employer (contracts). A way to facilitate supply and demand: differentiating the organization and ways of working and skills.

**Didactics**

*Discipline:* didactics deals with the way knowledge and skills are organized and presented to people and how these people are able to use this for their personal development.

*Use:* the cognitive flexibility theory is a theory developed by R.J. Spiro on the way people learn. According to the theory simple subjects can be presented in a linear way. Complex issues however would be too much simplified and not understandable anymore if they would be presented in a linear structured way. For complex subjects, information should therefore be presented in a way that every person can go through the
material in its own way and can develop an own frame of understanding of the matter. A way to do this is via hypertext.

**Meaning:** in the cognitive flexibility theory, flexibility means a multi-interpretable way of presenting the information, so everybody can explore the complex matter in its own way.

**Software development**

**Discipline:** software development is about the way of using mathematical and logic based languages, to organize the execution of digital functions, which result in software programs for end users.

**Use:** in software development flexibility is used to describe the possibility to use the code of (components of) a developed program for other functions than was originally intended (as well). Flexibility also relates to the way technology or programs can be used under different conditions or with different demands. This reflects the amount of work that is needed to develop the source code of a program. After all this has been programmed it is considered not efficient if the whole process of programming would have to be done all over again to change a function.

**Meaning:** the meaning of flexibility in software development refers much to the way described in the introduction: the effort it costs to change the system.

**Conclusion:** the general definition of flexibility can now be evaluated with the specific meanings summed up in figure 22a. In this perspective it becomes clear that the two parts of the definition used in section 2.2.2 are both relevant. The second part very well covers almost all the uses of flexibility, but the use of flexibility in physics and physiology might be better addressed by keeping the first part included in the general definition. The specification of flexibility with the cost of change included in the definition is specifying one aspect of flexibility and makes it too specific for a general definition.

### 2.2.4 Reasons to use flexibility

From the analysis of the different disciplines two reasons to use flexibility can be identified. The first reason to use flexibility is as a reaction on uncertainty. For example the uncertainty in the management of a process or the uncertainty about input and internal conditions in an installation. This use of flexibility is used in engineering, management and labor market. Uncertainty can be present for different reasons. It can be because of the complexity of a system, it can be because of uncertainty about future developments or it can be because of a lack of knowledge about a subject.

The second reason to use flexibility is as a way to produce solutions or products that fit differentiated needs of different users. In this case the reason to be flexible is mainly efficiency. Designing a totally new product for every individual is much more expensive than designing a standard body, with possibilities to tailor the product with minimal changes to differentiated needs and wishes. This use of flexibility is used in product design, labor market and software development.

These two categories can be used to qualify the disciplines and uses of flexibility. Sometimes both uses of flexibility are used together.

### 2.2.5 How to use flexibility

As described above there are two reasons to use flexibility: as a reaction on uncertainty or as a reaction on differentiated needs of users. This distinction makes it possible to elaborate ways to use flexibility. The combination of (a) the identification of reasons and (b) uses
<table>
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<tr>
<th>Discipline</th>
<th>Meaning of flexibility</th>
<th>Reason for flexibility</th>
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<tr>
<td>Engineering</td>
<td>In engineering flexibility relates to physical technical installations, which perform activities and deliver value. Flexibility refers to the ability of the installation to change its internal working and keep delivering its output value.</td>
<td>Uncertainty about input, external influences and internal working.</td>
</tr>
<tr>
<td>Product design</td>
<td>In the discipline of product design, flexibility refers to the ability of a product to serve differentiated needs of users. The costs of the ability to perform different functions are thereby often not considered important.</td>
<td>Differentiated wishes and needs of users.</td>
</tr>
<tr>
<td>Physics</td>
<td>In physics in the case of materials, flexibility refers to deformation without breaking.</td>
<td>Differentiated demands/ conditions</td>
</tr>
<tr>
<td>Physiology</td>
<td>In physiology, flexibility means the ability to move, or the range of movement of a joint or muscle system.</td>
<td>Differentiated demands/ conditions</td>
</tr>
<tr>
<td>Management</td>
<td>Flexibility means the relation between total freedom and total determination in processes. So in this case flexibility is a degree.</td>
<td>Uncertainty about future developments and conditions</td>
</tr>
<tr>
<td>Public administration/ law</td>
<td>Freedom from restrictions.</td>
<td>Uncertainty about future needs of stakeholders</td>
</tr>
<tr>
<td>Labor market</td>
<td>In the labor market flexibility is used in distinctive ways. A regulative way: freedom for the employer (contracts). A way to facilitate supply and demand: differentiating the organization and ways of working and skills.</td>
<td>Uncertainty about future demand for labor. Differentiated wishes and needs on job conditions.</td>
</tr>
<tr>
<td>Didactics</td>
<td>In the cognitive flexibility theory, flexibility means a multi interpretable way of presenting the information, so everybody can explore the complex matter in its own way.</td>
<td>Differentiated ways of learning of people.</td>
</tr>
<tr>
<td>Software development</td>
<td>The meaning of flexibility in software development refers much to the way described in the introduction: the effort it costs to change the system.</td>
<td>Differentiated wishes and needs of software users.</td>
</tr>
</tbody>
</table>
of flexibility related to these reasons might make it possible to make a further step in developing the framework on flexibility.

Drewe (1993) already identified flexibility as a reaction on uncertainty in decision making and provided a framework for that. He describes the following: uncertainty can exist about processes, goals or means. There are two ways to deal with this uncertainty. 1. Reduce the uncertainty by more research, more coordination, more means or more clarity about goals. 2. Accept the uncertainty and either don’t do anything and take risks or accept uncertainty and incorporate possibilities to adjust.

Elaborating on this, the way to deal with uncertainty might be to first reduce the uncertainty, by more knowledge, clarity and organization and than defining a margin within which decisions have to be taken. This margin prevents too much freedom and gives guidelines and a vision about what the goals are and how they are intended to be realized. This recognizes that flexibility is not only about more freedom, but about a balance between freedom and determination. The division of Drewe also has to be nuanced. After accepting uncertainty it is not only about the division of not doing anything and accepting the risk and incorporating possibilities to adjust. It is about a degree between the two extremes of conditioning everything you can and excluding any risk (no flexibility) and doing nothing at all and having great risks (total flexibility). Any place you choose on that scale results in a certain trade off between freedom and risk.

Instruments that can be used in this are for example scenario planning and strategic management.

The second reason to use flexibility is as a reaction on differentiated needs of users. Also this is an aspect that became more important over time. The credo of the first consumer car Ford Model T, “Any customer can have a car painted any color that he wants so long as it is black” has now changed to buying and assembling your car online and fully adjusted to your personal preferences. Other examples of adjustable products or multiple product versions are numerous. Serving differentiated needs is now often made possible by new methods and technologies. This way of making products adjustable to users’ preferences is widely used in different kind of products. These can be cars, variations of Senseo coffee machines, mortgages, mobile phones covers and ring tones, email clients, desk chairs, a Harry Potter story, boats, the articles in a magazine, interiors of houses, garden maintenance and so on.

There are different possibilities for how these answers to differentiating user preferences can be realized. A main motivation in this often is efficiency. One product, service or system must be able to adjust at little costs to answer the different preferences. This can be done with different methods and instruments. Examples for this are explained below.

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![Figure a. Balancing flexibility and risk](image)

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Multi functionality:
Combining different functions in one device might provide a high level of flexibility. Whether you want to cut, saw, screw or open a bottle, you only need one tool: the Swiss army knife. This tool can be very useful in different circumstances and for different needs. Also an all-in-one multimedia device in your house can be very useful when you want to watch TV, work with a word processor, communicate with friends, listen to music or maintain your photo collection. All with one device. If we however would have a device with which we could cut bread, watch television on and could travel on the highway (a bread cutting television car) it would probably not be a good multi functional tool. So creating flexibility by multi functionality is about combining related functions which share a common quality and don’t become much more expensive or less effective by adding extra functions.

Plug in / add on:
The plug in or add on is a variation on the multifunctional. But where the multi functional is mostly static, the plug in or add on can be changed infinitely. It mostly exists of a body which performs a basic function. This body can be extended with building blocks that make extra functions or variations possible. The advantage is that the basic body can stay relatively small and cheap and users only add the functions they really use. This method is often used in software.

Tuning:
Tuning is a much used method to serve differentiated user preferences. This tuning is mostly something that can be done by the user itself and enlarges the benefit and the market of the product. Examples are the mobile phone, the toaster, the gears of a bike and a desk chair.

Supply on demand:
Supply on demand might not deliver a flexible product, but can deliver the product in a flexible way and customized to the preferences of the user. It can be considered as a supply side version of tuning. The product can be tuned to preferences of a specific user, but can not be changed afterwards. This can in the case of durable goods sometimes result in a product that exactly fits one user, but becomes less functional and valuable when it is passed on to a second user.

Layered flexibility:
Layered flexibility is a variation on the plug in. The difference is that all the functionality is incorporated in a product, but can be accessed on different levels. This is a relatively new way of developing products that are in this way made useful for starting as well as very advanced users. Examples of this are Gmail and Wordpress, which have a very simple interface for basic users, but also provides access to all kind of features and services for advanced users. (Walling, 2007)

2.2.6 Risks and disadvantages of flexibility
Flexibility is often considered a good thing, but is not necessarily always positive. It is sometimes used as an excuse to leave things open too much or as an easy alternative for better research or goal formulation. Voogd (1995) identified some of the disadvantages or dangers of the use of flexibility in planning processes:
• Flexibility can be used as a way to hide the real agenda and goals.
• Flexibility can (accidentally) result in the stimulation of expansive values to the detriment of defensive values; in other words, the conservation of a certain
situation can get a low priority, because of keeping open possibilities influenced by new developments.

- Flexibility can (accidentally) result in the stimulation of ‘hard’ over ‘soft’ factors, because they are harder to determine and therefore more easy to change.
- Flexibility can be used by the administration or interest groups to be able to act freely and not be restricted by regulation.
- Flexibility can result in incremental (gradual) planning, with the aim to decrease the resistance against measures and decisions.
- Flexibility can be in the way of and contradictory to the human need for predictability and transparency of things.

What can be added to that is that an excessive use of flexibility might lead to unnecessary freedom and waste and inefficient use of means. If everything is developed in a way that it stays flexible and open to a large extend, but that flexibility is not used to differentiate, it might result in an average everything being the same mediocrity.

2.2.7 Conclusion

In this section general aspects about flexibility have been identified. Flexibility has been found to be defined as: the ability to change and adapt to different circumstances. This general definition has many variations in specific disciplines. In this project the definition will be specified to: the ability to adapt to changing and differentiated circumstances.

Two reasons to use flexibility are: 1. as a reaction on uncertainty, and 2. as a reaction on differentiated needs. For both, methods to apply flexibility have been explained.

A disadvantage of the use of flexibility can be that things are left open too much, for multiple possible reasons.

This section about the general meaning of flexibility provides a structure to study flexibility in urbanism more specifically.
2.3 Flexibility in urbanism

In this section the meaning of flexibility in urbanism will be studied. This will be done with the insight that was developed in the previous chapter. Although this section will already go more into the field of urbanism it will still have a relatively theoretic character. In this section research question 2: ‘What role does flexibility play in urbanism?’ will be answered from a theoretical perspective.

2.3.1 Relevance for urbanism

After flexibility has been introduced in general it is useful to explain the context in which it can be used in urbanism. This is not only useful to develop an understanding of the subject, but also makes very clear why flexibility is a relevant subject for the urban planner and designer. A good way to do this is to describe the subject of our profession and its character.

The urbanist works on the organization and design of areas, on many different scales and in many different types of environments. In this work one has to consider both the long term, the current use and the historic context. The goal is to realize and manage attractive environments for the users one is designing for. Those users can be people with very different lifestyles, demands and behaviour. These differences are also present in time, when the use of space, the group of people using the space or society in general changes. From this short description one can already see that the urbanist is working on a very complex and dynamic subject. One could simplify this and work from all kind of standard assumptions that have more to do with theoretic models than with the actual dynamic of the use of space. This functional planning has however proven to fully misunderstand the dynamics of the use of space and work with it in an inappropriate way. This is currently often still being done by simplified environments that neglect and leave out complexity. This will however not turn out to be the areas that will still exist in three hundred years. And although they for some aspects provide comfortable solutions, they neglect the human drive to raise the degree of organized complexity (Salingaros, 2005) and lead to apathetic citizens. To develop vital areas that are both comfortable and inspiring for their users, complexity and dynamics of our world and the environment we are living in has to be acknowledged and dealt with. Complexity however means that one might not always be able to fully predict and control what is happening. This is not something new, but at most something that might not have been so explicit all the time. This presence and acknowledgement of a degree of unpredictable and uncontrolled developments means something for our approach and ones physical proposals and interventions. It means that a professional and sensitive approach is needed. Professional in a sense that one uses all the knowledge, methods and techniques that are available in the profession. Sensitive in a sense that although one works professionally one acknowledges a certain unpredictability and uncontrollability and is open and sensitive to the results of this not being able to influence and steer everything. By applying a learning cycle (van der Heijden, 2003) one is able to learn from and react on changes that take place.

For proposals and interventions it means that designs are developed in such a way that they are not simplistic and static, but incorporate a certain complexity and enable differences and changes.

The notions and approaches described here are in many different situations, disciplines and projects described with the word flexibility. This already shows the complication that the use and study of flexibility brings with
2.3.2 Where does uncertainty come from?
As uncertainty is the main reason to use flexibility it is useful to identify where uncertainty in urbanism is present or comes from. There are several sources of uncertainty in the field of urbanism. Four of them are identified and explained below.

The field of urbanism
The first is the state and structure of the field of urbanism itself. Urbanism is a relatively young field which means that the body of knowledge is rapidly developing. This however also means that for some subjects that are worked on still little knowledge is available. Also the debate on what urbanism is is alive and the role and boundaries of the field are sought for. The diverse subjects that are dealt with in urbanism and the many other fields an urbanist has to be able to cooperate and communicate with make it a broad and multi-disciplinary field. In this context the professional has to be able to work as a generalist, but also often has its own narrow specialization. This altogether shows that the role and the task of the urbanist is not static, can be very different and can change depending on the context. This means that it is uncertain for an urbanist in what projects he will exactly work in the future and

Maakbare city vs. dynamic city
what role he will have to play in that. A constant search to the role of urbanism, the use of methods and the structured development of the body of knowledge of the field is therefore very useful to reduce this uncertainty.

**Working for the future**

An important aspect of the field of urbanism is that the (design) work that is done today has to have a function, role and meaning in the future. This means that one can design on the basis of knowledge, experience and assumptions about the future, but how things will work out exactly is often uncertain. The assumptions that are done about the future are based on predictions, forecasting (and sometimes wishful thinking and utopian theories). A balance between accounting for probable and steering towards desirable futures is something that influences the work of an urbanist. However a vision on a desirable future must be present and can be strived for, the harsh reality and a probable future shouldn’t be denied. This large role of both the short and long term future and the way the urbanist chooses to deal with that, result in a lot of uncertainty that should be accounted for, but shouldn’t paralyze.

*Globalization, complexity and change*

Since the way society functions plays a role in urbanism, the massive changes in recent decades are very relevant for urbanism. These changes influence the way people use their environment and the wishes they have about their physical environment. The way an area can satisfy needs for transportation, communication, social safety, the creation of an identity, economic development, social development, the expression and development of culture, community development and so on, influence the success and position of an area. Recent technological, economic and social changes not only pose new demands to the current physical environment, but also demonstrate the probable influence of changes yet to come. As it was impossible to predict all the recent changes a few decades ago, it is now impossible to exactly predict what will happen in the coming years or decades. This is partly caused by the complexity of the developments taking place. Trying to understand this complexity is the best way to be able to see and react on the changes taking place.

*Development processes*

Compared to the period of time a design has to function in, the development process of a project might look short and predictable. Depending on the size of the project it can take three to thirty years. This period however in another way also has its proportion of complexity and uncertainty. The intensity of the stakeholders working together and the results that have to be achieved under changing internal and external conditions often make it a complex project. Because of this complexity and uncertainty many of the aspects of a project and often the exact outcome can change and are uncertain at the start of a project. This uncertainty during the process influences the way the design process has to be done and requires a sharp sense of the designer on what will stay the same and what could change during the process. For the process manager, Wigmans (2003) describes three sources of uncertainty.

- Perceptions. Partnerships consist of multiple parties with own ideas about problems, solutions and strategic choices.
- Aims. It is not always obvious that it is possible to unite the aims of different parties.
- Organization. Even if perceptions and aims match, activities of the different organizations still have to be tuned to each other.
2.3.3 Where are differentiated user needs present?

The second reason to use flexibility is one that can be easily explained in a conceptual sense but is harder to explain and ‘proof’ with clear urban examples or solutions. The presence of differentiated user needs can be explained with cultural changes and differences between users. Next to that, examples of places that do not facilitate differentiated user demands might be illustrative.

A trend that is celebrated by some and abominated by others is the individualization of society. In contrast to society a few decades ago, where models where developed which dealt with the standard family, standard employee and standard neighborhood, the current society is characterized by individual choices, personality and personal expression. This trend requires products and services to be able to adjust to the individual.

In another more conventional way this difference between individuals and organizations has always been present. Every organization which uses a building will use it in its own way, according to the activities that are executed or even the culture within the organization. A certain degree of standardization will always be present. This standard solution however, should provide enough opportunities for different uses (and change). This differentiation in use of physical space is also the case in urbanism, where different people use streets, parks and squares in their own way.

Examples that illustrate a lack of facilitation of differences and are therefore not flexible enough are the following:
- squares that only facilitate large scale activities and events, but don’t provide attractive places and environments on the human scale for different people.
- squares that (for some reason) are forbidden or physically not accessible for bicycles.
- city roads that are dominated by cars and leave no safe room for pedestrians and bicycles.
- a monofunctional neighborhood that is organized for one group of users and provides no facilities for groups with other lifestyles.

2.3.4 Disciplines in urbanism

To start working out the meaning of flexibility in urbanism, also for the different roles and disciplines within urbanism the use of flexibility will be described. After this the reason to use flexibility and the way to use flexibility from the general use of flexibility, can be tested, adjusted and specified to the field of urbanism.

**Urban planner**

*Relevance:* the urban planner is confronted with an increasing complexity in social-spatial issues. This makes it more complicated to develop theories and models on urban planning and work on designs.

*Use:* as a reaction to uncertainty, flexibility comes back in many of the subjects urban planning is dealing with. Mostly because of uncertainty about future developments, complex subjects or complicated processes. Practically flexibility is being used within development process models on different scales and in working with scenario’s and strategies for projects.

**Urban designer**

*Relevance:* the urban designer is the one who has to realize the call for flexibility with practical solutions and principles in concepts and designs.

*Use:* flexibility is used by an urban designer as well as a reaction on uncertainty as a reaction on different needs of users. When it is used as a reaction on
uncertainty that uncertainty is about future program or use of functions in the city. In the first concept for a masterplan for example it might be uncertain exactly which program will eventually be realized in an area in fifteen years. To deal with that uncertainty one can either eliminate the uncertainty by determining everything in advance or design the structure of the city or typology of the urban blocks in such a way that the decision on which exact program will be realized can be made in a later phase of the project. This way of designing also influences the way that changes in program or use of the city can be facilitated and realized years after the design has been realized. Also as a reaction on differentiated needs an urban designer might design elements in the city in such a way that opportunities for for example transportation are present in different forms (walking, car, public transport) or squares can be used for markets, sports or walking.

**Development process manager**

*Relevance:* the development process of urban projects is increasingly complex and mostly takes years or sometimes even decades. Managing this process means constantly adjusting goals, means and methods to changing demands and conditions.

*Use:* also the development process manager uses flexibility in two ways. First the general way of using flexibility in management as a way to deal with uncertainty about the future and internal and external changes in the process. This practically means the flexibility to adjust the budget of the project, the temporization of the different phases, the design to regulations, the involved stakeholders to the ambition of the project and so on. The second reason for using flexibility is to adjust the process to changing demands of the stakeholders. The stakeholders are namely the users or clients of the service ‘project management’. This means that goals, means and ways of working have to be able to change due to changing demands of stakeholders or new stakeholders that get involved in the project.

**Public administration**

*Relevance:* as explained earlier public administration sets boundaries between which urban developments can take place in the form of regulations or policy. These regulations are aimed at guiding developments in a desirable way.

*Use:* regulations however should not bound possibilities for parties to much, because opportunities might be missed. Flexibility in regulations has to be realized in a way that the regulations can also be interpreted and adjusted to unforeseen developments and the boundaries that are set on the one hand prevent undesired developments, but on the other hand leave enough room for initiatives of stakeholders. In the case that policy is not clear enough in directing developments, regulations can be used to set stronger and more clear boundaries (Geuze)

**Architect**

*Relevance:* flexibility is particularly relevant for an architect, because he has to deal with a broad range of subjects where he is no specialist on. Also the time period for which he designs solutions, require flexibility in this solutions to deal with changes in conditions and demands of the many different users.

*Use:* when developing concepts and designs the architect has to come up with solutions that one the one hand cover all kind of disciplines, but on the other hand leave enough room for specialists to work out their competent solutions. Like the urban designer an architect has to implement flexibility in the design to be able to deal with changes in the future and differentiated preferences of users.
The two reasons for using flexibility fit the way the use of flexibility in urbanism is evaluated.

2.3.5 Possible use in urban situations
To further illustrate the use of flexibility in urbanism some examples will be evaluated.

A notion of flexibility becomes clear when comparing the renewal of two neighborhoods in The Hague and Delft. In the Spoorwijk in the Hague the whole neighborhood from north to south is demolished and rebuilt with new housing. The neighborhood vanishes and is totally replaced by new new buildings. This approach doesn`t show much ability to change things gradually and is an example of radical change. From both social and environmental perspectives this approach is questionable.

An example that is in contrast with this is the renewal of the neighborhood Die Delfgaauwse Weye in Delft. In this neighborhood also part of the existing building stock is demolished. Other buildings in the area are however maintained and adjusted to current standards. Because of this approach a divers image of new and older buildings, all meeting nowadays standards, is present in the neighborhood.

A situation in urbanism that very much illustrates the value of flexibility is gentrification. Gentrification is only possible if users on a low scale have the ability to change things in a neighborhood. With this ability to change things and adjust buildings to their current needs the buildings get new values and adjust to current needs. This gentrification would not be possible if the power to change things is only organized at a centralized level. Change would than take place more directive and radical.

2.3.6 Flexibility in urban design
Flexibility has been used in multiple concepts in urban design. Two examples of that are the framework approach and so called plan flexibility. In the framework approach a framework or structure is conceptualised within which local specificities are fit in. The framework is used to structure an area or present a certain continuity and homogeneity in an area. De Jong (2004) describes this as structural flexibility.

Plan flexibility is used to design structures or other aspects for areas but leave open how they are implemented or worked out eventually. This approach has often been used in regional and landscape designs. Designs are in that case visualized with lines, areas and arrows, instead of precise design. This way of planning sometimes leads to too vague and free designs and is opposed by some for this reason.

2.3.7 Flexibility aspects in the urban development processes
Within the development process of a project, several aspects can be identified for which flexibility can be a relevant issue. To get a better idea on where and for whom these aspects are relevant, they are divided in governance, management and design.

Governance: regulations, policy, goals.
- Regulations: flexibility is an issue in regulations (policy and law) at the moment that a balance needs to be found between directing and facilitating. On the one hand policies and laws are meant to steer developments in a certain direction and set the margins within which developments can take place. This however always comes from the subjective perspective of the law- or policy maker. To be able to facilitate initiatives of parties and coop with changes that the law or policy
didn’t anticipate on, a certain flexibility in the regulative system might be relevant. They however shouldn’t be so flexible that they don’t have any regulative or directive power anymore.

- **Policy:** like described above, policy should have the flexibility to on the one hand be directive for developments, but on the other hand have the flexibility to change and not be a burden for initiatives that add value at the moment that the assumptions of the policy perspective proof to be wrong.

- **Goals:** developments or projects that are initiated should come from a vision and have goals to direct the developments. Those goals however should be set in such a way that they don’t fix things which are still uncertain in the initiation phase. That would result in problems when dealing with the actual developments in later phases of the project. The flexibility in goals from a governance perspective should thus be that they set goals on why the development is started, but leave room for future developments.

**Management: stakeholders, goals, means, phasing, methods, decision making.**

- **Stakeholders:** the management of a project has to identify the relevant stakeholders and deal with them in such a way that they get the role (power and influence) in the project that is appropriate for them. In the management of stakeholders positions and goals there has to be acknowledged that the amount, role and goals of stakeholders can change, according to internal or external developments and phases of the project.

- **Goals:** goals of the projects as a whole might need to be able to change during the process as a reaction on internal and external developments and changes in the goals of the individual stakeholders.

- **Means:** one of the core tasks of the management is to manage the means that are available to work on a project. This might be money, people, knowledge, time or power. It is important for the management of a project to have clarity about which means are available for them, but also have the flexibility to be able to adjust the means to developments that take place.

- **Phasing:** projects mostly exist of different phases. This is done to adjust for example the means, stakeholders involved or way of working to differing circumstances during the project. The exact time planning of those phases, or management of coming phases is something that needs a certain flexibility and can not always fully be determined in advance.

- **Methods:** the management of a project is responsible for the organization of the project. They determine the way that activities are executed and the organization is structured. Managing in this case however again means, on the one hand determining and directing the way things are done, but also organizing the flexibility to change the structure of the organization and execution of activities if there is a need to do so.

- **Decision making:** decision making is something that flexibility is relevant for in a similar way as it is for goals. Decisions are ideally made on the basis of all the information that is needed for the decision. This however is often not the case, because of uncertainty about for example future development, or other ways of limited information. In those cases decisions should be made in such a way that they direct developments at this moment, but leave open possibilities for change in the future. A pitfall in decision making is that in some situations of too limited information decisions are taken with political motives, or the idea that some decision has to be taken. This fixation often leads to problems in the future when information does become available and the chosen and fixed decisions turn out to be wrong.

- **Planning documents:** planning documents very
much influence the way a project is 'fixed’. The way they are formulated and the way decisions are laid down in documents influence in what way it is possible to change things in the future. Using the appropriate planning documents for the different phases of the project can help to manage this in a good way.

**Design: design products, urban structure, typology, functionality, program**

- **Design products:** the visual means of the urbanist can be a powerful tool in the decision making and development process. They can however also have the power to lead to wrong development when to early in the process, on the basis of convincing concepts or visualizations, decisions about aspects of the development are taken to early. Urban design in the beginning of the process can however also be very useful to test and visualize different possibilities for developments. It is the task of the urbanist to be aware of the impact of design products and use them in a way to as much as possible stimulate thinking and formulation of goals and also very effectively only fix those aspects in a project or design that need to be fixed at that moment.
- **Urban structure:** as is obvious, the urban structure of an area is something that stays the same for ages. This means it should be realized in such a way, that it doesn’t only answer to a question today, but is able to facilitate all kinds of needs and desires over the ages. This might also mean that structures that have proven to be successful are interesting to use and new concepts have to be applied reservedly.
- **Typology:** for building blocks or urbanization patterns different typologies can be identified. Typologies might have a context or setting in which they are most appropriate as well as a degree of flexibility. So choosing a typology for an urban development might influence the way the area is later able to facilitate change or change in itself due to a changing position in the city.
- **Functionality/use:** the functioning of an urban area is a very concrete aspect of a design for users. Areas, blocks and public space should function in such a way that they can facilitate different user demands or ways people use the city and be able to change and adapt to trends in society which from an economical, social or cultural perspective might change the way the city is used and functions spatially.
- **Program:** the program that is realized in buildings is always something temporarily and will change. This involves different degrees of change. A certain program, such as a house, an office or a shop might change its demands about housing when it changes its way of use and consumption of space. Or one shop might leave and be replaced by another, which has other demands for the building. Or it must even be possible to change from one function to the other, when shops leave and are replaced by housing or vise versa. General design principles as well as expectations about the future determine how much flexibility is needed to facilitate change in program.

### 2.3.8 Conclusions

Flexibility is relevant for the field of urbanism, because of the increasing acknowledgement and role of dynamics in our field and cities. Uncertainty in urbanism comes from the character and context of our profession, the future oriented character of our work and the organization of development processes. Differentiated user needs are present because of a natural differentiation in individuals and organizations and increasingly because of a more individualistic culture.

Understanding flexibility can lead to a different approach in projects or can result in the use of specific design approaches. In many aspects of a development process flexibility plays a role.
2.4 Authors on flexibility in urbanism

Flexibility is used by different authors, who attach their own meaning to the concept. That flexibility can have different meanings in different disciplines has already been explained in sections 2.2.3 and 2.3.4. A study of different authors contributes to the development of an understanding about flexibility in urbanism. This section contributes to an answer on research question 2: ‘What role does flexibility play in urbanism?’ from a practical perspective.

Drewe, 1993
Reader Werkwijzen van Ruimtelijke Planvorming, p. 42
When writing about spatial development processes, Drewe identifies three sources of uncertainty in decision-making: uncertainty about the operating environment, uncertainties of policy and uncertainty about related choices. As solutions for these three sources respectively investigations/research, clearer objectives/policies and strategy/co-ordination are proposed. He also translates this into the a scheme (figure 34a) where current and future uncertainty about processes, aims and means are identified.

The way to deal with all this uncertainty consists of two steps. First reduce uncertainty by more research, more political clarity, more means and more coordination. The second step is to accept uncertainty and either don’t do anything and take risks or realize possibilities for adjusting later on. This can be realized in the planning system and in the plan itself, and can be called flexibility. Flexibility of the planning system can be promoted by dividing fundamental (strategic, long term) and concrete (tactical, long term) policy decisions. For short term decisions the amount of certainty is mostly larger. Flexibility of the plan itself can be promoted by:

<table>
<thead>
<tr>
<th>Uncertainty if a certain plan will have the effects aimed at.</th>
<th>Current situation</th>
<th>Future situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty about Processes</td>
<td>Do we have enough insight into the processes to be able to foresee the effects aimed at?</td>
<td></td>
</tr>
<tr>
<td>Aims</td>
<td>Do we have enough insight into the desirability of the effects aimed at?</td>
<td></td>
</tr>
<tr>
<td>Means</td>
<td>Do we have enough insight into if the used means will result in the effects aimed at?</td>
<td></td>
</tr>
</tbody>
</table>

Figure 34a. Uncertainty in decision making by Drewe
- phasing (postpone uncertain choices for example)
- deciding on the possible margins
- deliberate alternatives to find the most flexible alternatives.

Working with uncertainty in operational processes means spotting uncertainty and measuring its influence. Secondly evaluating alternatives on uncertainty and flexibility. And thirdly considering the possibilities for the mentioned reducing and acceptance of uncertainty. This is necessary because of the costs of managing uncertainty.

**Wigmans, 2003**  
*Management van gebiedsontwikkeling, part 3 - 26*  
In chapter 2.5 *Management van flexibiliteit* the role of flexibility in the management of the cooperation of partners in the development process is discussed. The uncertainty and complexity in this process mentioned before, require an approach that results in proper directions for the development process, but also acknowledgment that things have to be left open and stay uncertain for a certain period. Also the way parties approach the process individually requires some flexibility, when individual perceptions, aims and organization have to be translated and transformed to common perceptions, aims and organization. The aim of this flexibility is to be able to manage the cooperation as a process, in a way that it is not fixed to specific solutions to quickly and aimed at the enrichment of the content. Trust and expectations are important elements in this. Insight into how this management of flexibility can be done is still limited. There is however potential for more use of flexibility, because the current fixation that is currently often used as a reaction on complexity doesn’t prove to be the right way.

**Rijksplanologische dienst, 1984**

*Ervaringen met planningmethodiek, p. 69, 80, 82*

In this report on planning methodology, flexibility is used in a clear way. The report goes very extensively into the organization of the spatial planning process. The triangle ‘planning process, vision formulation and progress analysis’ is used. In this triangle, in the case of planning and decision making the use of flexibility should be considered for decisions that can be postponed. When this is done there should be attention in the progress analysis how this works out. Only when this evaluation is done, flexibility can be used as an effective tool.

**H. Voogd, 1995**  
*Methodologie van ruimtelijke planvorming, p. 76*  
In the chapter ‘Planning as organizational process’ Voogd writes a section about ‘Flexibility, phasing and evaluation’. In this section he sums up aspects of the misuse of flexibility and relatively negatively proposes to replace flexibility in planning policy by phasing. Although this approach only goes into a specific use of flexibility in a relatively negative way it gives interesting suggestions about how to use flexibility in a good way.

The disadvantages of the use of flexibility are summed up by Voogd as follows:
- Flexibility can be used as a way to hide the real agenda and goals.
- Flexibility can (accidentally) result in the stimulation of expansive values to the detriment of defensive values; in other words, the conservation of a certain situation can get a low priority, because of keeping open possibilities influenced by new developments.
- Flexibility can (accidentally) result in the stimulation of ‘hard’ over ‘soft’ factors, because they are harder to determine and therefore more easy to change.
• Flexibility can be used by the administration or interest groups to be able to act freely and not be restricted by regulation.
• Flexibility can result in incremental (gradual) planning, with the aim to decrease the resistance against measures and decisions.
• Flexibility can be in the way of and contradictory to the human need for predictability and transparency of things.

Three kinds of flexibility can be identified in the planning process. All can result in negative consequences.
• Flexibility of the content of policy.
  Consequence: target groups, aims, effects and results are not defined clear enough. This means that policy can be adjusted to easily, the aimed results can get lost and evaluation becomes hard or impossible.
  Measure: define within which margins policy can change.
• Flexibility of methods and procedures
  Consequence: procedures are not clear and evaluation is hard.
  Measure: definition of evaluation procedures and criteria in advance.
• Flexibility of organization
  Consequence: information about the process is dispersed between different people, responsibilities shift between people which results in problems and organizational structure is unclear which results in problematic evaluation.
  Measure: clear arrangements and the use of a sufficient data management system.

One of the main problems Voogd has with flexibility is that explicit evaluation becomes harder and is sometimes replaced by implicit evaluation. Explicit evaluation means that an evaluation procedure is determined in advance and changes are evaluated on how, why and in which way they took place. This is in contrast to implicit evaluation, where evaluation takes place, but is not done in a systematic way.

Heeling and Westrik, 2001
Over stedebouw, p. 191-195
In their article about the sustainability of the urban plan Heeling and Westrik use flexibility in the context of change and sustainability. They state that the urban pattern of streets and squares, in contrast to use, density and architecture, hardly changes over time. This means that it needs to be realized in a way that it can cope with changes over time. Designs therefore should not only be aimed at temporary (policy or market) considerations. They state that an urban plan or design is sustainable when it is able to cope with changes over time and thus flexible.

Khandekar, 2004
Integrale gebiedsontwikkeling, p. 148
Khandekar is the designer of the Den Bosch station area of which he described aspects of the design process in the book about integrated area development (Bruil, 2004). He explicitly states that flexibility and phasing are two major aspects in the masterplan for the area. By designing an orthogonal grid with closed urban blocks, strong flexibility in the phasing of developments (depending on the plots becoming available) is realized. This was however combined with a strong spatial element (pedestrian boulevard Leeghwaterlaan). The basic closed urban block can facilitate different functions, which means that the program of the individual blocks doesn’t have to be determined in advance. This also stimulates the mix of urban functions that was aimed at. This means that the image of the area can not only be dependant on the (changing) functions in
the blocks, but needs to be based on strong design of public space.

**Brand, 1994**

*How buildings learn*

Steward Brand who is an author, editor and initiator of several networks and conferences, wrote a book on changes and adjustments to buildings that are realized over time. He doesn’t literally go into the concept of flexibility, but describes many aspects of change that are also relevant when thinking about the concept of flexibility.

In the change of buildings Brand recognizes different layers that all have their own rate of change. His ‘six S’s’ consist of site, structure, skin, services, space plan and stuff. Site stays the same for ever. The structure of a building is expensive to change and stays the same for 30 to 300 years. The exterior surface or skin of the building will change every 20 years, to keep up with fashion or technology. Services in the building like wiring, climate installations, or moving parts like elevators are changed every 7 to 15 years. Many buildings are demolished early if their outdated systems are too deeply embedded to replace easily. The space plan of a building can change every 3 to 30 years, depending on the type of building. The floor plan of commercial space might change regularly, while homes might stay the same for longer periods. The last layer is stuff; the chairs, lamps, phones and appliances in the building. Another interesting concept that Brand introduces is the difference between low road and high road buildings. Low road buildings are buildings that don’t cost much, are easy to change and can be adjusted to the changing demands of the user. These buildings are mostly older, can be used for different purposes and are not static. If a company owning or renting the space expands it has the possibility to add an extra floor, acquire some extra space in the building, break through a wall and so on. High road buildings are often monumental, large scale buildings that are not easy to change. The users have to adjust their behavior to the building instead that they can change the buildings to fit their needs. These buildings mostly cost much and are often owned by large organizations that are unable to make the connection between the vision of the organization on the building and the individual user who will eventually have to use the building.

To be able to work with uncertain futures Brands pro-
motes scenario planning or scenario-buffered building for architects and planners. Next to programming they should use scenario planning to be able to design buildings that fit users demands now and can be adjusted to changing needs and context.

**Anne Vernez Moudon, 1986**

*Built for change – Neighborhood Architecture in San Francisco*, p. xviii and 188

In the book ‘Built for change’, Moudon studies on the neighborhood Alamo Square in San Francisco USA, on how during the centuries change took place in this neighborhood. She identifies three different time periods in the development of the neighborhood. On the basis of different aspects she identifies developments and changes in urban structure as well as building design.

From this extensive study she derives six lessons about continuity and change. First she states that although older neighborhoods are considered valuable, their quality is not only based on there age, but mainly on the fact that they have changed continuously over time and have different layers of history buried in them.

Secondly she states that the design of city and buildings should take place in an integrated way. “Although it is true that a house is not to be designed like a city and vice versa, it is nonetheless important to conceive of the house, or unit of building, as a cell of the city organism. Planners need to know about the properties of this cell, just like architects need to know how the cells are related or how they are structured within the city.” Thirdly, Moudon emphasizes the importance of subdivision of land in shaping city form and in controlling the nature and the extent of changes over time. In the case of Alamo Square the original parcellation and separation between public and private territories not only dominated patterns of change, but also remains as an indelible footprint of city form. The small lot as the unit of change is considered important in this.

Fourth, there is something said about the American context. Moudon states that the particularities of American society and building culture should be recognized and used.

Fifth she states that the Alamo Square neighborhood is a good example for other American neighborhoods and many examples of adaptable buildings can be found there.

As last she states that design, planning and building have for too long remained prescriptive activities, lacking theoretical bases. A more systematic approach, bases on the observation and analysis of what exists, would allow the accumulation of knowledge and would also begin a dialogue between a given built world and dynamic socioeconomic forces.

Especially for designers there are some extra remarks she makes in the study. "Whatever the scale, whether it be in the design of city or the dwelling, it is important not to design everything. Leaving some ambiguity in the way space can be used opens the door to interpretation and variety. This will be useful not only for the purposes of personalizing space, but also for accommodating changes that cannot be foreseen when the design is conceived.” Moudon states that in general, generous dimensions will facilitate the appropriation of space for a variety of activities. Over time, this approach will not promote a continuous use of our urban environment. For urban design her opinion is that design directions include a simple, straightforward, and easily legible urban framework that is accessible and usable by the residents. Within such a framework small lots will support resilience because they allow many people to attend directly to their needs by designing,
building and maintaining their own environment. By ensuring that property remains in many hands, small lots bring important results: many people make many different decisions, thereby ensuring variety in the resulting environment. And many property owners slow down the rate of change by making large-scale real estate transactions difficult. Finally, the fine-grain fabric that small lots generate is an essential ingredient of an architecture that caters to the pedestrian.

Charles Landry, 2000
The creative city, p. 6 and 13
In his introduction on creativity and urbanism, Landry states that creativity drives the evolution in culture. Cultural heritage is the sum of past creativities and creativity drives the re-assessing of each aspects of our culture when it passes on to the next generation. Creative people and organizations are the ones who influence this change and come up with new ideas to solve problems. To be able to do this they work on the edge of their capacities and knowledge and look at situations in an integrated and holistic way, laterally and flexibly. This flexibility is needed to develop unexpected combinations and visions.

Alexandra den Heijer en Hans de Jonge, 2004
Sturing van vastgoedprocessen in Inleiding Vastgoedmanagement p. 76
Flexibility is mentioned in the case of decision making in real estate management. To minimise risk the property should be able to fit to different possible futures. This is needed to be able to react on changing needs of users.
Adding flexibility requires reservation or creation of space or options for change. Four types of flexibility can be identified for this:
Spatial flexibility: the spatial and legal possibilities to use more space for buildings, increase the density and expand buildings horizontally and vertically.
Technical flexibility: structural and mechanical possibilities to adjust building form and lay-out.
Legal-financial flexibility: possibility to adjust real estate costs and revenues in the case of changing quantitative demand for space. For example with short term rental contracts or buildings that are easy to buy and sell.
Organizational flexibility: the extent to which the organization is able to adjust its needs to be able to better use the available space.

The picture shows a building of MIT that because of its storey height of more than four meters is flexible for different functions. This is a form of technical flexibility. The building is during its development process constructed in such a way to be able to adjust the building to changing mechanical and functional requirements. The cost of this flexibility has been considered to the revenues that it could bring in the future: quicker and cheaper reaction to change.

de Jong, 2004
Sun wind water earth life and living; legends for design p.539
With different examples de Jong identifies two kinds of flexibility: structural and functional flexibility. Functional flexibility is described as the possibility for the user to find among places with different conditions within a building or city a spot that matches his requirements. If his requirements change there is the possibility of easily finding a new spot that matches his new requirements.
Structural flexibility is in my opinion not an example of flexibility. It involves a standardized (technical or structural) system that has to facilitate all different
demands. From this perspective the structure is considered flexible. Practically it however means that an easy to build system can be realized to which users have to adjust their requirements.

Peter Kuenzli and Arie Lengkeek, 2004
*Urban Jazz: Pleidooi voor de zelfgebouwde stad*, p. 65, 69

Kuenzli and Lengkeek position flexibility very clear from an urbanism perspective. In their book about private housing development they say that this subject might be a reason to connect the cultural durability of the city with the technical durability of the city. This would be part of an effort to shape the spatial coherence and continuity of the city and shape conditions for flexibility, diversity and freedom. This has been neglected and abandoned in the functionalistic urbanism of the last eighty years. In this trend we lost the notion of the continuity in the city and developed a building culture that is aimed at short term success. In their plea they state that urbanism should provide the principles which guide the development of the city, within which builders have freedom to give shape to their own ideas and preferences. They state that in a system that allows coincidence and improvisation in urbanism, the city becomes less vulnerable and better resistant to time.

They identify two possible forms of flexibility in architecture: durable architecture or temporal architecture.

Figure a. Two kinds of flexibility by de Jong
2.5 Examples on flexibility in urbanism

The use or presence of flexibility can be studied in many locations and cases. In this section cases in which flexibility plays a role are studied. These cases serve as illustrations of the meaning and use of flexibility and as studies to the specific subjects flexibility is related to.

The illustrative cases that are studied to contribute to an answer on research question 2: ‘What role does flexibility play in urbanism?’ are:

- Manhattan, New York, USA
  Flexible grid
- Portland, Oregon, USA
  Flexible grid
- Belgian planning system
  Low scale flexibility in planning system
- Amsterdam centre, Netherlands
  Historic flexible urban environment
- Masterplan Hamburg Hafencity by KCAP
  Flexible masterplan and development process
- LA4Sale, Small Villages Cookbook
  Flexible urban growth strategy
- Wimby! Logica
  Flexible spatial framework
- Solids, Amsterdam, Netherlands
  Flexible building concept
- Roombeek, Enschede, Netherlands
  Flexible design and development strategy
The currently famous grid structure of Manhattan was started in 1811 with the Commissioner’s Plan for New York (Heeling, Meyer and Westrik, 2002). After the first non-native people settled in 1612 the city grew at the tip of the island. The Commissioner’s plan aimed at a structured further urbanization and development of the island. This was done with 150 east-west streets and 12 north-south avenues. The streets were the connections between the harbors at both sides of the island and were in line with the peers which were on a 75 meter distance from each other. Because of the amount of streets they were only 25 meters wide. The avenues were the connections with the hinterland and were 40 meters wide, because of more intense traffic. This street pattern resulted in blocks of 61 by 250 meters. Within these blocks very different buildings have been realized over time. Originally, the blocks had plots of 30 meters deep and 8 meters wide at the street. Part of the plots in Manhattan still have this size, with three or four storey buildings on them. The other extreme are the high-rises, which make the original buildings inconceivable and comprehend a whole block. There are several forms of buildings in between, which range from either or both great height or width. The flexibility of the blocks within the strict grid pattern allowed the blocks to change, adjust to the building needs of the time and stay successful. Both conservative, utopian and directive zoning laws have been used during the decades, which have influenced the urban forms with different success. (http://www.manhattan2050.com/urban.html).
a. Manhattan 45th street

b. Manhattan 88th street

c. Manhattan 82nd street

d. Manhattan 78th street

e. Manhattan 107th street
Portland, Oregon, USA
Flexible grid

The Pearl district is another example of change in a grid structure. The blocks in The Pearl are relatively small square blocks of 60 by 60 meters. The area was originally a warehouse and industrial area north of downtown Oregon (Wikipedia, Pearl District Portland Oregon, 2007). After the demolition of an elevated highway ramp in the late 1980s part of the district was opened and redevelopment of the area started. Now it is an intensive area with high density, high-rise, warehouse-to-loft conversion and is known as a cultural district with galleries, restaurants and cafes. An area that formally was an industrial area, adapted because of changing conditions and got a new position within the city. The urban structure and site and the structure of the buildings were able to accommodate new demands and program by probably changing the floor plans, services/installations and probably sometimes their skin.

![Map of Portland, The Pearl](a. Map Portland, The Pearl)
![The Pearl District, Portland](b. The Pearl District, Portland)
![The Pearl District, Portland](c. The Pearl District, Portland)
Belgium, planning system
Low scale flexibility in planning system

The result of the Belgian planning system is often seen as messy by Dutch viewers. A lot of freedom is let to inhabitants to build their own house individually and in their own way. This leads to a very diverse landscape which is covered by a pattern of houses. The freedom to determine spatial developments individually at a low scale is historically present in the Belgian planning system (Demeulder, 2007). This means that the appearance of the landscape is not determined by large scale plans, but by individual choices and needs over time. Rural buildings can change from farm into factory, into leisure facility, into housing, depending on the needs of the owner. This system provides a large flexibility for the individual user to change things decentral on a low scale.
Amsterdam centre
Historic flexible urban environment

Part of the centre (Grachtengordel) of Amsterdam is already more than 350 years old. The success of the area shows that there is some form of flexibility present that has allowed it to change during these ages. The strict structure didn’t change so much and many of the building facades are still the same. The buildings themselves where however build in such a way that they have been able to change program in such a way that they have always been able to facilitate city life. The structure of the inner city of Amsterdam is a relatively strict pattern, which cannot easily be changed, but on a low scale the users have opportunities to change the function or layout of the building. The fixed larger structure is no restriction for this.
Masterplan Hamburg Hafencity by KCAP
Flexible masterplan and development process

KCAP was chosen to make the masterplan for the transformation of Hamburg Hafencity in Germany. The basis of the plan consist of two basic schemes which display the division of the area in parts and the structure of and relations within the area. A further visualization of a possible model was also made, but the exact design of the area was left open. This approach did mean that the urban design firm had to stay involved in the development of the area with developers and architects, but there were left opportunities to work out the plan in a way that fits every part, time and stakeholders best.
a. Cultural landmarks Masterplan Hamburg Hafencity

b. Model Hamburg Hafencity Uberseequartier
LA4Sale, Small Villages Cookbook
Flexible urban growth strategy

‘Landscape Architects for Sale’ developed their Kleine Kernen Kookboek (Small Villages Cookbook) for the development of housing in the province of North Holland. This was formally done by sacrificing pieces of landscape where a lot of average neighborhood housing was realized, to protect the rest of the landscape and villages, where nothing could be build. This lead to a discontinuity in the normal growth of villages on the one hand and developments which were out of scale and culture on the other hand. The proposed strategy of the Small Villages Cookbook is to let every village grow by 1% a year according to one of the three village typologies that can be found in North Holland. This strategy on the one sets very strict guidelines for how growth can take place and how it should look like, but one the other hand leaves open the things that have to be chosen locally or individually, like where exactly the development will take place, how large the houses will be and who will build them.

a. La4Sale growth scenario Grootschermermeer
a. Village North Holland

b. Village North Holland
**Wimby! Logica**

Flexible spatial framework

The renewal of the Rotterdam neighborhood Hoogvliet in the south-west of Rotterdam is a large, long-term and innovative project. Large parts of the area, with 36,000 inhabitants, are part of the renewal process. The renewal of the area risked to become fragmented and lack common ground, because of all the different renewal projects in the area. The office Maxwan was asked to develop more urban design cohesion between the plans and within the total area. They did not do this with a masterplan, but by developing some common principles and choices, which had to be used in the development of all the different projects. This was called the grammar for the renewal and was named Logica, or the logics of Hoogvliet.
Solids, Amsterdam, Netherlands
Flexible building concept

Solids is a type of building that is currently being developed by housing association Het Oosten in Amsterdam. The idea behind it is to realize a building that can be adjusted and therefore function for a long time. Three layers in the building concept are identified. First the site of the project, which will stay the same for 1000 years and is the responsibility of and can be changed by the municipality. Second, the structure of the building, which will stay the same for 100 years and is the responsibility of and can be changed by the building owner, in this case the housing association. Third, the (housing, office or business) unit, the program, which will stay the same for 10 years and is the responsibility of and can be changed by the occupant.
Roombeek, Enschede
Flexible design and development strategy

Roombeek is a neighborhood in Enschede that has been destroyed by the explosion of a fireworks factory in 2000. In the redevelopment of the area an aim has been set to develop 50% of the houses with private home development. Although this way of development, moreover in an urban context, is rare in the Netherlands a good program has been developed for this in Enschede. An urban design has been developed that defines a context for every plot in the area. Things like urban character, mix of program, ground price and freedom have been laid down in maps and urban principles. For the Lonneker Spoorlaan, which is the backbone of the area, principles have been developed within which the architectural form of the building has to fit. This provides great freedom for the type of house that can be developed and on the other side provides a certain uniformity in the street. In different parts of the neighborhood, possibilities for different types of buildings have been provided.

People who develop their own house are advised by building advisors, who support the development process. For people who only want to choose from a few alternatives, an Twentse building catalogue has been developed. To stimulate the architectural diversity in the area and explore the possibilities within the framework, a design competition has been held that resulted in 167 entries.
a. Masterplan Roombeek
2.6 Issues and methods for the use of flexibility

2.6.1 Issues in flexibility

This study on flexibility has until now, in the theory, literature studies and examples, shown some issues or subjects that are relevant in the discussion on flexibility. To be able to use them in the construction of an understanding of flexibility they are worked out below. Hereby a start with an answer on research question 3: ‘3. What methods, approaches or instruments can be developed for urbanism, to use flexibility in a structured and effective way?’ is made.

This list might not be complete, but offers the subjects that often play a role when the concept flexibility is used. The subjects that will be explained are:

- culture
- power
- scale, layer
- grain size
- change
- investments and means
- diversity
- stakeholders
- continuity, fixation and robustness
- surplus

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Culture
The culture of a society influences how flexibility is used and if there is a need for flexibility at all. In communist state planned societies, where much is determined top-down and executed according to plans and procedures, flexibility is less used than in more dynamic market oriented societies where developments involve much more complexity and are less predictable. The same goes for the planning culture and planning system of a society. In the 20th century Dutch planning system, flexibility did not have an important position, because much was calculated and determined in advance and executed as planned. This is now changing because of a larger role of the market and the recognition of factors that cause complexity, uncertainty, constant change and unpredictability. In this situation, flexibility of plans, solutions and ways of working becomes an important aspect in dealing with this. Some projects and methodologies also do that nowadays. Other aspects however, like for example the planning and production system for large parts of our housing stock still represent a rigid culture that doesn’t provide opportunities for people who want to build their own house. Another example of where planning culture strongly influences a certain use of flexibility is the Belgian planning system. As explained earlier, the power to influence spatial developments is organized at a very low level. People can easily change their buildings’ program and design and build in the way they like. This amount of flexibility at the users level is essential in the Belgian planning culture, but would be unthinkable in the Dutch planning culture, where aesthetics and program are mostly strongly regulated. A step further in flexibility in the planning culture are the favella’s or slums that can be found in developing countries. In those examples often nothing is organized top down or by a government.

Power
The organization of power within a project very much influences the need for flexibility. If a small group or an individual stakeholder has the power to determine what is going to happen, has the ability to realize that and has the ability to deal with changes, flexibility is needed and used less than in the case of a large group of stakeholders, with power divided among them and lack of organization. As explained in section 2.3.2 this aspect is one of the sources of uncertainty in the development process.

A second relation between power and flexibility exists in the way power can be divided to different levels. As identified in the scheme in the introduction on flexibility different stakeholders have responsibilities and influence on change on different levels. A conscious consideration of the power and influence on different levels is important when using regulations. Also in the comparison of planning cultures in the previous section this issue plays a role.

Scale, grain, layer
The scale and layer on which something takes place is very relevant to consider in urbanism. A new highway can on the one scale be a connector, while on the other scale it can be a barrier. Also the layer in which one is planning interventions is relevant to be able to evaluate the aimed and possible effects of the intervention. Possible divisions in scales and layers are very diverse and differently used by different people. What in urbanism often is the case is that the relation between two layers consists of a structure vs. a program in the sublayer. This program is than again the structure for the program in the sublayer below it. The recognition of these different scales is important to be able to effectively act and evaluate effects. The use of this divisions in
<table>
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<td>3 - 30</td>
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<td>Urban elements (buildings, infrastructure bodies, collective spaces)</td>
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<td>Site</td>
<td>Site</td>
<td>Municipality</td>
<td>Urban structure</td>
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Figure a. Flexibility in layers in different models
scales is that it can help to make a division in aspects that are fixed and aspects that can be left open. Only if these are done at the right scale they will have the aimed effect. Some examples of divisions of time, space, subjects or responsibilities will be explained to illustrate this.

Figure 60a shows several models which use the division in layers. The first is Steward Brand who identifies six layers in which change takes place in buildings. Every layer has its own time period within which change takes place. A second example in the scheme is the Solids concept which is being build in Amsterdam by housing corporation Het Oosten. In this concept a building is divided on three scales with each its own actor and time period within which change takes place (10, 100 and 1000 year). Elaborating on these examples a deviation can be made for the existing city and for the development process.

Another example of deviation in layers is a model of the (network)city by Gabriel Dupuy. The model is used to gain an understanding of the workings of the system of the city as a whole (van Schaick, 2005). It uses three perspectives or operators that are related to each other. The first level is the road network, telephone network, etc. The second level is the production network, the consumption network and domestic network. The third level is the territory of the urban household. The levels are dependent and facilitate the above laying level.

In the book *De Kern van de Stedebouw* (the core of urban design) Heeling et al. present a spatial layer model of the urban environment. With the model they try to identify different disciplines or perspective from which one can be working on an area.

**Grain size**

What is striking in many of the examples in this study is that a small grain size of elements on a lower level uncovers a level that is very much needed in vital cities.

A small grain size enables diversity and gradual change on a low level. Changes started at this low level can be starting points for bottom up processes. The presence of dynamics on a low scale, because of a small grain size contributes to the ability of an area to deal with changes in a healthy way.

There has to be noted that small grain size is relative to the environment and that the presence of a small grain size sometimes makes large scale interventions harder to execute.
A key issue in the discussion on flexibility is change. Changes take place because of the interaction between systems and agents and actions of agents, which results in development of these systems and agents. In dynamic systems the working and results of these interactions are often unpredictable and the working of the system itself is often unknown. Static systems much more work on the basis of actions and are often more predictable. Time is a fundamental part of change. Change without time is impossible and might at most bring the word ‘difference’ in mind.

Batty (2005) describes five drivers that are, in his opinion, critical to an understanding of how change (in cities) takes place: randomness, historical accident, physical determinism, natural advantage and comparative advantage.

Flexibility is in two ways related to change. On the one hand flexibility can be an effective way to react on changes that take place. On the other hand flexibility can result in and enable change, when that is needed. By using flexibility one should enable to deal with the change that one reckons with or is conceivable and on the other hand control the margin of change that is allowed to take place. Extreme changes or very large variations are often impossible or too expensive to take into account. This means that flexibility can be effectively used to deal with a certain amount of uncertainty and change, but has its limits.

**Investments and means**

Flexibility and the opportunity to change is often influenced by the way means are accumulated or invested. This already can be seen in the separation in layers of a building and the time, money and change aspects of that different layers. The structure of the building accounts for a large part of the construction costs and is therefore not something that will be changed every year. The construction therefore needs to be able to facilitate changes on the lower layers within it, but doesn’t need to be able to change very much itself. Infrastructure is another good example of this principle. When a bridge, station or railroad is constructed a lot of material and money is invested in it. This means that lower layers of these constructions like how they exactly function might be changed now and than. But they will for example not be moved to other locations every year, because that is too expensive to do and would be a waste of materials and money. What can be concluded from this is that the more money and the stronger it is fixed, the smaller the chance that changes will be realized.

**Diversity**

Like change, diversity also has a double relation with flexibility. Diversity provides certain flexibility, but flexibility also makes diversity possible. Differentiation of for example buildings in a neighborhood provides opportunities for the differentiated housing needs of different people. On the other hand a flexible building provides a possible answer to different program and could lead to differentiation in program. The advantage of variety and diversity is that changes can take place gradually. As a reaction on constant changing conditions, only part of the buildings in a neighborhood will have to be changed. When all the housing units are the same change will either not take place or take place in a radical way.

**Stakeholders**

Important in making flexibility operational is the stakeholder issue. It is for example relevant to be clear in who you want to give the opportunity to change things
and who can benefit from that. Also a clear division of responsibilities and opportunities for change and fixation/regulation of the different aspects in the city is needed. This stakeholder aspects can in the scheme about the different layers in flexibility often be connected to a layer of time and place. Delegating responsibilities to the right stakeholder often contributes to the ability to react fast and in the right way to changes that take place. The stakeholder concerned is often the one who experiences change first and has ideas about how to react on it.

**Continuity, fixation and robustness**

Flexibility can also be seen as a scale between total fixation and total freedom. Flexibility is in that case not only about as much freedom as possible, but about the appropriate balance between freedom and fixation. For this reason the opposites of change, freedom and volatile/fragile, namely continuity, fixation and robustness often play a role in the discussion about flexibility. Also these three aspects can be desirable or can bring strong qualities to a project. The right balance between them in one layer or the relation between them in different layers can very much influence the success of a plan or area.

**Surplus**

Spatial surplus in the proportions of buildings is something that is often promoted to provide flexibility. The surplus of space (in three dimensions) enables a user or program to keep using the building when its spatial needs change or the program changes. A surplus should however have its limits to not become a waste of resources.

**2.6.2 How to use flexibility as a reaction on uncertainty in urbanism?**

From the study on flexibility in general and in urbanism specifically, we can now come to more concrete recommendations about how to use flexibility in urbanism. This section will be about the use of flexibility as a reaction on uncertainty. There are several steps that can be taken separately or after each other when one is using flexibility as a reaction on uncertainty. Some of these steps are derived from the recommendations of Drewe (1993) on flexibility. Others come from the earlier work in this study. The first step is reducing uncertainty. The second is accepting and dealing with uncertainty, which consists of two steps. Firstly forecasting and scenario planning. Secondly practical ways and approaches for dealing with uncertainty in concrete situations. These steps will be discussed below.

**Reducing uncertainty**

Uncertainty about the subject and process one is work-
ing on leads to ineffective actions taken and paralysis of process, people and organizations. There are however ways to reduce this uncertainty. One can for example gain more knowledge about the subjects one is working on. An urbanist might have to do this every now and then, because his broad focus and knowledge is not always sufficient for more specific subjects in individual projects. This kind of gaining more knowledge is also something that is done in the analysis of specific projects. By analyzing the location and the task that is given, the urbanist is better able to focus his actions and propose relevant interventions and measurements. When analysis leads to sufficient insight in the project and task a real difference can be made between ‘visionary, utopian, purely artistic or theoretical solutions’ and ‘realistic and professional solutions’. Those last ones show real understanding and insight to the problems and forces and are in control of developments and change. Clear identification of the subjects that are relevant for a project can lead to sufficient and effective analysis.

Clear consciousness about and/or formulation of goals can, like for individual people and organization, help the effectiveness of urban developments and reduce uncertainty. This can be the case in multiple ways. At the highest scale social and political goals are sometimes driving forces in the project. On step lower the goals of parties and stakeholders who are participating play a role. Those two combined often make the goals of the project. Defining and communicating the goals of a project can help very much in the organization of a project. It is than for every activity in the process clear what goal it is supporting and which direction it should be heading. Goals will probably have to be formulated for different subjects (financial, spatial, social, environmental and so forth) but are most stimulating when they are translated into a vision for the whole project. For the project as a whole clear goals and objectives have to set to be able to manage the process, take decisions and execute activities. The way these goals are formulated on the one hand has to provide enough clarity, but on the other hand has to be defined according to the period they are about. Short term goals can be defined very concrete, while long term goals should often leave more room for change.

After analysis and goals, coordination is another opportunity to reduce uncertainty in the process. By improving the coordination of activities within the process and between the parties involved, greater control of the process is realized and less has to be left to coincidence and with that uncertainty. More coordination and control (either from a Rationalist or Evolutionary perspective (van der Heijden, 2005)) is not something regular in every organization, but can lead to reduction of uncertainty.

Assessing uncertainty
When uncertainty is reduced by better understanding external influences and better managing internal aspects, there is still uncertainty about the future left. This is partly a choice by leaving some things in the process open and undefined for later, but partly not possible to influence at all. In both cases a consciousness of what could happen is useful and needed. Depending on the term and type of aspects different amounts of predictability and uncertainty exist. For short term, conservative and stable developments, the predictability and probability of events are relatively high and forecasting is a useful method in this case. For longer term developments, which are more volatile, hard to understand or even hard to imagine, scenario planning is an appropriate method. Both methods are
Forecasting is a capability of skilled professionals that really understand their matter. They can assign probabilities to future events or forecast the developments of certain trends. This is done on the basis of the evaluation of historical events and the development of current trends and expectations. Parts of these forecasts are based on for example current demographic information, parts are based on presumed causal relations between current data and for example expected policies. This type of forecasting can be very useful to base decisions on in the case of short term and stable developments. The urbanist often uses analysis as a way to better be able to do predictions.

Developments that are hard to predict or events that are not likely to occur are however not assessed with this method. In those cases scenario planning is an appropriate instrument (van der Heijden, 2005). Not because of its predictive power, but because the consciousness it can raise about the ‘what if’ of events that are not probable. Also the advantage that one has when the improbable does occur is worth using this method. Solutions and decisions and their impact have than already been evaluated before the event occurs. The advantage of using scenario planning for projects and organizations is summarized by van der Heijden (2005) in three points:
1. They help the organization in understanding the environment better, allowing many decisions to be seen not as isolated events but as part of a process of ‘swings and roundabouts’. In this way scenario-based planning helps managers to avoid undue conservatism, by allowing ‘calculated’ risk taking.
2. Scenarios put structural uncertainty on the agenda, driving home to the organization what sort of ‘accidents are waiting to happen’. In this way scenario-based planning helps managers to avoid taking undue chances.
3. Scenarios help the organization to become more adaptable by expanding their mental models of the business environment and thereby enhancing the perceptual capabilities needed to recognize unexpected events and take proactive action.

When developing scenario’s some thing have to be taken into account. Scenarios aren’t the 10% higher and 10% lower predictions when forecasting, but are developments that structurally change the context. This can for example be the case when formally non present factors start influencing certain developments, which result in developments totally different from stable, probable or predictable growth or decline. Only when scenarios are developed in such a way one can benefit from the use of scenario planning. A mistake often made is when scenarios are confused with versions of one plan. A version or variant is a model that is changed in some internal aspects. A scenario is a model in which the external aspects and context changes. Within one or more scenarios one or more versions of a model or design can be evaluated.

Uncertainty and change in urban design
Part of the information in this study has a background in management studies. This makes it often very applicable for urban planning and development process management. This would however leave a gap for flexibility in urban design. Therefore the position of uncertainty and change in urban design will also be elaborated. This has to be done because of the different meanings and roles flexibility, uncertainty and change have among the different disciplines.
However the methods mentioned above are partly focused on management and decision making they can also be used by the urban designer. In that case it however has to be clear which form of uncertainty and change is relevant. Also for the urban designer there are numerous aspects that can be used in scenario assessments. Changes in the way people use their spatial environment and changes in program might the two most relevant in this. But also demographic and economical changes, changes in planning culture and architectural fashions and changes in the role and content of politics and policy are things that are relevant to consider when making designs.

2.6.3 Methods, approaches and concepts as a reaction on uncertainty in urbanism

When uncertainty is reduced, the possibilities of change are assessed and uncertainty is accepted, concrete methods and concepts can be used to work with it. Some of these are becoming regular practice nowadays, others are not yet used very often.

Masterplan and development vision

However the design and plan have long been the important instruments of the urbanist, it becomes more and more accepted that these are not the right instruments to steer all developments anymore. A development vision (Reijndorp and Reitsma, 2006) seems a more appropriate instrument to steer the gradual development of an area. It is an useful instrument for larger areas, where there is not one commissioner, but a group of organizations involved in an area. The development vision than not provides a literal plan, but a handbook and guidelines for the area. This approach acknowledges that urban development and management isn’t a one time event for a static city, but an ongoing concern for a dynamic city were different opportunities, coalitions and needs emerge over time. This approach is also reflected in the way the meaning of the instrument masterplan develops. Were a masterplan used to be a detailed overall design for an area, it now gets a different interpretation. Gietema (2007) tells that not making a detailed design and only presenting some basic principles made his office KCAP win the competition for the design of Hamburg Hafencity. Also Christiaanse (2007) in an interview with www.arkiblog.net gives his definition of a contemporary masterplan “It is a sustainable framework for a development that accommodates different programs at different time speed on different circumstances.”. He remarks that in that sense it is a design tool and not a planning or administrative tool. This way of designing can provide a strong framework (enabling a direction for the development) within which different (unknown) developments at different speeds can be tested and eventually take place.

Integral approach

Another important principle in dealing with change is a multidisciplinary or integrated approach. This firstly enables the reduction of uncertainty because of the presence of relevant knowledge. Secondly it secures the availability of relevant knowledge to deal with the change that takes place.

Layer approach

The layer-principle has already been mentioned before in section 2.6.1. For stakeholders specifically it means that a project or area should organize responsibilities and choices at the appropriate levels. In that way choices are made by people who they are most relevant for or who have the most knowledge or experience about the subject. This means that for example choices affecting the whole city are made at municipal
level. But if at municipal level is also decided what the problems in a neighborhood are or how for example the public space in that area should be designed, choices become bureaucratic and the people involved are ignored. To be able to deal with problems and opportunities that emerge, the ability and responsibility to deal with them should be organized at the level that is most appropriate and effective in dealing with the problem or subject. In that way change can be addressed effectively (flexibility) and change doesn’t become a problem.

**Spontaneous City (Spontane stad)**

An approach to deal with dynamics and change in cities is developed by Urhahn Urban Design and is called the spontaneous city. This approach acknowledges and stimulates continuous small scale change and dynamics. In a brochure published by Urhann Urban Design, the spontaneous city is characterised as:

The Spontaneous City stands for:
- Greater influence exercised by users;
- Flexibility in terms of functions, time and space;
- And a continuous process of transformation.

The Spontaneous City is a reaction to:
- The world-wide trend to view cities as ready to use products;
- The tendency to banish serendipity entirely.

The Spontaneous City is a way of thinking - it’s anything but a standard recipe which can be applied to any given location. Thinking from the point of view of people and bearing in mind the processes which are at work and the changes which are always on-going in a city. This provides for a city with a long-term sustainability level and its own sense of place. The historical Canal Zone is one of the oldest spontaneous developments in Amsterdam – a network of canals containing plots of land each of which was developed by its original owner. Former warehouses are still being converted into lofts, luxuriously decorated Baroque reception rooms are still being converted into stylish offices, and hospitals are now used as hotels, not to forget that some conversions have already outlived their purpose and have been reconverted to yet another use. You can’t get much more durable and sustainable than this!

The quest for Spontaneous City is an ongoing process. In this endeavour, one cannot simply borrow historical examples, but must search for concepts that fit the contemporary world. Every city must find its own strategy for developing and renewing residential and working areas that are both sustainable and distinctive.

In this sense, Spontaneous City is a good investment. It provides freedom for different individual users and is open to change over time. At the same time, it respects the geography of the environment, and the culture of the city and its citizens. A sustainable environment is not only flexible, but is unique and full of surprises.

(2007, Urhahn Urban Design)

2.6.4 Conclusions

In this section ten issues are identified that are relevant in understanding and using flexibility. Next to that three steps to reduce, assess and deal with flexibility are explained. This last step is illustrated with four methods that incorporate flexibility.
2.7 Case studies

2.7.1 Introduction
After a theoretic study on flexibility, the subject will in this section be evaluated from a more practical point of view. This is done to investigate which role flexibility, both implicit and explicitly has (had) in those large urban projects. The research question which is the basis for this section is:

Research question (research proposal)
5. What role does flexibility currently play in the development strategies of large urban projects in the Netherlands?
   a. Which types of large urban projects can be identified?
   b. In which way can the development process of these projects be described?
   c. In which aspects of these projects does or can flexibility play a role?
   d. Can this be translated to methods, approaches or instruments for the use of flexibility in large urban projects?

These questions will be answered in the different parts of the case studies. Question 5a is answered in the section ‘The development process of large urban projects’ which can be found in the appendix of this book. Question 5d will be answered in both the conclusions of the case studies and the section ‘Theoretic framework’. For the case studies there is a main question that has been formulated.

Main question:
Has there been explicit attention for flexibility as a way to deal with uncertainty and change in the future? In which way was or is this present in the different aspects in the different phases of the project. Where was uncertainty present and did change occur?

This question can be made more specific for the different aspects, identified in the section ‘Flexibility in urbanism’, for which flexibility is relevant. On the basis of these specific questions the cases are evaluated. The information that is used for these evaluations is collected from websites and books about the projects and more specifically from records of city council meetings, official documents and contracts of the projects, local land use plans, the masterplan of the project and own observation at the projects location.

The quality of the case studies is not that the information and conclusions from the case studies are empirical solid. The limited number of case studies does not allow drawing general conclusions about flexibility in large urban projects. What it however does do is providing an impression and indications about how flexibility is used. For this reason three relatively different projects have been selected for the case studies. They are all three transformation projects, which makes them relevant for the Binnkhorst project. They differ however in either size, project approach or time period in which they were/are realized. The selected case studies are:

- Kop van Zuid, Rotterdam
- Ceramique, Maastricht
- Northern Ij-shores, Amsterdam

After each case concluding observations are drawn up to summarize both conclusions about the case itself and remarkable and interesting aspects that can be used in a design project. The conclusions from the case studies, together with the conclusions from the theoretic section make up the basis for the ‘Framework on flexibility’.
For every case a standard set of questions is used to evaluate the projects. Those questions are based on the section ‘Flexibility in urbanism’ and are divided in three categories (governance, management and design).

**Design**
- Which design products were used/made during the planning process, what was their aim and were they the appropriate products to steer different future developments?
- What urban structure was designed for the project? Did it provide a flexible guideline during the development of the project and opportunities for change during its use?
- Does the area function in such a way that it provides opportunities for change and different uses in the five different layers?
- Does the design leave opportunities for different program, change in program and changes made by users?

**Governance**
- In which municipal policy was (the start of the project) embedded? Did municipal policy change over time?
- What were the municipal goals at the initiation of the project and did they change or evolve?

**Management**
- What were the goals at the start of the project and (how) did they change during the different project phases?
- Which stakeholders were involved at the start of and during the project and how were these partnerships organized?
- Did the methods and instruments used during the project leave opportunities for flexibility?
- In which different phases has the project been divided and how much room did this leave for flexibility?
- At which points were important decisions taken and in which way did they leave possibilities for change?
- Which planning documents were used to organize the planning process?
2.7.2 Rotterdam Kop van Zuid

Characteristics:
Type of project: transformation of harbor area into central mixed use urban area.
Size: 125 hectares
Program:
5300 houses
377.000 m² office space
34.000 m² leisure
3500 m² shops
51.000 m² commercial services
16.000 m² special uses
3600 build parking places

General info:
City: Rotterdam, Netherlands
Planning period: (1978/) 1993 – ongoing
Design: Teun Koolhaas Associaties and dS+V Rotterdam

In which municipal policy was (the start of the project) embedded? Did municipal policy change over time?

In the reconstruction period after WO II, the focus in Rotterdam was more on new modern neighborhoods in the periphery, than on the harbor areas near the river which became vacant and the older neighborhoods south of that. During the 1960s the attention for renewal of the social housing in the older neighborhoods grew because of protests against their neglect. Also the renewal of the harbor area got more attention. City plans stated that 4000 houses could be realized to provide housing for the people that were leaving to neighboring municipalities at that moment. First plans where to realize social housing. With the presentation of the urban design of Teun Koolhaas in 1987 however, the focus shifted to a more market oriented development, with next to (more expensive) housing, offices and tourist attractions. During the 1990s the idea existed to develop parts of the Kop van Zuid into an international telecom office location. At the start of the 21st century the program that is realized at the Kop van Zuid is part of the strategy to provide more housing for middle and upper income households. The aim of this is to realize a better balance between social and more expensive housing in the city.

What were the municipal goals at the initiation of the project and did they change or evolve?

The original goals for the location Kop van Zuid were to realize a certain amount of houses within the city to transform harbor areas that became vacant. With the idea of realizing a new bridge over the river, the goal of connecting and integrating the north and south side
of the river became part of the plans. During the 1980s a more integrated goal and mixed use plan was developed for the area. In the 1990s this developed into the ambition of becoming an international telecom location. During the realization of the project a more pragmatic vision was adopted with which relatively intensive mixed use urban area is now realized in high densities. The Kop van Zuid is now part of the strategy to attract higher income households to the city.

What were the project goals at the start of the project and (how) did they change during the different project phases?

The project goal to develop the area into an intense urban area has different sides. Most of the housing areas were realized relatively early in the project and successfully. The goal to realize a large amount of office space did take more effort however. The first office buildings to be realized were all build for governmental organizations. The aim to make parts of the Kop van Zuid an area for international telecom companies was supported by the acquisition of the KPN Telecom office build by Renzo Piano next to the Erasmus Bridge. This project that cost significant effort and money might however stay the only one in this introvert ambition. The realization of more office buildings and high rise towers is now done in an individual and step by step way.

Which stakeholders were involved at the start of and during the project and how were these partnerships organized?

Before there was a masterplan for the whole of the Kop van Zuid, the work on the area was done by the municipality in close cooperation with the local inhabitants organization Feijenoord (BOF). This group of inhabitants had a relatively large role and even came up with an own design for the area in 1978. After the approach for the area changed to a larger scale and a more integrated development, the role of the inhabitants of the (surrounding) areas changed from a prominent role in the developments to a more participative role focused on specific subjects. Programs were started to employ local people in the new area, with differing success. Because of discontent with the approach of the municipality among the inhabitants organization, parts of this cooperation eventually blew up.

The masterplan of 1987 was an initiative of the department for urban design and traffic management. The head, Riek Bakker, asked Teun Koolhaas Associaties to
come up with a masterplan. This plan was presented in an effective way and stimulated the planning for the area. The design was reviewed by the National Investmentbank, the Enterprise Development Company and Erasmus University. This and other reviews and adjustment led to a masterplan which was eventually worked out in more detail by the project bureau Kop van Zuid.

For the Wilhelminapier a specific masterplan was made by Foster. Foster also designed the first building that was built on the Wilhelminapier.

The further development of the buildings in the area was controlled via a Quality team, which was a delegation of the municipal design control commission. This team was together with the project bureau and the architect and developer involved in the design of the buildings. With this way of public private cooperation the development of the neighborhoods could be done by private developers, with the influence of the municipality remaining during the whole process. It didn’t restrict private developers to much, but enabled the municipality to be involved in important details and communicate the idea of the area as a whole.

Notable about the project is that the municipality has always been supporting the project in a strong way, financially and administrative. This for a great extend contributed to the continuous development of the project and involvement of private parties.

**Did the methods and instruments used during the project leave opportunities for flexibility?**

The organization of the development process with a regularly changing masterplan, a global local land use plan and quality-teams guiding the interpretation of these documents provides the possibilities to change and adapt to changing circumstances. In the beginning of the process the original masterplan was adjusted because of research, discussion about it and changing spatial choices. The status of the masterplan made this possible. But also after the masterplan was more ‘fixed’ in the local land use plan, the infill of the blocks remained open to change. The quality-teams were the instrument to guide the further detailing in the process.

**In which different phases has the project been divided and how much room did this leave for flexibility?**

A clear division in phases is hard to make, but different periods in the planning process can be recognized.

**Motive and initiation**

a. Masterplan Kop van Zuid
The recognition that something had to be done in the area and that there was potential for development became clear during the 1970s when parts of the harbor became vacant. Also the need for locations for new housing developments within the city were the reason that the area became an option for redevelopment in the structure plan of 1978.

Research and analysis
This was the start of a period of further analysis of the location and the need and possibilities for redevelopment. Several ideas came about, but no feasible idea emerged out of this.

Visions and aims
On the 3rd of June 1987 the urban planning department of the municipality together with urban design firm Teun Koolhaas Associates presented a new vision and masterplan for the Kop van Zuid. This plan included a bridge between the north and south bank of the river Maas and should establish the center of Rotterdam on both the north and south side of the river. This masterplan was altered in the course of time, but proved to be a strong starting point and vision for the development.

Formation
After the presentation of the masterplan in 1987 it was evaluated by several parties. This led to adjustments to the plan. During the same period a covenant between the national government and the city was signed for the financing of part of the project costs for for example infrastructure. Also the acquisition of private developers for the development of the buildings in the area can be considered the formation period.

Development plan
After the masterplan was evaluated and it became more clear what the financial conditions for the project were and which parties (with their own visions) were involved, a final masterplan was developed. This was done by the project organization Kop van Zuid, which was part of the urban planning department of the municipality. This masterplan fixed the position and design of streets and harbors and gave suggestions for the building blocks. The buildings and blocks were however often altered later by the project organization or the architects.

Development preparation
After the masterplan was finished it was laid down in a local land use plan in 1991. After this moment aspects of the design were changed and the designs for some of the individual buildings were made.

Realization
Most of the projects on the Kop van Zuid were built between 1995 and 2000, which is considered the first building phase of the project. The second phase is 2000-2010 in which large highrise buildings at the Wilhelminapier are realized.

At which points were important decisions taken and in which way did they leave possibilities for change?
The decision to start redeveloping the area was taken during the 1970s, but did not yet involve a concrete development task. It was only until after the presentation of a masterplan by Teun Koolhaas, that a goal and direction was set. This masterplan involved a program and approach that was different from previous ideas and therefore set a specific development direction. The development goals were also laid down in a covenant with the national government about the program and infrastructure that should be realized. The actual ambitions for the area were higher than the numbers from the covenant. This left room to if necessary change the program without breaking the covenant.

Which planning documents were used to organize the planning process?

As a reaction on the ideas that existed on the development of the Kop van Zuid and the proposed location of an erotic centre in it, the tenants organization Feijenoord came up with an own design. The erotic centre was not realized, but in the years after that no masterplan was set either. It was the masterplan of Teun Koolhaas, which was presented in cooperation with the municipal urban and traffic design department that was the start of a development. This document started a discussion and resulted in a final design and the start of the development. On Mai 18th 1989 the city council ordered the redevelopment of the Kop van Zuid. This was followed by their approval of the local land use plan at the 3rd of September 1991. Although this plan should guide and restrict the development it left things relatively open. In the land use plan, only three types of program were allocated: urban functions, housing and open areas. These types contained a range of subfunctions and provided the freedom to structure the area, but not be too restrictive in what functions could be realized in the future. Although the land use plan left freedom for the future, it is also clear about street front that should be realized and heights of street fronts. These aspects influence the character of the environment and are therefore determined. The further detailing of the land use plan is done by a quality team and a program team that discuss and approve concrete design proposals. Programmatic goals for the area were also laid down in the covenant between the municipality and the national government.

Which design products were used/made during the planning process, what was their aim and were they the appropriate products to steer different future developments?

The Teun Koolhaas masterplan has clearly been an accelerator for development. His design really set a direction for the development. And although it was a masterplan it has been altered after evaluation of the plan and consultation of parties. Also after these changes the original concept was still standing and kept guiding the developments. The masterplan for the Wilhelminapier by Norman Foster has not proved to be that strong. Only the height of the lower zone in the middle

a. Masterplan Wilhelminapier Rotterdam
b. Rotterdam, Kop van Zuid
of the pier was maintained. The Foster design was already very detailed in the design of every building and the typology of the lower floors of the buildings. On the one hand this provides a clear image of how the area could be realized. On the other hand it doesn’t recognize the context of the project. If the only problem of the area would have been designing and building it the design would have been strong and appropriate. There was however uncertainty about which partners would build the buildings, if there was demand for so much real estate and exactly they would be built. This context means that a design with principles and guidelines would have been more appropriate. This is now also being proved in the way the pier is realized. The buildings that are actually realized don’t look like any of the previous designs and are planned, designed and built to their current constraints.

The constant change in designs can also be seen in the designs of the project bureau Kop van Zuid. Versions and models that were made in 1978, 1991 and eventually in the building period 1994 all differ. This proves that not so much the aesthetic design, but more the principles are important to lay down in a design. What is also striking is that the urban design made by the project bureau is mainly about building masses. Aspects like meaning, functioning, role and identity of public space have not a prominent role in the designs. On the one hand the structure and building masses are important and the aesthetics of public space might have to be designed later in the process. On the other hand is the public space the domain of the municipality and could be a strong guideline and framework for the design of the rest of the area.

All the architectural designs of the buildings were made later in the process, within the space the land use plan left for that. This was much space and in that way the buildings again got a new design that was considered best at that moment.

What *urban structure* was designed for the project? Did it provide a flexible guideline during the development of the project and opportunities for change during its use?

In general the structure of the Kop van Zuid is fixed and determines the layout of the area. The structure was not determined from the beginning and has been discussed, tested and evaluated during the design process. At some locations, like the Wilhelminahof and Landtong and the possible connection with the Paul Krugerstraat, space has been left open to realize possible extra connections in the (near) future.
Does the area function in such a way that it provides opportunities for change and different uses in the five different layers?

On the larger scale the structure of the area is fixed as described above. Because it is embedded in the surrounding city not much of the structure will probably change. The old railway track which goes through the area is something that could bring structural changes in the area, when neighborhoods at both sides of the track would be connected. On the building level things will change because of the realization of new buildings at empty spots in the area. Also some of the old buildings on the Wilhelminapier are examples of buildings that have been and will be changed and reused in the coming years. Apart from this however, the scale of most of the buildings is something that disables change. The large office buildings or very large housing complexes are something on which users have no influence to change them. Exceptions for this can be some of the units on the Lodewijk Pincoffsweg, which look like they can be used as either houses or for commercial functions. The design of the public space in the area is something that got much attention. This can be seen in the high standards in the design of some parts of the housing area in the area Stadstuinen and the two main roads through the area. On the one hand this well planned design provides a strong framework for the area. A special pavement that is developed fits to the many different locations within the area and is a contrast to some sidewalks where it has not yet replaced former pavement. On the other hand the diversity of new pavement lets you sometimes wonder why so many different types are needed. The organization of public space is also on the Kop van Zuid influenced by the physical design of it. At some places however the design doesn’t predetermine the organization. Examples of this are the parking entrance of the World Port Center which doesn’t have an own street, but is just hidden at the other side of the sidewalk (picture 1a). Also the differences in pavement patterns and types seem to intend to say something, but don’t always mean much for the user. The scale and size at which the public space is organized are spacious for the current situation, but probably very well provide a good dimension for what the area will grow into.
Does the design leave opportunities for different program, change in program and changes made by users?

Solutions in for example the Lodewijk Pincoffsweg provide opportunities for changes in functions. Also the height of the ground floor on the Wilhelminapier provides opportunities for different functions. There are aspects in the housing areas on the Kop van Zuid that provide opportunities for a differentiation in functions, but because of culture or regulations this will probably not take place soon. The size and design of most of the buildings in the Kop van Zuid enable some flexibility for users in use and program of parts of the buildings. Physical changes are however not likely to take place because of the scale of the buildings.

Concluding observations

The land use plan leaves relatively much open. This provides opportunities for divers developments, but doesn’t steer in a clear direction. The projectteam and qualityteams provided some of this guidance.

The scale of many of the buildings in the Kop van Zuid doesn’t stimulate change. The human scale is something that in more places in the area is not strongly present or vibrant.

In the transformation and development of the area not so much use has been made of temporary functions that can inspire the development. This would also have stimulated a development of activities on the human scale in the area.

During the process design have been used to visualize possible developments. They have however regularly been changed during the process.

Designing on all the scales in an early stage might be usefull to develop and test a vision for a project. The design than has to be generalized to a framework and
principles to provide opportunities for change. During the realization designs can be evaluated again with the original vision.

References:
http://www.kopvanzuid.info
82 a. Maastricht, before and after transformation
2.7.3 Maastricht Ceramique

Characteristics:
Type of project: transformation of industrial area into central mixed use urban area.
Size: 23 hectares
Program:
1.600 houses
70.000 m² office space
5.000 m² retail
20.000 m² hotel accommodation
20.000 m² cultural functions
4.400 m² parking places

General info:
City: Maastricht, Netherlands
Planning period: (1973/) 1987 – 2004
Design: Jo Coenen

In which municipal policy was (the start of the project) embedded? Did municipal policy change over time?

Since the end of the 19th century ‘Societie Céramique’, a pottery factory, developed in the area that is now called Ceramique. Maastricht for a long time developed within its fortifications, but this industrial area lay on the eastern river shore outside the fortifications. The expansion of the city after WO II and the expansion of the area that was considered the centre of the city, made that the Ceramique area became a blind spot within the city. After some extensions at the edge of the city and the decay of the inner city, the development of new housing within the city got more attention. The Ceramique factory location was a very interesting location in this, but was not touched yet because of the employment it provided. Also the size of the area made it impossible for the municipality to buy the whole area from the factory. Arrangements with the Sphinx Ceramique company and a public private partnership between the municipality and investor ABP in 1988 eventually made it possible to start the development of the location. The location was intended to stimulate regional economic development and potential with an international impact.

What were the municipal goals at the initiation of the project and did they change or evolve?

Already before the Sphinx Ceramique area was acquired there were goals formulated for the area in regional and municipal planning documents. They stated that in the case of a development at this location, multifunctionality, stimulation of housing and the realization of green areas should be realized. When the development really started the relations and parallels with other
large urban projects in the Netherlands were identified. Also the fact that this scale of development was a new type of project in the Dutch context was named. The ambitions about the approach for this new type of project were: to cooperate with private parties in the development of the project, use an innovative approach for large project locations, realize high quality housing, offices and infrastructure, realize the planning process of the development in a short period and based on long term visions and long term agreements.

What were the goals at the start of the project and (how) did they change during the different project phases?

The programmatic goals were laid down in detail in a partnership agreement which was signed by the municipality and investment fund ABP in 1988. Although these goals were relatively concrete and detailed they left room for variation and adjustments to changing market circumstances. Also in the case of large changes in the market, the possibility to cancel, change or postpone parts of the project was incorporated with a flexibility-clause. The realization of the project was planned to be done within ten years.

Which stakeholders were involved at the start of and during the project and how were these partnerships organized?

After the Sphinx Ceramique factory offered to sell the area in a letter to the municipality in 1987, the municipality choose the Dutch pension fund ABP as the partner to develop the project with. After a market orientation by Wilma Real Estate and an urban design by Jo Coenen, the municipality and ABF signed an agreement for the development of the area in 1988. This cooperation was translated in a project organization chaired by ABF. In the cooperation the municipality was focused on public aspects like subsidies, permits and the design of infrastructure. ABF was focused on contact with other market parties and the management of the project. In 1994 ABF handed over the management of the project to Trimp & van Tartwijk en BBN advisers. Jo Coenen functioned as the supervisor for the architecture of the different buildings, which were designed by different architects. The buildings were developed by different developers (Wilma Vastgoed BV, Bouwfonds Woningbouw, MBO Ruijters, 3W Vastgoed) and are now owned by a housing corporation and investment funds (Vesteda (previously ABP), Kantorenfonds Nederland, Stichting Bedrijfspensioenfonds voor de detailhandel). The interests of and the cooperation between the different public and privat parties and inhabitants is now organized in
the Parkmanagement Randwyck – Ceramique Association, which is aimed at the improvement of cooperation, development and management of the area.

Did the **methods and instruments** used during the project leave opportunities for flexibility?

Although the planning process of Ceramique was very clear directed, the possibility of change got attention in the planning process. In the cooperation agreement of 1988 the risks and actions involved with changing market conditions and the inability to realize the entire intended program were described. The project organization by a public private partnership is something that was seen as a new approach to this type of project in 1988, but is a start into enabling a project to adjust and react on a market reality. The masterplan of Jo Coenen was changed during the start of the project, but has been a plan that steered the development strongly. In the design specific solutions were implemented which enabled flexibility in program.

In which different **phases** has the project been divided and how much room did this leave for flexibility?

Motive and initiation
There has been a long period in which the idea of re-developing Ceramique has been present (since 1972). The need for new housing areas had been reached by extensions outside the city and moving the Ceramique factory was considered too dangerous for the employment opportunities it provided. The idea of changing the Ceramique factory area into an extension of the city center stayed an attractive idea however. An offer of the factory on June 10th 1987 to sell and gradually leave the area was an opportunity to realize this idea. Because the financial investment was too large for the municipality to pay it was only until a private partner (ABP) was found that the start of the project could be considered (1987).

Research and analysis
The studies on the possibility of developing the area were done in 1988 by Wilma Real Estate (market exploration) and Jo Coenen (urban design). These studies provided the basis for the start of the development.

Vision and aims
The conclusions from the research and analysis of the area provided enough ground to initiate the start of
the development. The urban design proposed a strong main axis for the area and a dense urban typology for the buildings. A mix of housing, commercial and public functions aimed at an atmosphere that fitted the extension of the center at the other side of the river. A pedestrian bridge was the connection between the old and this new part of the centre.

Formation
The organization of the development was started with a cooperation agreement between the municipality and ABP on August 16th 1988. The agreement stated that ABP would do the necessary investments and had the responsibility to realize the agreed program. The municipality was responsible to facilitate the process as much as possible and would realize the public infrastructure.

Development plan
The analysis and formation of the project were done in such a way that they were a good basis for the development already. After some adjustments this resulted in the fact that the realization of the project could start relatively fast in 1989.

Development preparation
The area was acquired and the municipality supported the development of the project. Before the building process could actual start however, permits had to be given and the preparation of the realization of public infrastructure had to be taken. The demolishment of the former factory buildings was an extensive step that had to be taken and was done in one step. Probably because of the size of the area and the high probability of the realization of the goals of the project, this is something that was not done in phases. The permit process and solutions for the soil pollution found in the area
made this phase take longer than planned.

Realization
The first buildings in the area were realized in 1992. Most of the buildings were built between 1993 and 2000 and some were finished in 2004. Although this is a period of 15 years it can be seen as a relatively quick realization of a project.

Urban management
The management of the area is partly organized in the Parkmanagement Randwyck – Ceramique Association. This association enables the cooperation between stakeholders in the area in reacting and acting on what takes place in the area.

At which points were important decisions taken and in which way did they leave possibilities for change?

The decision to develop Ceramique together with ABP was taken to have the needed financial resources to buy the area from the factory available. ABP was chosen to take an overall approach for the area instead of separated project developments. This decision provided a strong partner in the long term development of the area and enabled a consistent urban design for the whole area. On the other hand the partnership with ABP is not something that would easily be changed in the case of disagreement. To prevent this it might have been good that ABPs’ task was very focused, not aimed at project development and that it transferred its daily involvement in 1994. The decision for the development of a masterplan by Jo Coenen resulted in a very much focused design process. The design that was used to explore the possibilities of the area was to a large extent after some adjustments also the design that was
realized in the end. This consistency is not something typical for a large development process, but might be caused by the focused approach in this project. The critique that has risen to this approach has been that too little alternatives have been considered and weaker points of the design have not been addressed.

**Which planning documents were used to organize the planning process?**

The planning process was started with an intentional cooperation agreement between the municipality and ABP. After a market study was done and a first design was made, both parties signed a cooperation agreement for the development of the Ceramique area. Also the city council unanimously decided to support the project in 1988. The definitive approval of the zoning plan took place in 1992. In 1994 a protocol was signed by the municipality, ABP and the developers about the realization of the buildings and in which cases they could be postponed. This has never really been used to speed up the building process, but was an instrument for the case this would have been necessary.

**Which design products were used/made during the planning process, what was their aim and were they the appropriate products to steer different future developments?**

The first design made for Ceramique had an orientational goal, but provided a clear image already. It stayed the basis for the further development of the design and realization of the project. In intense discussion with the municipality and the developer the design was further developed. Especially the northern and southern node in the area took extensive study and design before they got their final shape. The urban design was later worked out in architectural designs by diverse famous architects. This process was supervised by Jo Coenen. The urban design has since the beginning been relatively precise in its image and design for the area. Jo Coenen explicitly did this to provide an urban design of high quality, which refers to the designs made by Berlage, ... and .... He rejects an urbanism of arrows and vague borders which eventually flows away in mediocre compromise design. The notion of change doesn’t get rejected in this approach, because several concrete proposals are done to deal with change. The ground floor along the Avenue Ceramique is designed in such a way that a change in program is possible, the large dimensions of the apartments provide room for change and the notion that the design has to prove itself and the use of the area and the public space will change is present. This makes this design process an interesting example of a case where not a vision, but directly a design steered the project in a successful direction. This might have been possible because of the ‘small’ size of the area, the ‘short’ process of the redevelopment and the committed people among the stakeholders involved.

**What urban structure was designed for the project? Did it provide a flexible guideline during the development of the project and opportunities for change during its use?**

The plan from the beginning consisted of a central north-south axis, the avenue Ceramique, which is the backbone of the area. A substructure of side streets exists between the blocks. Within the blocks relatively high quality inner courts exist which are accessible for pedestrians. Those are accessible via the many underpasses for pedestrians which go through the buildings. This pattern provides a clear structure for the organi-
a. Maastricht, 1992 Square

a. Maastricht, 1992 Square design proposal
The organization of the area. The area is in the north very well connected to its surroundings near La Fortezza and the Plein 1992 square. In the east it however leaves some open wounds and doesn’t interact so much with its surrounding. In the south of the area the character changes to the scale of the highway crossing through the area. This means larger buildings, less diverse functions and a confrontation between the human scale and the infrastructure. The structure of the area facilitates different program within the area. The design and organization of some parts of the public space could however have been better, to facilitate more diversity. The strong design and quality of for example the materials used in the public space, means that the public space is not so much influenced by plots that are still vacant.

**Does the area function in such a way that it provides opportunities for change and different uses in the five different layers?**

Both the design and the current functioning of the area seem to be good and convincing. This is partly due to the strong design and intensive maintenance of the area. Physically there are opportunities to change the functioning of the area, by changing aspects in its design or specific places in the area. These changes can take place, because of strong overall principles present in the area. The question is however where these changes will come from and if they are being allowed. The strong design and maintenance might also mean that change can only be initiated by one party. The diversity that is present in the area in for example shops, types of public space and differentiation in transport, make it a relatively vital area that can absorb change an react on demands.

**Does the design leave opportunities for different program, change in program and changes made by users?**

In the design of the area a diversified program is facilitated and stimulated. This diversity is also realized in for example the Plein 1992 square in the north of the area. The buildings surrounding the square have different functions and in the commercial strip in the north both supermarkets, cafes and other shops are present. How initiatives for changes by users are possible remains a question. Physically there is room for change, but if users are allowed to break the well kept image of the area doesn’t become clear in the use of the area.

**Concluding observations**

The size of the area enabled a very directive approach that has been used in the design and development of the area. The organization of power has been very centralized in the hands of a few large parties. Flexibility is considered in practical design solutions on the human scale. Vitality and diversity are present in the area. Diversity is present, but room for uncertainty and change might be lacking.

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2.7.4 Amsterdam Northern Ij-shores

Characteristics:
Type of project: transformation of harbor area into mixed use urban area.
Size: 430 hectares
Program:
9000 houses
1,5 million m2 business

General info:
City: Amsterdam, Netherlands
Planning period: 2001 – 2030
Design: BVR & DRO Amsterdam (urban design department municipality Amsterdam)

Since the project has not long ago been started it cannot be evaluated in the same way as the other two cases. The activities in the first phase of the project and the plans that exist for the future can be studied however.

In which municipal policy was (the start of the project) embedded? Did municipal policy change over time?

The transformation of the Northern Ij-shores is one of the projects with which Amsterdam is trying to realize the goal of 50.000 new houses. These 50.000 houses are part of the 150.000 houses that have to be realized in the region as a whole. The other areas in which the municipality is trying to realize this goal are Ijburg, Overamstel, Zeeburgereiland and Zuidas. This diversity of areas improves the feasibility of this goal. The context of this ambition is the already longer existing idea of the city of Amsterdam to concentrate urbanization and protect green areas around the city. This lead to the ‘finger-city-model’ that Amsterdam currently has, with green areas relatively close to any part of the city. It also means that new developments for a large part have to take place within the build up area of the city.

What were the municipal goals at the initiation of the project and did they change or evolve?

The ambitions of the local municipality Amsterdam North fit within the ambitions of the city and are taken into account in the masterplan for the IJ-shores. In Amsterdam North 14.000 houses should be built, of which 4.100 in the Northern Ij-shores area, before 2015. To make this possible, investments will have to be done in transportation networks and the green network has to...
been maintained and strengthened.

**What were the goals at the start of the project and (how) did they change during the different project phases?**

The goals of the project are to transform a harbor and industrial area, that is being used less intense than before, into a diverse area for housing and business with connections to the city and regional scale. At this moment extensions of the public transport network (metro) are foreseen. Also the road network is planned to develop to a level that facilitates an active area. The existing green and water structures are recognized as strengths of the area and should be maintained in the new plans.

Since the area is relatively large and partly still being used, the developments should start at different locations and with different strategies. Examples of this are the NDSM area where commercial and cultural initiatives in the creative industry take place and the area Overhoek which is a new residential neighborhood.

**Which stakeholders were involved at the start of and during the project and how were these partnerships organized?**

The local municipality and DRO Amsterdam had already been working on the area, but were not able to come up with an effective strategy for the transformation of the area. The office BVR has been contracted to change this and develop a masterplan for the area. For this masterplan residents of Amsterdam North have been consulted and their comments on concepts and proposals have been used to adjust the masterplan. The organization of stakeholders is not described in the masterplan. The Overhoeks area that is now being developed is a partnership between ING Real Estate, Ymere, Vesteda, Filmmuseum, Shell, municipality Amsterdam and municipality Amsterdam North. For the NDSM area a group of squatters and architects (Kinetisch Noord) has done a proposal during an idea-competition for the area. They won the competition and developed a 6000m² factory hall into breeding ground for the creative economy and large cultural activities. They received multiple millions of euros in subsidies from different funds for this.

**Did the methods and instruments used during the project leave opportunities for flexibility?**

The masterplan is an extensive plan that describes an...
analysis of and vision for the area. It provides a long term framework for the development of the area. The structuring elements like the infrastructure, identity and development strategy for the different areas have been laid down in the masterplan. This on the one hand provides a direction for further development and on the other hand leaves open in what detail the development will be worked out and realized. The masterplan has suggestions for what should be taken up in the development plans for the specific projects.

In which different phases has the project been divided and how much room did this leave for flexibility?

Motive and initiation
The motive for the development of the Northern Ij-shores comes from the development that on the one hand industrial areas become vacant and on the other hand the demand for housing increases. This also stimulated the developments in the Eastern Harbor Areas and now also similar developments west of central station. Ideas on the Northern Ij-shores already longer existed, but initiatives started with a combination of the southern Ij-shores being successfully developed, the involvement of BVR and cultural and private initiatives in the area.

Research and analysis
BVR in cooperation with DRO Amsterdam, municipality Amsterdam North, multiple working groups and smaller design offices did the analysis of the area and the assignment. This took place from 2001 to 2003.

Vision and aims
A vision on the development of the whole area has been presented in the Masterplan Noordelijke Ij-oever in oktober 2003.

Formation
For specific location like Overhoeks or NSDM, partnerships have been established or initiatives are undertaken. Because of the size of the project this is done in sub-projects and phases.

Since the project has not long ago been started further phases on the large scale have not yet taken place.

At which points were important decisions taken and in which way did they leave possibilities for change?

In 2001 decisions have been taken by the city coun-
cils about the development of the central part of the Northern Ij-shores. This enabled negotiations with Shell about the redevelopment of that area. During the vision formulation process identities have been chosen for the different areas of the whole Northern Ij-shores. This also involved decisions about program and building height.

In 2007 a request for money from the FES fund has been approved for construction of quays and infrastructure in the Overhoeks and Buikersloterham area. These investments in infrastructure influence the speed at which the area can be developed.

**Which planning documents were used to organize the planning process?**

Since the project still is in an early stage, not all the regular planning procedures have been used yet. The masterplan has relations with the municipal structure vision for Amsterdam. For parts of the area (central Northern Ij-shores) decisions about the redevelopment have been taken by the city councils in 2001. For further developments procedures for environmental aspects and land use plans have been identified and will be used.

**Which design products were used/made during the planning process, what was their aim and were they the appropriate products to steer different future developments?**

Because of the scale of the area most design activities in the masterplan have a structural character. The structures of infrastructure, water and green have been laid down in a general structure. Also aspects like building heights for the different areas and profiles for the main and standard roads have been designed. The masterplan also contains organizational aspects of the
project like how the parking policy develops during the development of the project, where boats can moor and what type of residents and businesses is aimed at. This has however been done in a way that recognizes that laying down these things in detail is impossible.

What urban structure was designed for the project? Did it provide a flexible guideline during the development of the project and opportunities for change during its use?

The design of general structures is necessary to have clarity about those at the start of developments in sub-projects. A main (road) structure has been developed with a main road in east-west direction and sub roads in north-south direction that connect the water to the area and the surrounding neighborhoods. In the masterplan profiles have been designed for those roads and green structures have been proposed. What is not shown in detail is how the different profiles can work in different areas and conditions.

Does the area function in such a way that it provides opportunities for change and different uses in the five different layers?

Temporary functions have been realized in part of the area. Those are great stimulators for the development and use of the area. They provided accommodation for divers small and large scale activities and can be points for new developments in the area to connect to. The development of the Shell area is relatively top down and in some parts monofunctional. How the tranformation in areas that are still being used and that will have a mix of functions will be done is interesting in this context.

Does the design leave opportunities for different program, change in program and changes made by users?

The area is aimed to have a divers program, with several big attractors. This mix is however not realized in all parts of the area.

Concluding observations
Temporary functions are used to have attractors for the area.
Because of the size of the area it is divided in sub-projects, that have a different character or position in the area.
Infrastructure is not something that is intensively worked at before the start of development of the area. There is an extensive vision on spatial and organizational aspects of the area in the masterplan.

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2.8 Conclusions and recommendations

At this moment in the project conclusions will be drawn that result from the research and can be used in the development of the transformation design for the Binckhorst. More extensive and complete evaluation will be done after the design project and will cover both the research and the design.

2.8.1 Research conclusions

In the different sections of this research, conclusions have been drawn that provide an answer to the research questions and are later on used in the construction of the framework on flexibility. To summarize those conclusions preliminary conclusions from the research will be drawn up here.

The general definition of flexibility is: the ability to change and adapt to different circumstances. Flexibility is used in many different disciplines and circumstances in different ways and often has slightly different meanings.

The two reasons to use flexibility are as a reaction on uncertainty and as a reaction on differentiated needs. Both reasons have their own uses in applying the concept flexibility.

Disadvantages of the use of flexibility emerge when flexibility is used to leave things unclear. A wrong balance between freedom and determination is chosen in that case.

Flexibility is relevant for urbanism to understand and be able to respond to the dynamics that is more and more present and recognized in our profession. The different disciplines within urbanism can again use flexibility in their own specific way.

For multiple aspects in the governance, management and design of large urban projects, flexibility is relevant and has been identified. Those aspects have been used as the basis for the case studies.

The use of flexibility by authors and in projects has clarified the concept flexibility further and has resulted in issues that are related to flexibility in urbanism. Those issues are:
- culture
- power
- scale, layer
- grain size
- change
- investments and means
- diversity
- stakeholders
- continuity, fixation and robustness
- surplus

In specific methods and approaches flexibility can be used to better deal with the dynamics that is present in our profession. In those methods, flexibility is not a number, but a complex balance that has to be consciously specified for every project and situation.

2.8.2 Overview concluding observations case studies

Concluding observations Rotterdam, Kop van Zuid

The land use plan leaves relatively much open. This provides opportunities for diverse developments, but doesn’t steer in a clear direction. The project team and quality teams provided some of this guidance.
-The scale of many of the buildings in the Kop van Zuid doesn’t stimulate change. The human scale is something that in more places in the area is not strongly present or vibrant.

-In the transformation and development of the area not so much use has been made of temporary functions that can inspire the development. This would also have stimulated a development of activities on the human scale in the area.

-During the process design have been used to visualize possible developments. They have however regularly been changed during the process.

-Designing on all the scales in an early stage might be useful to develop and test a vision for a project. The design than has to be generalized to a framework and principles to provide opportunities for change. During the realization, designs can be evaluated again with the original vision.

Concluding observations Maastricht, Ceramique

-The size of the area enabled a very directive approach that has been used in the design and development of the area.

-The organization of power has been very centralized in the hands of a few large parties.

-Flexibility is considered in practical design solutions on the human scale. Vitality and diversity are present in the area.

-Diversity is present, but room for uncertainty and change might be lacking.

Concluding observations Amsterdam, Northern Ij-shores

-Temporary functions are used to have attractors for the area.

-Because of the size of the area it is divided in sub-projects, that have a different character or position in the area.

-Infrastructure is not something that is intensively worked at before the start of development of the area.

-There is an extensive vision on spatial and organizational aspects of the area in the masterplan.

2.8.3 Translation of research conclusions to design recommendations

To connect the research and the design in this project it is necessary to draw up the relevant conclusions of the research as an input for the design. In this way the process, products and content of the design can be made consistent with the results of the research. This will result in more specific and applicable research conclusions and a test of those conclusions in the design.

Process and preparation

- Acknowledge change and dynamics¹

- Analyze the assignment and location in all its aspects²

- Specify what you don’t know about the location and the project

- Specify what is uncertain at the location and for the project

- Identity the parties involved in the start of and during the process

- Realize openness about plans and process to stimulate interaction between and involvement of stakeholders.³

- Integrate a learning cycle or opportunities for adaptation of plans to adapt to changing circumstances or new opportunities.⁴

- Work cyclic

Products, communication and regulation

- Early in the process use detailed and specific designs only to communicate and evaluate, not to regulate.

- For long term and large scale, design a vision not a plan.⁵
- For mid term and middle scale, design spatial principles.  
- For the short term and small scale, make plans of which the quality can be tested.  
- Lay down guiding structures within which change can take place.  
- Adapt and differentiate regulative systems during different phases of a process.  
- Provide a regulative system that is able to provide the flexibility aimed at in the design, but also guarantees the quality of it.

**Design: content and solutions**  
- Design solutions that can function in different circumstances and answer differentiated needs.  
- Use a certain surplus in design solutions which provides room for differentiation and change.  
- Don’t design everything into great detail. Leave room for interpretation during its use.  
- Make designs that incorporate the past, are designed for today and leave room for the future.  
- Adjust the fixation of means in your design to the possibility and necessity of change.  
- Be specific in the scale your solution is aimed at and has effects on.  
- Use diversity as a way to realize flexibility.  
- Design strong and facilitating structures within which change can take place.  
- Be specific in what to design and fix and the margin within which you leave freedom.
Examples that illustrate the recommendations are added below.

1. The design of some recent monofunctional neighborhoods lack an acknowledgement of change and dynamics, because of their narrow focus. Examples that much better incorporate change and dynamics are for example some designs and studies by Urhahn Urban Design within their Spontaneous City projects. For example: Plaspoelpolder Rijswijk, Hamerstraat Amsterdam, Venserpolder Amsterdam and Euroquarter Almere. Also the Solids concept takes changes over time as a starting point.

2. For example by making an Atlas that doesn’t only go into obvious aspects, but documents a wide range of aspects of an area.

3. In Almere Homeruskwartier the involvement of potential residents has been used to change the production process and realise a more diverse neighborhood and process.

4. Roger Evans uses design codes that steer the design of an area. Although they are very directive, a feedback loop is explicitly incorporated to change the design codes during the development process if that is proven to be necessary.

5. The recent masterplan for the Northern Ij banks is a plan voor a very large area of 400 hectares. Because a detailed design would be unrealistic a structure for the area with design principles has been proposed. Also the Ion term design of Hamburg Hafencity is based on some spatial principles and a structure for the area.

6. In the neighborhood Roombeek in Enschede multiple principles of the design are laid down in a plan. This plan determines what the character of the different parts of the area will have to be, but leaves much open for other parties to decide.

7. Public space design

8. In the masterplan for the the Northern Ij banks in Amsterdam a structure for the whole area is designed and presented as the context for plans that are developed at a later moment in parts of the area.

9. In King Spadina, a neighborhood near the centre of Toronto, building rules have been made less strict temporarily to enable new initiatives. After the transformation started and a new atmosphere emerged, rules were made more strict again to remain the qualities of this new neighborhood.

10. The Solids are aimed at providing a structure that facilitates differentiated program. An urban design example is the Grand Canal Square in Dublin, that is realised in a early phase of a new development. The square now provides a high quality starting point in the area and will in some years be a nice square in a high quality environment. The Spielbudenplatz at the Reeperbahn in Hamburg is a square that got a new open air stage in 2006. The stage consists of two large moveable covered stages that can be moved over the square to either form one covered hall together, or two separate stages near or far from eachother.

11 Both the Solids and the example that inspired the Solids concept, the Tetterode building in Amsterdam are able to facilitate multiple uses because they are not only focused and spatially narrowed down to one function. This however also means that they mostly are more spacious than the minimum requirements.

12 Buildings or cities that are only aimed to exist for twenty years require a different approach than building that are planned to exist much longer. The way means are used and invested in these cases influence the way change is enabled. Concepts that only aim to exist for twenty years are a light urbanisation strategy developed by MVRDV and the XX Building in Delft.
3. **Analysis**

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3.1 Introduction

This analysis is the preparation for the transformation design for the Binckhorst. In this chapter the relevant information and interpretation for the Binckhorst will be presented. More extensive documentation for the Binckhorst can be found in “Documentation Binckhorst’.

Design question one to four are fully or partly answered in this chapter.
1. In which way should flexibility be used in the case of the Binckhorst?
2. In what way can flexibility be applied in the strategy and design for the redevelopment of the Binckhorst?
3. What role should the Binckhorst play in the city and what type of area should it be developed into?
4. What is the Binckhorst currently like and what role should this play in the transformation?

In section 3.2 the location is introduced and most of the analysis is presented. In section 3.3 specific (experimental) analysis drawings about flexibility in the Binckhorst are presented. Section 3.4 summarizes the strengths, weaknesses, opportunities and threats of the transformation of the Binckhorst into a vital mixed use urban area. In section 3.5 the assignment for the design project, partly bases on the analysis, is presented. This will guide the development of a transformation design and strategy for the Binckhorst.
The Randstad is the most intensely used area in the Netherlands. The southern part of the Randstad is referred to as the Southwing and consists of the large cities The Hague and Rotterdam. These two more and more grow together spatially and with infrastructure systems. The Binckhorst lays very centrally in this region with good connections to both highways and public transport. The pressure to develop the Binckhorst (130 hectares) from its current use as an industrial area into more intense urban area is high. Its distance to the centre of the The Hague, the presence of good infrastructure connections and the activities and qualities in its surroundings provide opportunities for this. The need to develop new real estate at inner city sites complies with the desire to keep parts of the green landscape open.
Characteristics

Numbers

Surface: 130 hectares
Water: 6 hectares
Streets and parks: 28 hectares
Offices: 15 hectares
Other: 8 hectares
Available for redevelopment: 73

Places

1. A12 highway and railway
2. Haagse Veste offices
3. KPN Telecom headquarters
4. Graveyard Sint Barbara
5. Cabellero factory
6. Binck Twins
7. Trekvliet canal
8. AVR waste treatment
9. Binckhorst Castle
Street names

a. Binckhorst, map
The Hague exists since the 13th century and originally grew at the dune riches, like other older places in its surroundings. The Hague was never given the rights to develop as a trades centre and develop fortifications. Therefore it mainly grew as a residential city and governance centre. These still are two qualities that the city is known for.

As can be seen on the map, the Binckhorst started to develop in the growth period 1906-1948. Originally the Binckhorst was a polder with the historic castle that dates from 1308 as the only building in it. Developments mainly started in the north and along the Trekvliet canal. The graveyard Sint Barbara was established in the 1920s in the middle of the Binckhorst. Part of the southern harbours in the Binckhorst has been realized in the 1930s. The largest part of the harbours and most of the developments in the south of the Binckhorst date from the period after WO II.

Historic buildings are not so much present in the Binckhorst. The ones that are present, and can be seen on the map, provide great quality. They are next to the castle both houses and buildings for industrial purposes. Except the larger ones in the north, they are all small scale buildings.

Very little has been planned in the development of the binckhorst. This meant that many activities could find a place in the Binckhorst. It however also means that spatial quality has not play a role in the Binckhorst. This lack of structure can be seen as too much flexibility.
The areas that characterise the image of The Hague are shown on the map at the left. The yellow area represents the beach and area of Scheveningen, which attracts many tourists and recreational visitors. The red represents the city centre of The Hague, which attracts visitors with its shopping opportunities, restaurants and cafes and cultural events. The national governance centre is in the centre and is shown in blue. Nearby is the office district which is shown in purple and extends to the east. Nearby are the two large train stations Central Station and Hollandse Spoor. In green are two recent large extensions of the city Wateringse Veld and Ypenburg. The Binckhorst lays relatively central in this.

The most recent spatial policy document for the city of The Hague is the Development Vision The Hague 2020. It states that The Hague wants to be a multicultural city, an international city, a city at the sea and a monumental residence. Special attention is aimed at multiple opportunity zones in the city.

**Numbers**
- Population The Hague: 474,425
- Population metropolitan area Haaglanden: 980,000
- Surface: 98.2 km²

International city of peace and justice, with over 150 international organisations

**Legend**
- Identity
  - Scheveningen Beach area
  - The Hague City Centre
  - Business district
  - Recent extensions
  - International zone
- Highways
- Railway
Traffic

The national infrastructure is present at the east side of the city. To improve the accessibility of the west of the city a new ring road is now being realized. To improve the accessibility and diminish the amount of cars in parts of the centre of the city a inner city ring is realized. This ring goes through the Binckhorst over the Mercuriusweg and the Binckhorstlaan. The proposed extension of the A13 via a tunnel to the Binckhorst and a new exit at the A12 could improve the accessibility of the inner city ring road and the position of the Binckhorst strongly.

Public transport routes are organized in a pattern that results in central- ity at the two large train stations in the east of the city. These stations are very close to the Binckhorst. New public transport developments are the Stedenbaan and the Randstadrail. A new train station Binckhorst/Voorburg and a Randstadrail route through the Binckhorst are proposed to improve the accessibility of the Binckhorst by public transport.

The Binckhorst has a poor urban structure, that is only aimed at its current logistic needs. Little routes are present for bicycles and pedestrians. Significant improvements are needed to enable a vital urban development.
Land use

Regional
By showing the land use in the region Haaglanden, the position of the Binckhorst becomes more clear. The area around the city of The Hague consists of greenhouses, agricultural landscape and the dunes. The Binckhorst is one of the industrial areas in the city, which mostly lay at the edge of the city near highway exits. The Binckhorst is in the centre of the city and lays near large office locations.

Binckhorst
In the Binckhorst itself many functions are located. The image at the right shows six categories for this. There is a significant amount of office buildings already present in the Binckhorst. Part of this is vacant at the moment. The large amount car dealers and garages is striking and is part of what the Binckhorst is known for at the moment. A large car demolition plant has recently been removed. Some large industrial functions are still present in the Binckhorst. They may be hard to relocate and remove from the area. Because of environmental hindrance they however cannot easily be combined with living functions. The retail and small businesses that are located in the Binckhorst often are relatively small scale and can be considered as a potential in the redevelopment of the Binckhorst.

Legend
- Image a and b
  - Urbanization
  - Greenhouses
  - Industrial area
  - Offices
  - Agricultural landscape
  - Landscape park
  - Urban park

- Image c
  - Offices
  - Retail
  - Small businesses
  - Cardealers and garages
  - Industry and logistics
  - Housing
  - Other

335 m² office space x1000
Green & water

The Trekvliet, which flows along the Binckhorst, has a position in the regional water system. Both for shipping as for water management it plays a role.

In the Binckhorst multiple functions are present oriented at the Trekvliet. This are three industrial functions: the waste plant which transports waste with ships, the asphalt plant and the concrete plant which both get their supplies by ships. Recreational water functions are three recreational harbors or ship storage locations and one rowing club.

The shores in the Binckhorst are now largely not publicly accessible. This goes for both the harbor and the Trekvliet.

green

In the surroundings of the Binckhorst multiple large scale green elements like the Estate Zone in Rijswijk and the green between Vliet and A4 are present. In the Binckhorst itself the graveyard is a large green element. The historic green structures of the Broeksloot and the Laakkade are two elements in the south and west that can potentially provide qualities for the Binckhorst.
Sub areas

North west
The north west of the Binckhorst is characterised by some large scale functions and elements, the low intensity of use of the area and the historic buildings in the north west corner of the area. The large building located at the little harbor is the waste treatment plant.

Mid west
The mid west of the Binchorst can be devided in some large elements. This are the concentration of car dealers in the north, the ministry of defense offices south of that and some large halls for businesses in the south. In the small green area in the middle, the historic Binckhorst castle is located.

South west
The south west of the Binckhorst is used by multiple businesses. Some of them are located along the Binckhorstlaan. One of the newest buildings in this area is the Bincktwins, which houses multiple business in two stories. It is rather large and has almost blind walls to its surroundings.
North east
The north west of the Binckhorst is only used by a few large functions. The two large buildings in the north have recently been sold by KPN Telecom to developer Vestia, which is studying on a new function for the building. The marshalling yard is a large function in this area and is recently renovated.

Mid east
The mid east of the Binckhorst consists of the graveyard Sint Barbara, one block of social housing next to it and multiple buildings for businesses. The intensity with which the buildings are used differs. In some businesses are active, some are used for storage and some are vacant.

South east
The south east of the Binckhorst is characterised by the harbor and the headquarter of KPN Telecom. Also the asphalt and concrete plant are present in this part of the area. Since recently the Cabellero factory, a facility for creative companies, is located in this part of the Binckhorst.
Proposals

a. Berlage, The Hague, 1908
b. Dudok, The Hague, 1949
c. Structurevision The Hague, 2005
d. Design proposal OMA, The Binckhorst
Identity

Current identity
The current identity of the Binckhorst mainly consists of the main routes which go through the Binckhorst and some larger buildings one sees traveling through or past the Binckhorst. The Cabellero factory is a new programmatic point which is associated with the Binckhorst.

Identity providers
Multiple aspects in the Binckhorst that are currently not being used can be used to strengthen the identity of the Binckhorst. This are some historic buildings, buildings that could get a special function, the water present in the Binckhorst, green structures in the Binckhorst and the surroundings, the Binckhorstlaan and the sight location next to the A12 highway. Other things like new buildings and new program can also be used to develop the identity of the Binckhorst.
Edges
The Binckhorst has different types of edges to its surroundings. The red lines represent barriers that will have to be accepted or overcome. The black lines represent potential connections that can be established between the Binckhorst and the Laakhaven area and the centre. The blue dashed area represents edges that can enable connections with the surrounding neighborhoods. The yellow line represents a transition to a nearby area.

Landmarks
Multiple landmarks and lines of sight can be identified in the Binckhorst. Those can be used and considered in the redesign of the Binckhorst.

Legend
- Landmark
- Line of sight
- Barriere
- Potential connection
- Transition
- Inspiration and connection
3.2 Flexibility in the Binckhorst

Uncertainty

Uncertainty about future developments requires flexibility in planning and design. To better be able to manage this uncertainty it can be visualised in an analysis drawing. In this drawing the infrastructural projects are shown that have a large impact on the Binckhorst, but of which it is not yet clear if, how and when they will be realised. This causes uncertainty. Also the redevelopment of the KPN Telecom building recently acquired by Vestia it is not yet known what will happen to it. For some industrial functions that put environmental constraints on the redevelopment in the case they cannot be removed it is now also unclear if it will be possible to relocate them. This causes uncertainty about precise possibilities for development.

Aspects like soil pollution and the diversity of land owners can also cause uncertainty in the development process.

Legend

- Objects that represent uncertainty
- Accumulation or recent investments of means and/or effort

Means

If means are invested recently or a large accumulation of means is present, change will not take place at all or only in a radical way. This means that some things will not change or that flexibility for dynamics is not an issue at those locations. Possible radical changes can be input for a scenario study.

Large scale infrastructure, like the highway, railway and canal represent a high accumulation of money or effort or cost much money or effort to change them. Buildings or locations that have recently been invested in will also not be the first to change drastically.
Diversity

Diversity means that flexibility is present and change can take place dynamically. In this analysis drawing the areas that have a diversity in either building, program or ownership that enables dynamic change are pointed out.

Grain size

If the grain size is small and objects can be identified on a low scale level change can take place in a more dynamic way. By identifying this one develops an understanding about how a transformation can be designed and take place.

In this analysis drawing the areas that have a small grain size of a low scale is present in building, program or ownership are marked. Areas that contain elements of a larger grain size and scale might need a different planning approach.
Stakeholders
The presence of stakeholders means that interaction with them takes place during the development process. Stakeholders at different levels require different approaches and provide different opportunities. This has been explained in the research section. In this drawings two types of stakeholders are identified. The large scale stakeholders will have to play a role on a higher scale in the vision and planning of the development of the area. They influence the transformation with decisions they make about the development of projects in the area. The stakeholders that play a role on a lower scale are directly involved and active stakeholders in the area. They can either oppose developments and delay them or facilitate and stimulate developments on a small scale with their activities and initiatives. In this last way they can strongly contribute to the dynamics, development and identity of the area.

Legend
- Potentially directly involved and on small scale stakeholders present
- Large scale stakeholders

Planning culture
The previous drawings can partly be summarized in an analysis drawing about the planning culture in the area. This drawings shows two kind of approaches that are needed for the area. In the south multiple starting points, motives and opportunities exist for a development to start. This can take place in a dynamic way and be initiated by privat and market parties. The characteristics of the north and Binckhorstlaan area and the developments that are foreseen there requires a different planning culture and approach. Because the changes will be more radical and motives are not always present more planning is needed to prevent spatial disasters. More new and artificial spatial elements will have to be used to steer the developments in this area.
3.4 SWOT

For a SWOT to be effectively used as a planning tool a goal or end state that is aimed at has to be set. For this SWOT analysis of the Binckhorst, that would be a transformation of the current area into a vital mixed used urban area. The strengths and opportunities can be used in the design and the weaknesses and threats will have to be solved and dealt with. The conclusions of the SWOT are used in the formulation of the assignment.
Areas and opportunities for redevelopment available

Large scale water structure available in the area

Water sports activities already present in the area

Buildings with historic characteristics present in the area

Concentration of high end offices present

Multiple large train stations nearby

Large green landscape parks nearby

City centre and business district nearby
Incomplete urban structure
Barriers in north and east
Poorly connected to surrounding areas

Missing low scale and human scale infrastructure

Poorly accessible for bicycles and pedestrians

Presence of industrial activities that can delay redevelopment

No public transport in the area

Presence of polluting traffic streams

Not directly connected to the city centre and business district

Little qualitative green present
Upgrade of city centre ring road

High demand for space for new developments

More attention and focus for temporary uses

Many people passing through the Binckhorst

Needed increase in access road capacity in the east of the city
Possible rivalry with developments in The Hague-Scheveningen

Social-economic divisions present in The Hague

Tighter environmental pollution policies
3.5 Assignment

Analysis and SWOT
What becomes clear in the analysis and SWOT is that the Binckhorst currently is an isolated area which is not connected to its surroundings and the city. Activities have been developed in the area however, which provide a certain dynamic and opportunities for the redevelopment of the area. The Binckhorst currently has qualities that are not used because of its unplanned and monofunctional organization. Also the position of the area in the city provides great potential that is currently not being used.

Assignment
The assignment for the design is to solve the isolated position of the Binckhorst by better connecting it on a city and local scale. This is a condition for the area to transform from its current use to a mixed use urban area that makes use of the position in the city and the qualities that have until now been hidden. Uncovering those qualities will provide a new area in which large urban developments can take place. In the design the gradual transition from the existing use to a new character has to be considered.

Long term
It takes a long time for an area like the Binckhorst to be developed. This for example twenty years period is a continuous process of further discussion, design and building. The design should be able to provide the guidelines and conditions for this period. It should in the beginning mainly focus on the main structure and conditions for the development. During the process it has to become more and more concrete in the design of buildings and public space.

Flexibility and goals
When working with flexibility the question very much becomes what to design and fix and what to leave open for the future. To be able to do this it is useful to identify what the goals for the project are. These goals can than be defined and specified for different perspectives.

In this case those perspectives are the research to which the design has to contribute, the design as a project and product, the area, the goals of the municipality and my own professional goals.

Research goals
The research goals in this design project are to find out how to develop a design in such a way that flexibility is present. The possibilities to apply flexibility are studied to both develop a flexible design as to develop a further understanding of flexibility.

Design goals
The goal of a design is to develop an understanding of an area and use that understanding to develop a (spatial) vision or plan which can be used to guide and steer the development of the area. Steering the development is supposed to increase the quality of the area.

Area goals
Based on the analysis, goals for the design of the area can be set. Those are:
- design a balanced urban structure that facilitates the development of a mixed use urban area.
- better connect the area to its surroundings and the rest of the city.
- realise an amount of public space and green that is needed in a mixed use urban area.
-use existing functions in the development of the area.
-make more use of the existing water and green in and around the area.

**Municipal goals**
The municipality The Hague has set goals for the whole city and for the Binckhorst specifically. The goals for the city are to develop as a world capital for peace and justice, provide a residential and monumental environment and enable citizens to grow economically, socially and culturally.

Specific goals for the Binckhorst are to:
-realise a mix of housing, offices and facilities
-develop in high density (FSI 1.5 for the whole area)
-a dynamic area: no large industrial functions, but 24h liveliness
-integration in the urban fabric of the city

**Professional - personal goals**
My personal and professional attitude about the city will also influence the design of the area. This can be brought to light by specifying this attitude for the Binckhorst:
-develop an extensive human scale infrastructure
-realize mixed use everywhere. No monofunctional areas.
-develop areas where interaction between buildings and street life takes place.

**Program**
The municipality has set programmatic goals for the area. Those will be considered in the design:
-5000 new houses
-extension of the A13 highway
-new A12 exit that connects to city ring
-new train station Binckhorst/Voorburg
-Randstadrail through the Binckhorst
-3500 new jobs
4. Design

4.1 Introduction
4.2 Design concept
4.3 Design framework
4.4 Goals and rules
4.5 Places
4.6 Sections
4.7 Scenario's
4.1 Introduction

The design that has been made for the Binckhorst is presented in this chapter. The design project has both been a design assignment as a research to what flexibility means in the products, methods and design in the development of a transformation design and strategy for a large urban project.

First the design concept is presented at two scale levels. The different elements and places of those to images are than further explained. The structure for the area and its character are explained and illustrated. On a detailed scale only the sections of the major structure have been designed and explained. The design is after this tested on how it develops in different scenarios.
Design concept Binckhorst and surroundings
4.2 Design concept

Connect

The Binckhorst is changing. This involves a lot of dynamics of temporary and permanent changes taking place in multiple buildings, streets and places in the Binckhorst. Although there are all kind of things uncertain and undetermined yet in this inspiring complexity, there is one thing that is clearly inspiring and directing the developments: the design concept for the Binckhorst. This design concept is stripped down to two clear images in which the essential elements in the development of the Binckhorst are clearly shown. The first image is about the context of the Binckhorst in which the relations between the Binckhorst and its surroundings are shown. The second image is about the Binckhorst itself and the qualities and structures that can be found in it.

The Binckhorst is very well positioned in the national highway network. With an extra exit of the A12 and the extension of the A13 this is even improved. Those two improvements also improve the position of the Binckhorst in the cities’ infrastructure network, by making it an entrance to the city scale network.

This new centrality in infrastructure networks together with other local qualities in the area provide much potential for new developments. The position of the north of the Binckhorst near the centre of The Hague, next to the Laakhaven, at the city ring road and near the A12 exit provide an environment for intens urban and mixed uses in high densities. The northern A12 exit is a landmark for the entrance of the Binckhorst and the end of the Laakhaven axis. It also is a possibility for human scale traffic to cross the A12 from Hollandse Spoor to Voorburg. In the south of the Binckhorst the harbor, together with the southern A12 exit, the new station Voorburg-Binckhorst and the existing offices provide a context for well connected, high quality, central urban developments.

Legend

- Urban hotspot
- Railway station
- Park
- Contour Binckhorst
- Binckhorst related road structure
- Road structure in surroundings
Regional A13
Delft-Scheveningen

With the extension of the A13 a new regional connection from Delft to Scheveningen is realised. The Binckhorst is one of the hotspots on this line and the entrance to the centre of The Hague. This regional centrality provides opportunities for program which functions on a regional scale and for living environments which are well positioned in the regional network.

Legend

- **Proposed additions to structure**
- **Highway**
- **Regional road**
A12 exits

The two exits on the A12 highway, which runs along the Binckhorst, provide an excellent accessibility for the area. The southern exit is mainly aimed at Voorburg and the south of the Binckhorst. This results in a high quality environment which is also very well connected to the national highway network. The northern exit connects to a very long line which runs through the Laakhaven and the south-west of The Hague. It also is the connection between the A12 and the centre ring road.

Centre ring road

The Binckhorstlaan and Mercuriusweg are part of the centre ring road and in that way directly connected to the south and east of the centre. This position provides a motive for program that is typical for the centre of a city, which can very well be realised in the north of the binckhorst.
East-west connections

Via the existing Neherkade and a new connection north of that, the Binckhorst is very well connected to the Laakhaven area. A new bicycle route from Holland Spoor to the Binckhorst also improves the connection on the low scale. This route continues by bridging the A12 to Voorburg. With that it becomes a long and very useful connection from Hollandse Spoor station to the Binckhorst and Voorburg. In the south of the Binckhorst, the upgrading of the existing connection with Voorburg improves the relation between the Binckhorst and Voorburg.

Trekvliet - City centre

By establishing a new route along the Trekvliet, the west of the Binckhorst can connect to a route that is coming from the centre. This does not only improve the relation between the centre and the Binckhorst, but also provides an attractive low scale route to areas south and east of the Binckhorst.
East-west bicycle route
A new route that bridges the A12 and Trekvliet canal is designed as a local bicycle link. This route connects Voorburg, via a sequence of parks and squares, to the north of the Binckhorst and the Laakhaven area. Station Hollandse Spoor is at the end of this route which is currently already a much used route by pedestrians and bicycles in the Laakhaven area. Also the existing route through the Laakkwartier and the new route from the south of the Binckhorst connect to the pedestrian and bicycle bridge over the A12.
Reside and provide

Existing buildings that play a prominent role in the transformation are shown as pioneers and starting points for developments. These are buildings that can perfectly facilitate cultural activities, small businesses and special programs or are impressive environments that inspire further developments.

The different types of new structures that are realized in the Binckhorst enable the transformation of the area and the growth into an intense mixed-use urban area. The largest elements in this structure are the Binckhorstlaan and the Mercuriusweg. They are designed in a way that they are no burden to the low scale city life and stimulate an intense urban program.

The new gridlike structure in the area provides better connections within the Binckhorst and between the Binckhorst and its surroundings. Together with specific local qualities and buildings they form multiple opportunities and starting points for new and diverse urban environments in the Binckhorst.

In the southern edges of the Binckhorst the connections with the surrounding neighborhoods are improved with new roads and bridges and elements that provide quality for both sides of the edge. Along the Trekvliet the quality of the water is used to make a green edge for the Binckhorst. This quality is extended perpendicular into the Binckhorst multiple times. Towards Voorburg an existing park and street are upgraded and transformed from a boundary to a centrality and transition between Voorburg and the new urban and harbor quality of the Binckhorst.
4.3 Design framework - hierarchy

Main structure
The image to the left represents the main structure that is designed for the area. The different elements in the main structure have a different position in what is most and less essential in the design. The structure that improves the connections of the area with its surroundings on a city scale is crucial in overcoming the isolated position. The essential structure represent the core of the character of the design for the area. The sub-essential structure represents the rest of the main structure that is needed to develop the area.

Legend
- Crucial main structure
- Essential main structure
- Sub-essential main structure
Sub-structure
Next to the main structure, also a sub-structure of streets, alleys and paths will be developed in the area. It is however on the scale of the whole area not essential how exactly this will be designed and built. Drawing it does give an idea about the scale of the area and what the sub-structure could look like.

Legend
- Crucial main structure
- Essential main structure
- Sub-essential main structure
- Sub-structure
A grid like structure is proposed to facilitate the transformation and growth of the Binckhorst. This grid consists of multiple lines that improve the internal accessibility of the Binckhorst and better connect it to the surrounding areas on a local and city scale.

The grid results in areas that can be designed in different urban typologies. Both urban blocks, objects and very large buildings can be realized if that is desired.

**Flexibility**

The main structure is flexible because it provides guidelines but also leaves open what exactly happens within these guidelines. The structure facilitates developments that can take place within it and that will be designed at a later moment in the process.
a. City of urban blocks
b. City of objects
c. City of fields
d. Mix
Gradual transformation

The new structure that is designed for the Binckhorst partly consists of the structure that is currently present in the Binckhorst. This enables a gradual transformation and renewal of the structure. Although the current structure is being used, the new additions improve the street pattern in the Binckhorst radically. The existing pattern is renewed everywhere to adjust the design to the needs of the new urban context. The realization of the new structure is used as an instrument to stimulate and facilitate developments by private parties.

The development of the new structure can take place gradually and dependent on the exact developments and demands in the area. This can be seen in the series to the right.

Legend
- Existing structure
- New structure
Gradual transformation from existing to new structure

Internal vs. External motivated structure
Transformation Binckhorst North

An example of the development that could take place within the structure at a location in the north of the Binckhorst is shown in the series of images below. This shows that the realization of new and upgrading of existing infrastructure provides an opportunity for developments. New buildings in the beginning co-exist with old buildings that are demolished if their use ends and a new proposal for the plot is developed. This process is not possible to predict exactly and therefore not useful to determine exactly in advance. A long term structure and vision and conditional guidelines are useful to provide a clear context for opportunities for change.
Transformation Binckhorst Harbor

The series on this page shows the possible transformation of Binckhorst Harbor. The addition of a new road to the structure provides a central axis for development that connects to the existing office buildings. Also in this area the exact transformation cannot be determined in advance, but a more diverse mix of old buildings that are still being used by businesses and artists and new buildings with diverse program will exist. The number of floors of buildings in this area will be between 4 and 8.
Squares

Multiple squares are planned in the Binckhorst at places that become focus points in public space. Some of the squares are at places where they together with buildings make interesting places. Others have a specific place in the structure of the area. Some also strengthen the low scale and street life in places where large infrastructure is present. Most of the squares are realized relatively early in the process to provide a quality for the following development. This means that the design of the squares will have to function under different circumstances. The transformation of those circumstances and the connected uses are illustrated in the images to the right.

Legend
- **Squares**
- **Structure**
Uses of squares in different phases of development

a. Binckhorst harbor - Cabfab phase 1

b. Binckhorst harbor - Cabfab phase 2

c. Binckhorst harbor - Cabfab phase 3

d. Binckhorst harbor north - Asphalt plant phase 1

e. Binckhorst harbor north - Asphalt plant phase 2

f. Binckhorst harbor north - Asphalt plant phase 3
Green in the Binckhorst provides both nice urban parks as green structures in and around the area. Two green city structures south and west of the area provide great green connections between the Binckhorst and the surrounding neighborhoods. They both connect to the new green shore along the Trekvliet in the Binckhorst. This new line provides the Binckhorst with a green and blue atmosphere that is valuable for the area. Multiple green lines go from this structure deeper into the area. In the middle of the Binckhorst a series of green elements provides a large green space. A park around the Binckhorst castle and a green strip along the Zonweg together with the graveyard provide quality for a large part of the Binckhorst. A new green urban park in the north of the Binckhorst functions as a local quality and structuring element for the development of that area.

Legend
- Parks
- Tree lines
- Squares
- Structure
a. Large green elements nearby
b. Green elements in direct surroundings
c. Tree line
d. Urban park
e. Urban park
f. Tree lines Binckhorst
g. Parks Binckhorst
Water

An extension of the water structure has been designed for the north of the area. The south and west are already characterized by the harbor and Trekvliet, but the north is lacking a water system. The addition of this water structure does not only provide opportunities and solutions for water management, but also is a structuring element in the area. It can be used in multiple ways in combination with green or build elements.

The water also provides opportunities for (temporary) recreational activities in the area.

Legend

- Water
- Parks
- Tree lines
- Squares
- Structure
Water and urban design

reference canal, park, public space

Water sports activities

Transformation of waste treatment plan into (temporary) water sports centre. Binckhorst harbor
Public transport

Two streetcar lines go through the Binckhorst. One is Randstadrail line 1 which runs from Scheveningen via The Hague central station to Delft. This line only has two stops in the Binckhorst because of its regional character. The other line runs via station Hollandse Spoor to station Binckhorst-Voorburg. This line has more stops because of its local character. It improves the mobility in many parts of the Binckhorst. Streetcar stops are strategically positioned to be feeders of local structures. Station Binckhorst-Voorburg is the new station that has been moved from Voorburg to the north. It has an entrance at both the Maanweg and the end of the Saturnusweg. In this way it connects to Voorburg and to the offices and area around the Saturnusweg.

Legend

- Streetcar line
- Streetcar tunnel
- Streetcar stop
- Trainstation
- Parks
- Tree lines
- Squares
- Structure
Preservation

This image shows the buildings that are planned to be preserved for a longer period. They are preserved, because of their historic quality, the opportunities they provide for new developments or because they fit within the new design for the Binckhorst. This doesn’t mean that nothing is changed in those buildings. Renovations, temporary uses and transformations are still possible. Because these buildings are preserved for a longer period, they provide anchor points during the transformation of the area.

Flexibility:
-specification of planned continuity
-buildings can have different functions during the transformation

Legend
- Preservation of existing buildings
To show the structure of the Binckhorst in more detail, this image shows the designed network of the Binckhorst. The blue structure are the roads that function on city scale and are embedded in the profile of the main streets of the Binckhorst. The purple shows the network that forms the street pattern of the Binckhorst and enables the area to function as an intense urban area. The pink lines show connections on a low scale that are mainly used for bicycles and pedestrians. Within the structure shown earlier, the network can change depending on exact developments in the future.

Legend

- City scale road subterrain
- City scale road tunnel
- City scale road
- Binckhorst scale
- Streetcar/ Randstadrail
- Streetcar stop
- Human scale connection
#1. Density
The aimed density for the Binckhorst is relatively high. The municipal goal for the whole area is a FSI of 1.5. Since only part of the area can be used to realize new program the actual FSI in blocks has to be much higher. Since the pressure on the available land is high and the potential of the Binckhorst is high the goal is to realize new areas with high density.

The whole area is 1.300.000 m²
An FSI of 1.5 than means 1.950.000 m² of floorspace in the design
400.000 m² floorspace is present in the existing buildings that are preserved.

1.550.000 m² of floorspace needs to be realised in new developments
The footprint of the new buildings in the design is 240.000 m².
This for the whole area means an average of more than 6 floors.

#2. Building height
To realize the intended density in the area the buildings need to be of a significant height. To realize the aimed density minimum building heights have been set of four and six floors. For a coherent image and urban atmosphere the height of facades is set at a margin of four to eight, six to twelve or six to unlimited height.

Legend
- minimum 4 floors, facade margin 4-8 floors
- minimum 6 floors, facade margin 6-12 floors
- minimum 6 floors, facade margin minimum 6 floors

Minimum height
Facade height margin
#3. Mixed use
To realize a vital city a mix of uses is needed. If combined with high density it can lead to a dynamic urban area. The mix of functions must be realized on a low scale and monofunctional areas must be avoided. To realize mixed use areas goals are to have at least 30% housing and 10% other functions in a block after it is build. Flexible buildings that facilitate multiple functions can help to facilitate mixed use. Parts of the area are excluded of the mix use goals because of their existing function or environmental constraints. Developers and investors will be selected on their ability to realize mixed use buildings.

#4. Grain size
To create a dynamic and diverse building stock the grain size of buildings has to be kept balanced and somewhat small. This will not be easy with high density and large and new developments. It is however essential for diversity, dynamics and flexibility on the long term. Also street life benefits from regular entrances of buildings. A grain size or division is relative to the intensity of the area. Next to a division also different sizes of available units and buildings can help to facilitate differentiated and changing needs.
#5. Active facades
Buildings that do not connect to the street and do not use their facades programmatically or socially are not placed along the street but inside the block. Interaction between the street and the surrounding facades is needed for a vital area. No blind walls exist in the area.

#6. Ground floor height
The ground floor of buildings is relatively high or consists of two floors. This provides space for different uses and facilitates diverse users. Also other floors preferably have a relatively large height.
#7. Pedestrian friendly streets
Everywhere in the area streets provide enough space for pedestrians, provide many potential connections when being on the street and provide a rich information image (Salingaros, 2005).

#8. Buildings
The design of buildings enables multiple functions and diverse users. Buildings can be changed and adjusted to changing circumstances and needs.

Buildings that are built early in the process are able to be extended and enlarged in a later step of the process. Some have a temporary character and are removed after twenty years. No concession is done to spatial quality in those cases however. This approach stimulates a development that is not only based on large scale projects.

#9. Parking
Parking of cars is solved within the blocks. Streets are not dominated by cars. Parking for existing buildings is also realized in new developments. Some flexible parking places for short term parking are available in some streets.
Parking for larger groups of visitors is concentrated organized in every neighborhood.

#10. Other
Also other regular regulations apply to the Binckhorst and are conditions for developments in the area. These are for example policy for monuments and environmental aspects.
Rules
Principles are more strict than goals and can be literally applied in the development of the area.

#1. Parking
Parking is solved in the blocks with the construction of every new building. Parking space for existing functions is combined with new developments.

#2. Height
The height of buildings has a minimum of four or six floors. Margins are set for the height of facades.

#3. Water
All the water shores in the area are publicly accessible.

#4. Goals
If one of the goals is not met in a design proposal this lack of quality should be compensated in some way.

Land use plan map
A second way to translate the design into rules is a land use plan. The land use plan map on the next page has been made to test the spatial-legal perspective of the design. The land use plan map contains uses, building height and some extras for specific locations.

Next to the land use plan the regular for example monuments and highrise regulations apply for the Binckhorst.

Legend
- Public spaces
- Private mixed use developments
- Water
- Water structure
- Railway and train station
- Railway zoning, development limitations
- Temporary uses
- Graveyard
- Inclusion of public square
- Bridges
- Land use plan border
- Height contour
- Height category
- Public connection between two block sides

Minimum building height and facade height categories
A = minimal 4 floors, facade height margin 4-8 floors
B = minimal 6 floors, facade height margin 6-12 floors
C = minimal 6 floors, facade height minimal 6 floors
D = 0-3 floors
a. Land use plan map, design the Binckhorst
Maanweg Park

The existing park and road between the Binckhorst and Voorburg currently functions as a boundary between two sides that have nothing to do with each other. By upgrading the street and park it becomes a central park between the residential Voorburg and the urban mixed use new Binckhorst. Multiple crossings of the park open up the quality and facilities that are available in the new harbor area for the surrounding neighborhoods.
Trekvliet shore

The Trekvliet shore, which now is an inaccessible backside of the Binckhorst is transformed into a green front which includes connections between the Binckhorst and surrounding neighborhoods. The shore consists of both hard and soft quays and also is a street for the buildings along it. The route along the Trekvliet is used by people in the surroundings neighborhoods to go to the city centre, the north and south of the Binckhorst and Voorburg.
**Binckhorstlaan**

The Binckhorstlaan and Mercuriusweg are the central axis in the Binckhorst. The large scale infrastructure that runs through them is partly embedded in a glass covered tunnel. This is done to reduce pollution and nuisance from regional traffic that comes through the Binckhorst. The tunnel is regularly crossed by car and pedestrian bridges to not be a burden for local connections. The intensity from these axis and the local traffic using them is used for intense mixed use program along these axis. The number of floors of buildings along the Binkchorstlaan is set at 6 to 12 floors to realize an urban density and a consistent atmosphere.
**Binckhorst Harbor**

The existing harbor in the Binckhorst provides a characteristic opportunity for development. The combination with the existing office buildings, the new trainstation, new streetcar and short distance to the A12 provide excellent qualities to develop a new mixed use area with a relatively high density. Two roads (Saturnusstraat and Havenlaan) are central in this and contain retail functions and a lively street life. The height of buildings in this area is between 4 and 8 floors. The transformation and growth of the area takes place gradually which results in a mix of old and new buildings.
Binckhorst - Voorburg train station

The relocation of the existing Voorburg train station to Binckhorst-Voorburg adds a new quality to the harbor area that is now already being used by many office workers. By building two exits for the new station both the Binckhorst and Voorburg are served in an effective way. The station itself provides opportunities for new real estate development and an integration with the current international criminal court building which will move to the international zone in The Hague.
Binckhorst Park

The Binckhorst castle is currently hard to find. By extending the park around it and connecting that to the graveyard, a large green area is realized. Because of its form it still functions as a compact urban park, but can provide quality to the surrounding buildings and large parts of the middle of the Binckhorst.
Binckhorst North

Binckhorst North is the most dense part of the Binckhorst. Because of the new connections to A12 and A13, the presence of a randstadrail station and the connection to the centre and Laakhaven area the area is extremely well connected. The quality of the water and the new structure of the area provide the potential to grow into a intense urban area.
A12

The new exit Binckhorst North from the A12 is a connection to the Binckhorst, the centre ring road and the south of The Hague. It also is the end of the Laakhaven axis which is marked by highrise near the exit.
4.6 Sections

This map shows the sections for which street profiles are worked out in more detail. This is done to set a direction for the execution of the design concept and to show the concept in more detail at specific places in the area.

1. Binckhorstlaan
2. Mercuriusweg west
3. Mercuriusweg east
4. Trekvlietplein
5. Trekvlietkade
6. Laakas
7. Havenlaan
8. Saturnusweg
9. Zonweg

Height in sections

Maximum facade height
Minimum building height
The Binckhorstlaan is the central axes in the area in which the extension of the A13 is embedded. To prevent environmental problems in an urban environment the road is deepened and covered with a glass construction which is enriched with light architecture in the night. A reference for this is the Maastunnel track, the ‘s Gravendijkwal, in Rotterdam. The deepened road is regularly crossed by (small) bridges to prevent a burden for city life. A pedestrian friendly environment is created with wide sidewalks and tree lines.
Mercuriusweg west

The Mercuriusweg is the second large structure through the area, which leads to the A12 highway exit. It is both part of the city centre ring and the local structure. This means that next to the streetcar line two lanes in both directions are for traffic through the area. For local traffic, on both sides of the profile two direction car and bicycle roads exist. A wide sidewalk is preset to give room for pedestrians in this car dominated profile.
Mercuriusweg east

In the east of the Mercuriuslaan the traffic to the A12 highway exit is going underground with a similar solution as in the Binckhorstlaan. Next to this deepened and the streetcar line also here two parallel roads are present.
Trekvlietplein

The Trekvlietplein is the new monumental axes in the north that connects the Binckhorst with Laakhaven and the centre of The Hague. Large part of the profile is available for pedestrians that are present because of the high density and mixed used in the area. The buildings along the Trekvlietplein have mixed functions and are provide both a monumental and vital downtown environment.
The Trekvlietkade makes the quality of the Trekvliet accessible for the Binckhorst. Next to that it is an attractive new route through the Binckhorst. The road is used by both cars and bikes. Pedestrians use the path along the water and the sidewalk next to the buildings that are located along the Trekvliet.
Laakas
Havenlaan

The Havenlaan is the new line through the east of the Binckhorst that is a central line in the developments around the KPN Telecom and harbor area.
Saturnusstraat

The Saturnusstraat is a wide profile that is only partly used by the road that goes through it. In the middle a park/square/sidewalk strip is present that gives the street a pleasant atmosphere.
The Zonweg has on one side new building blocks of four to eight floors and on the other side the green and openness to the graveyard along it. The build side has a wide sidewalk along it. The other side has a rich sidewalk that is combined with a small park strip along it to present an attractive place to stay, next to the wideness of the unbuild graveyard.
4.7 Scenario’s

Introduction

Because the exact developments in society, the economy, government policy and the Binckhorst itself are hard to predict a precise plan for the coming 20 years is not useful and realistic. To still have an idea about what possible developments could be, it is useful to develop scenario’s for the development of the Binckhorst.

In these scenario’s one can see that different context influences how the transformation of the Binckhorst takes place. The speed of developments and the location where they take place is different in the different scenario’s.

Five scenario’s have been developed of which the first is the base case. In the different scenario’s the economic, infrastructural and regulative context is different.

The five scenarios that are worked out are:
Scenario 1: base case
Scenario 2: no money for large infrastructure
Scenario 3: economic recession
Scenario 4: industrial activities are not removed
Scenario 5: extreme housing boom

The icons that are used to illustrate the phase of developments are shown below.

- initiative/ start
- developing/ growth
- mature
a. Scenario 2, developments Binckhorst, 2025
b. Scenario 2, structure Binckhorst, 2025
c. Scenario 4, developments Binckhorst, 2025
d. Scenario 4, structure Binckhorst, 2025
Scenario 1

In the base case first developments in the Binckhorst start in 2008. In two places in the area improvements in the road network and public space are done. Market parties are active in developing the first mixed use buildings in the area. In 2012 industrial functions are removed from the area and the first two locations are given room to grow further. A little later the first streetcar line and the relocation of the trainstation to Binckhorst-Voorburg are realised.

In 2016 the Trekvliettunnel and the A12 highway exit open and stimulate large new developments in the area. To structure those, multiple parts of the new structure in the area are realised.

In 2020 developments started almost everywhere in the area, but the growth takes place continuously and dynamically.

1. Base case

Binckhorst 2015

In 2015 growth in the north and south have started and expanded. The Binckhorst is known for all kind of temporary cultural activities, its attractive route along the Trekvliet and the interesting new mixed use developments that are taking place.

Public interventions until 2015

- Main and sub-structure in Binckhorst Harbor
- Main and sub-structure in Binckhorst North
- Binckhorst Maanweg park
- Binckhorst Trekvliet shore
- Binckhorst-Voorburg station
- Streetcar line

- Started with: tunnel, A12 exit, Randstadrail, Binckhorstlaan and Mercuriusweg
Binckhorst 2025

In 2025 developments have been taking place everywhere in the Binckhorst. Some areas already changed completely from their former situation. The new image of the area is present everywhere. Older buildings are still present, but are step by step being replaced by new ones in much higher densities.

Public interventions 2015-2025

- Binckhorst Park
- Laak square
- Trekvliet tunnel A13
- A12 highway exit
- Binckhorstlaan
- Mercuriusweg
- Randstadrail
- Main and substructure in all parts of the area
Scenario 2

Although the economy has not performed badly, the governments financial situation and the political situation have become terrible. No money is available for large infrastructure interventions and if it would be planning procedures are taking so long that it can take decades before they will be realised. Only the money for the new bridge over the Trekvliet in the north, for the connection with Laakhaven, eventually becomes available in 2018. The money for the Trekvliettunnel might be available in 2030, but nothing is sure about that.

2. No money for large infrastructure interventions

Binckhorst 2015

Since no new bridge is realised yet in the north only the development in the south of the Binckhorst has started until now. Market parties saw the potential of this location, next to the highway exit and with the great harbor quality, and are building new blocks as planned. Since the shore of the Trekvliet became publicly accessible, this became the next location that is now starting to develop.

To facilitate the larger amounts of traffic that go through the Binckhorst the Regulusweg and Mercuriusweg have been broadened and the Zonweg and Wegstraat are redesigned to facilitate more traffic.

Public interventions until 2015

- Main and sub-structure in Binkhorst Harbor
- Binckhorst Maanweg park
- Binckhorst Trekvliet shore
- Streetcar line
- Started with: Binckhorst-Voorburg station and Mercuriusweg
Binckhorst 2025

Because the possibility of the realisation of the Trekvliettunnel is present, more developments around the Binckhorstlaan are taking place. This means that the south of the Binckhorst is gradually developing.

Developments in the north are limited to new blocks around the Trekvlietplein.

Public interventions 2015-2025

- Laak square
- Main and sub-structure Binckhorst North
- Binckhorstlaan
- Mercuriusweg
- Minimal interventions in main and substructure in all parts of the area
Scenario 3

The credit bubble of 2007 got more severe and the whole economy got into a long term recession. The money for the large infrastructure interventions was already planned in long term budgets so became available anyway.

Only in 2018 the economy is starting to go upwards again.

3. Economic recession

Binckhorst 2015

The new connection in the north has been build, but little new buildings are realised along it. The area is still relatively vacant. Preparations for the Trekvliettunnel and the A12 highway exit are taking place. The Binckhorstlaan and Mercuriusweg are step by step getting there new profile. In the south only little new buildings were realised after the improvements in roads and public space.

Public interventions until 2015

- Main and sub-structure in Binkhorst Harbor
- Main and sub-structure in Binckhorst North
- Binckhorst Maanweg park
- Binckhorst-Voorburg station
- Streetcar line

- Started with: tunnel, A12 exit, RandstadRail, Binckhorstlaan and Mercuriusweg
Binckhorst 2025

The infrastructure and public space in the area is of high quality. The first new building initiatives after the recession are making use of this and are developing in multiple locations spread over the whole area.

The businesses and artist that were attracted by the cheap buildings during the recession are now providing a special vitality and dynamics in the area.

Public interventions 2015-2025

- Binckhorst Park
- Laak square
- Trekvliet tunnel A13
- A12 highway exit
- Binckhorst Trekvliet shore
- Binckhorstlaan
- Mercuriusweg
- Randstadtrail
- Main and substructure in all parts of the area
4. Industrial activities are not removed

Scenario 4

Although the municipality made the Binckhorst one of its top priorities it has not yet been possible to remove the industrial activities in the area. The available land in the region is so little and other municipalities are not cooperating. This has been a burden for developments in parts of the area.

Despite those burdens the new infrastructure has been realised to at least facilitate developments in other parts of the area.

Binckhorst 2015

Some new buildings have been realised in the south of the Binckhorst. This has however been limited to a certain distance around the asphalt factory within which still small business are active.

Because the new Trekvliettunnel and A12 highway exit are almost ready, plans are being made to develop new blocks around the Binckhorstlaan and the Mercuriusweg.

Public interventions until 2015

- Part of the main and sub-structure in Binkhorst Harbor
- Binckhorst Maanweg park
- Binckhorst Trekvliet shore
- Binckhorst-Voorburg station
- Streetcar line

- Started with: tunnel, A12 exit, Binckhorstlaan and Mercuriusweg
The industrial activities are still a burden for developments in all parts of the Binckhorst. After the realisation of the Trekvliettunnel and A12 highway exit however the middle zone of the Binckhorst is booming.

In the north, temporary buildings for businesses have been build and temporary cultural activities are taking place.

**Public interventions 2015-2025**

- Binckhorst Park
- Trekvliet tunnel A13
- A12 highway exit
- Binckhorstlaan
- Mercuriusweg
- Randstadtrail
- Main and substructure in all parts of the area
Scenario 5

Because of an economic boom, a decrease in household size and the location of new institutions in the area between The Hague and Scheveningen, the demand for houses is booming.

5. Extreme housing boom

Since the demand for houses is much higher than expected, the development of new blocks takes place rapidly. Old buildings are rapidly replaced by new ones when they become vacant.

To steer the development in the north the planned interventions for 2016 have already been realised in 2015. This is before the Trekvliettunnel and A12 exit are ready.

When those two interventions and the redevelopment of the Binckhorstlaan and Mercuriusweg are ready the middle area of the Binckhorst is quickly developed next.

Binckhorst 2015

Public interventions until 2015

- Main and sub-structure in Binckhorst Harbor
- Main and sub-structure in Binckhorst North
- Main and sub-structure in multiple parts of the area
- Binckhorst Maanweg park
- Binckhorst Trekvliet shore
- Binckhorst-Voorburg station
- Streetcar line
- Laak square

- Started with: tunnel, A12 exit, Randstadrail, Binckhorstlaan and Mercuriusweg
Binckhorst 2025

In 2025 almost all of the Binchorst is build and a total transformation of the area took place. The plots that are still vacant or become available when older buildings are demolished are directly build upon in high densities.

Public interventions 2015-2025

- Binckhorst Park
- Trekvliet tunnel A13
- A12 highway exit
- Binckhorstlaan
- Mercuriusweg
- Randstadrail
- Main and substructure in all parts of the area
5. **Evaluation and conclusions**

  5.1 Introduction
  5.2 Evaluation research
  5.3 Evaluation design
  5.4 Conclusions
  5.5 Reflection on the project
  5.6 Recommendations for further research
  5.7 What if things change? - A framework on flexibility
  5.8 The flexibility assessment - Operationalising flexibility
5.1 Introduction

In this section the evaluation of the research and design are presented. Those reflect on the process and results of the project. The conclusions on the design represent the findings about flexibility in urban design presented in six propositions. The insight in flexibility and the way the urbanist can use this effectively is summarized as presented in the framework on flexibility. This framework is aimed at an accessible representation of the results of this project for the field of urbanism. An operationalisation of the theory is still being developed in ‘the flexibility assessment’.
5.2 Evaluation research

In this evaluation the preparation, execution and results of the research are evaluated. This is done to reflect on the process and results and determine their value.

Thesis plan
The thesis plan has been the basis for the research. It has been a good instrument to formulate a starting point for the project and guide the execution of the project. The aim that was formulated was ‘the development of an insight in the concept flexibility and the developments of methods for the urbanist to use it effectively’. This aim staid relevant during the process and has been met with the framework on flexibility and the conclusions from the design.

Four research questions have been formulated to help to reach the aim of the project. The questions have helped to direct the activities undertaken in the project and have been answered in multiple parts of the project. What has became clear during the process is that the questions, like the project, had an explorative character. Because of this character the content and approach of the project have not been straightforward. The questions did not always provide a clear basis for what activities to undertake.

Six design questions have been formulated in the thesis plan. They have not literally been used to steer the design process. This might be because of the distance in time between the formulation of the thesis plan and the work on the analysis and design. In this context the design questions were too specific at that moment. After an initial inventarisation of the location and possible assignment they could have been made more specific to effectively use them to steer the design process.

The proposed methods and structure for the project have been effectively for answering the research questions. What became clear however was that different activities have been executed too much sequentially and too little use has been made of a cyclic approach. This is logically in the context of the size of the activities and the project. Not everything can be done at the same time and mixed. A better mix and switching between activities might have been more effective however.

Research
The research consists of eight sections. The first part (sections 2.2 & 2.3) provide a sound basis for the research by thoroughly studying the meaning of flexibility. This is first done in a general way and after that more specifically in urbanism. With this insight the use of flexibility in urbanism is evaluated in the second part of the research (sections 2.4 & 2.5). This is both an illustration of the meaning of flexibility in urbanism and a study on the relevance and use of the concept. This forms the basis for part three (section 2.6) in which issues and methods that are relevant for the use of flexibility are identified and structured. To be able to translate flexibility into a design, case studies have been done in which an insight into three recent large urban projects has been established. The research has been a good way to study the subject. It has however not resulted in a complete final image on the subject. Because of the ambiguous use and complex matter more research can be done on flexibility.

Design
In the analysis of the Binckhorst an interesting test has been done with the analysis of flexibility in a project.
This approach and examples could be further developed to further enable the analysis of dynamics in urban design.

The design of the Binckhorst has been a constant struggle between a regular design and specifying what the role and influence of flexibility is on products and design. Much of the effort in this phase therefore has gone into methods and techniques and not only into a good design. Because of the ambiguity of the concept flexibility, this has been a challenging and non-straightforward task. The design has very much contributed to structuring, clarifying and testing the theoretic findings on flexibility. Also in itself it has become an example of how to design on this scale and for this type of project. Relatively little effort has gone into the illustration of what the project could look like from a programmatic perspective.

Conclusions
The design conclusions reflect the approach that has been used during the whole process. This approach has, with the struggle in the design process, resulted in the design on which the conclusions are based. Like the design also the conclusions focus on the way the design is made and not so much on the quality of the design.

The general conclusions reflect the insight that has been established in the concept flexibility. Next to the conclusions also the framework and the work in the report represent this insight. The conclusions present a certain consistancy, but there is still much about flexibility that can be studied and made more clear.

Framework
The framework is the summary of the research. It contains the main conclusions and the elements of the different steps in the research. It presents the insight that was aimed for in the project in a short way to interested readers.

Assessment
The assessment form has been made to operationalise parts of the research. This has partly been succesful with the organisation of the themes from the research. It is however still to broad and ambiguous to make it easily understandable and applicable for everybody.
5.3 Evaluation design

In the analysis of the Binckhorst, goals have been formulated for multiple aspects. Together with the research those can be used to evaluate the design that is made for the Binckhorst.

The goals for the area have been directly met so far as they are represented in design drawings. Aspects like the use of existing functions in the redevelopment process are not fully represented in a design drawing, but are part of the proposed approach and strategy. This makes them harder to quantify and evaluate.

Structure
The structure for the area is designed in such a way that a long term (robust) guideline is set. The structure enables different program and forms on a lower scale. It is aimed to grow and transform gradually, dependant on the actual developments in the area.

Diversity
Diversity is present in the design in the different types of environments within the area. This diversity is strengthened by a structure that also provides different contexts for development. Diversity on a lower scale is aimed at by the proposed goals about mixed use, building height, grain size, ground floor height and buildings.

Bottom up
The emergence of bottom up developments is stimulated by the use of existing buildings and program in the development, an emphasis on the presence of small scale and the acknowledgement of the value of dynamics. Only in areas like the north of the Binckhorst where the scale of developments could have a large intensity and scale, bottom up initiatives might play a smaller role, depending on the planning culture and ambition that are chosen for this type of locations.

Dynamics
Dynamics in the form of gradual change, temporary activities and bottom up change has partly been designed and represented in the plan. Because of the large scale the design proposal staid relatively general in this and didn’t come up with many concrete (small scale) design solutions.

Design scale
The scale of the design is very large. This has made it hard to determine in advance on which scales and in what way to develop a design proposal. Within the design both links to the larger urban context and the concrete of lay-out of streets have been made.

Government-market interaction
The design proposal is not clear in how the interaction between government and market and the interventions of government should take place. Little information about the role and use of regulations is provided. For example about when the proposed spatial design or goals will come into use and are from that moment a legal context for developments in the area.
5.4 Conclusions

In this section the design conclusions and research conclusions both are presented. They represent the insight that has been established during the project. More detailed research conclusions can be found in the framework on flexibility and in section 2.8.

**Design conclusions**

1. A framework has been designed within which multiple developments can still take place in the future.

2. The structure of the design can be developed gradually, depending on the exact developments in the area.

3. The design provides long term guidelines for the development of the area. Both the main structure is designed and more detailed principles are tested in the design.

4. A more personal perspective has been used in the development of goals and conditions for the design and development on a lower scale in the area. They represent a personal position of what a vital and sustainable urban area looks like.

**Research conclusions**

1. The definition of flexibility is ‘the ability to adapt to changing and differentiated circumstances’.

2. Flexibility is about finding a balance between freedom and fixation in aspects like: planning culture, organizational aspects of projects, the acknowledgement of possible changes, providing a robust design, the accumulation of means, grain size of buildings and units and diversity in form and program.

3. Flexibility is about providing long term guidelines that provide quality and security.

4. Flexibility is about stimulating dynamics and giving room to dynamics.

5. The two reasons to use flexibility are as a reaction on uncertainty and on differentiation.
5.5 Reflection on the project

Personal reflection on the project

Broad subject
Flexibility is too ambiguous to further study it on itself. This project has however provided a good basis to further study it in combination with more practical topics.

Flexibility is too ambiguous to further use it as a research topic on its own. It is however a good starting point or perspective to study other topics.

The ambiguity of the concept flexibility makes it harder to discuss flexibility and pass on knowledge.

The meaning of flexibility is sometimes influenced by perspective or goal.

Research
The research has sometimes been too extensive and complicated to keep all the different parts constructive and going.

I have been working on my own relatively much, which resulted in a lack of constructive discussion and interaction on the subject and on the project.

The research consists of good and constructive parts and activities.

Because of the unexplored and ambiguous character of the subject the project has had a relatively explorative character.

Large part of the effort in the design phase has gone into studying how to make the design instead of making the design.

Experience
The subject has provided the opportunity to study many subjects, projects, book and other information.

I have enjoyed studying dynamics and change in the urban environment a lot.

I have enjoyed the subject but not always the way the project took place.

I have developed a sound insight in the concept flexibility.
5.6 Recommendations for further research

The perspective of dynamics and change in the urban environment is a very relevant one to take in contemporary urban developments.

A shift should take place from urban design to more attention for urban management. In that way the constant dynamics are addressed instead of only the interventions.

Urban development strategies and typologies should be developed that are able to deal with both growth and shrink to different intensities in urban environments. Opposed to a final image that is realized and completed at ones.

The subject of contrast versus clusters should be studied further in network city theory.
Cities have long been the result of both collective organization and individual actions. In the 20th century, institutionalized planning cultures emerged and multiple forms of top-down planning were introduced. So-called scientific planning and other planning dogma theories, abstracted, rationalized, and industrialized the art of city-making. Those planning approaches developed a simplified image of the city that enabled the use of standard solutions and general principles which could be applied regardless the time, space and specificities and dynamics that emerged from those.

This kind of approach might have had a little theoretical relevance 50 years ago. Today it is not sufficient anymore to the dynamics and speed of change that characterize our environment. The diversity that is present and accepted nowadays, and is the result of among others globalization and technological developments, requires an approach that enables directing on the major lines, but leaves open possibilities to react on change and diversity.

To stimulate this way of thinking and working in urbanism it is useful to identify the issues and mechanisms that are relevant to a more dynamic planning and design approach. By explaining the concept of flexibility in urbanism, issues that are related to change and dynamics become clear and an insight is provided that can be used in both theory and projects.

In the following framework this is done with a focus on large urban projects.

**INTRO**

**Definition:** flexibility is the ability to adapt to changing and differentiated circumstances.

Flexibility is used in many different disciplines and circumstances in different ways and often has slightly different meanings.

**Two reasons** to use flexibility are:
- as a reaction on **uncertainty** and;
- as a reaction on **differentiated needs**.

Both have their own uses in applying the concept flexibility.
Disadvantages of the use of flexibility emerge when flexibility is used to leave things unclear. A wrong balance between freedom and determination is chosen in that case.

**Uncertainty** in urbanism comes from four reasons:
- **The field** of urbanism is a diverse and multidisciplinary community and profession that is constantly developing.
- The urban planner and designer are working for the **future**, by developing insights, concepts and proposals that are aimed at influencing current and future developments.
- Globalization, **complexity** and change play a large role in the subjects and locations an urbanist is working on.
- **Development processes** are often long term processes in which perceptions, aims and organization are sources of uncertainty.

**Differentiated user needs** in urbanism are present because of:
- Individualization and diversification of and natural differences in our society
- The multiplicity of functions an urban design should provide
10 ISSUES

There are ten issues that illustrated the meaning and use of flexibility in large urban projects

**Culture**: the planning culture in a country or time period influences the use of flexibility. A dynamic multi-stakeholder oriented planning culture requires more flexibility than a communist top down planning system.

**Power**: if power and influence in a project are divided among multiple stakeholders, flexibility in organization and process is more relevant than in a project were power is mainly with one stakeholder.

**Scale/layer**: the city has meanings on multiple scales. Be specific on which scale the application of flexibility should have its effect. Be sensitive to the scale on which change takes place and a reaction should have an effect.

**Stakeholders**: stakeholders play roles on different scales. Give them on their own scale the opportunity to sense change and the responsibility to act and react on it.

**Grain size**: change takes place most gradual and dynamic when a small grain size is present. A small grain size stimulates diversity and interaction.

**Diversity**: diversity stimulates interaction and enables gradual change.

**Change**: change is constantly taking place as a result of interactions between actors and events in a complex world.

**Investments and means**: the accumulation of means prevents change. Invest in a way that is appropriate to the change that is needed and expected.

**Surplus**: realize surplus in design solutions as a practical way to provide room for diversity and change.

**Continuity, fixation and robustness**: use the opposites of change, freedom and volatile cautious but as much as possible to provide clarity towards the future.

Every project and situation requires its own reaction on uncertainty and differentiation and its own ability to change and adapt and therefore its own balance between freedom and determination for the ten issues mentioned above.

By seeing flexibility as a balance between freedom and determination it can be used to direct developments with the acknowledgment of and space for change in the future.
Recommendations for a dynamic design and development process

**Process and preparation**
- Acknowledge change and dynamics
- Analyze the assignment and location in all its aspects
- Specify what you don’t know about the location and the project
- Specify what is uncertain at the location and for the project
- Identity the parties involved in the start of and during the process
- Realize openness about plans and process to stimulate interaction between and involvement of stakeholders.
- Integrate a learning cycle or opportunities for adaptation of plans to adapt to changing circumstances or new opportunities.
- Work cyclic

**Products, communication and regulation**
- Early in the process use detailed and specific designs only to communicate and evaluate, not to regulate.
- For long term and large scale, design a vision not a plan.
- For mid term and middle scale, design spatial principles.
- For the short term and small scale, make plans of which the quality can be tested.
- Lay down guiding structures within which change can take place.
- Adapt and differentiate regulative systems during different phases of a process.
- Provide a regulative system that is able to provide the flexibility aimed at in the design, but also guarantees the quality of it.

**Design: content and solutions**
- Design solutions that can function in different circumstances and answer differentiated needs.
- Use a certain surplus in design solutions which provides room for differentiation and change.
- Don’t design everything into great detail. Leave room for interpretation during its use.
- Make designs that incorporate the past, are designed for today and leave room for the future.
- Adjust the fixation of means in your design to the possibility and necessity of change.
- Be specific in the scale your solution is aimed at and has effects on.
- Use diversity as a way to realize flexibility.
- Design strong and facilitating structures within which change can take place.
- Be specific in what to design and fix and the margin within which you leave freedom.

**Cases**
- Hamburg Hafencity
- Solids, Amsterdam

**Further reading**
- Steward Brand - How Buildings Learn
- Urhahn Urban Design - Spontaneous city
- Anne Vernez Moudon - Built for change
- van der Heijden, Scenarios
5.8 The flexibility assessment - Operationalising flexibility

Introduction
To operationalise the research on flexibility and be able to use flexibility in the design and evaluation of projects, a flexibility assessment form has been developed. In this form multiple subjects that were found in the research to play a role in flexibility are represented.

With the form the flexibility character of a project or area can be evaluated and illustrated. The goal of the assessment is not to grade a project or calculate a value of how flexible a plan is. The use is to be able to get an insight to how flexibility is present in a project. In this way the expected need for flexibility and the solutions that have been used to answer this need can be evaluated.

Flexibility in this assessment is seen as the balance between fixation and freedom, homogeneous and chaotic, robust and volatile.

A judgement about if something is flexible, is to a certain extend subjective. For this reason the subject of the assessment and the perspective of the assessor have to be specified. Next to that, questions have been formulated per aspect, which should help the assessor to determine the score on that aspect.

Assessing
Scores that can be chosen range from a B for balance to -1, -2 and -3 and +1, +2 and +3. -3 represents a very fixed aspect with hardly any flexibility. +3 represents a very free aspect with far too much flexibility. If an aspect is not applicable or not able to be judged clearly the option ‘not applicable’ can be chosen.

On page two of the assessment form an explanation about the score can be added. This helps other people to read the assessment and can help the further development of the method.

Results
A score in the green area (< - >) means that a relative good balance has been found for flexibility. The orange areas means that relatively little (<<) or relatively much (>>) flexibility is present. The red areas means that extremely little (<<<) or extremely much (>>>) flexibility is present in that aspect.

On the next page is part of the result of the flexibility assessment of the design and realisation of the Kop van Zuid area in Rotterdam. The full version can be found in the appendix.
### Flexibility assessment form

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subject</th>
<th>Levels</th>
<th>Flexibility*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>Culture</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholders</td>
<td>Perspective</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Role/responsibility</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Change</td>
<td>Short term</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long term</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>Robustness</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scale</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Surplus</td>
<td>Unit</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neighborhood</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>City/region</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dynamics</td>
<td>Grain size (division)</td>
<td>X</td>
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</tr>
<tr>
<td></td>
<td>Units</td>
<td>X</td>
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<td></td>
<td>Buildings</td>
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<td></td>
<td>Blocks</td>
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<td></td>
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<tr>
<td></td>
<td>Neighborhoods</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Diversity (difference)</td>
<td>Form</td>
<td>Architectural</td>
<td>X</td>
</tr>
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<td></td>
<td></td>
<td>Unit sizes</td>
<td>X</td>
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<tr>
<td></td>
<td></td>
<td>Public space</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Program</td>
<td>Units</td>
<td>X</td>
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<tr>
<td></td>
<td></td>
<td>Buildings</td>
<td>X</td>
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<tr>
<td></td>
<td></td>
<td>Blocks</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neighborhoods</td>
<td>X</td>
</tr>
</tbody>
</table>

**Name and location of the project or area**: Kop van Zuid, Rotterdam

**Subject of assessment**: The design and realisation of the larger Kop van Zuid area (125 ha) until 2008

**Date of assessment**: March 10th, 2008

**Name assessor**: Maarten Bouten

**Background assessor**: Urbanism graduate student with an interest in flexibility

**References project**: not applicable
## Flexibility assessment form

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subject</th>
<th>Levels</th>
<th>Flexibility*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>Culture</td>
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<tr>
<td></td>
<td>Power</td>
<td></td>
<td>&gt;&gt; &gt;&gt;&gt; not applicable</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>Perspective</td>
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<tr>
<td></td>
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<td>Change</td>
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<td>Design</td>
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<td>Surplus</td>
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<td>Means</td>
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<td>Dynamics</td>
<td>Grain size (division)</td>
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<td>Buildings</td>
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<td>Blocks</td>
<td>Public space</td>
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<td>Diversity (difference)</td>
<td>Form</td>
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<td>Units</td>
<td>Unit sizes</td>
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<td>Buildings</td>
<td>Public space</td>
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<td>Dynamic</td>
<td>Block</td>
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<td></td>
<td>Neighborhood</td>
<td>Neighborhood</td>
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</tr>
</tbody>
</table>

Name and location of the project or area
Subject of assessment
Date of assessment
Name assessor
Background assessor
References project

* (fixation vs freedom)
* (homogeneous vs chaotic/disintegrated)
* (robust vs volatile)
## Aspects and questions

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
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<tbody>
<tr>
<td>What is the character of the planning culture which forms the context of the project? Role of government vs market. Government control vs. influence of user.</td>
<td></td>
</tr>
<tr>
<td>How is power organized in the project? Number of 'executive' stakeholders, size of the project, land ownership.</td>
<td></td>
</tr>
<tr>
<td>Are the perspectives of all possible relevant stakeholders taken into account in the planning and design of the project?</td>
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<tr>
<td>Are stakeholders given an appropriate role and responsibility to sense and deal with change at their appropriate level?</td>
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<tr>
<td>Is the influence of short term changes considered and in an appropriate way?</td>
<td></td>
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<tr>
<td>Is the influence of long term changes considered and in an appropriate way?</td>
<td></td>
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<tr>
<td>Is fixation used to provide clear guidelines, robustness and clarity towards the future?</td>
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<tr>
<td>Is the presence of and influence on multiple scales considered in the design?</td>
<td></td>
</tr>
<tr>
<td>Is surplus used/present in the design of the unit and building to facilitate changing needs and functions?</td>
<td></td>
</tr>
<tr>
<td>Is there space available (mainly public) in which changing and new functions can be facilitated?</td>
<td></td>
</tr>
<tr>
<td>Is there space available for growing and new functions and infrastructure in the city or region?</td>
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<tr>
<td>Are means invested and accumulated in a way that is appropriate to the expected changes?</td>
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<tr>
<td>Is there a division (ownership and organisation) on the scale of (groups of) units present?</td>
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<tr>
<td>Is there a division (ownership and organisation) on the scale of (groups of) buildings present?</td>
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<tr>
<td>Is there a division (ownership and organisation) on the scale of (groups of) blocks present?</td>
<td></td>
</tr>
<tr>
<td>Is there a division (ownership and organisation) on the scale of (groups of) neighborhoods present?</td>
<td></td>
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<tr>
<td>Do architectural differences (aesthetics and form) provide a rich information image?</td>
<td></td>
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<tr>
<td>Is a differentiation in the size of units and buildings present that facilitates differentiated needs (and functions)?</td>
<td></td>
</tr>
<tr>
<td>Is a differentiation in the design and function of public space present that facilitates different groups of users?</td>
<td></td>
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<tr>
<td>Are differences in program and use (functions and types) within groups of units present?</td>
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</tr>
<tr>
<td>Are differences in program and use (functions and types) within groups of buildings present?</td>
<td></td>
</tr>
<tr>
<td>Are differences in program and use (functions and types) within groups of urban blocks present?</td>
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</tr>
<tr>
<td>Are differences in program and use (functions and types) within groups of neighborhoods present?</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion:**
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http://www.udg.org.uk
Appendix

222  1 Introduction on the development process of large urban projects
228  2 Paper - Complex networks, network city and flexibility
238  3 Assessment form Rotterdam Kop van Zuid
1. Introduction on the development process of large urban projects

Introduction
To be able to make a selection for the case studies and to be able to research the role of flexibility in large urban projects, first an understanding about large urban projects needs to be developed. This will be done by identifying the subjects relevant in area development and characteristics of large urban projects. Hereby not pretending to be complete on this subject. On the basis of these properties and subjects, cases can than be categorized and selected and subjects for the case study can be determined.

Types of projects
Within the category ‘large urban projects’, different types of large urban projects can be identified. This is done by Wigmans (2003) on the basis of multiple criteria for urban redevelopment projects, which results in six categories. I however identify three categories of large urban projects.

1. Renewal or regeneration projects in which the function of the area stays the same but the area is modernized and updated to perform better. For example housing areas, industrial areas or station areas.
2. Transformation projects in which the old function disappears for the largest part and is replaced by a new function. For example the transformation of harbor or industrial areas into urban areas. The original function must not necessarily disappear completely, but is not the major function of the area anymore.
3. Strategic projects which are aimed at improving the competitive position of the city. Mostly, infrastructure and national commercial functions are important in these projects.

Project and context
Depending on the aims and organization of the project, large urban projects have different ‘ranges of influence’. Projects like regeneration of housing areas might mainly be aimed at social-economic goals and the neighborhood or city itself. Some are however also aimed at a regional level, when the housing renewal is done in such a way to not only improve the situation in the neighborhood itself, but also improve the position of the city as a whole by for example attracting more middle class or high income households to the city. Other projects with regional influence can for example use there position in infrastructure to exploit their central position for functions which have a regional catchment area, like retail, leisure or large office locations. Recently improvements in regional transport systems, like lightrail, are being realized. This means that the possibilities for areas and projects to improve their regional position increases. Paying attention to the regional scale and influence of the project becomes more and more important, because of the idea of the increasing position of regions instead of cities.

Strategic projects are explicitly aimed at having influence at the (inter)national level and improving the competitive position of the city or region. This is done by attracting special program or functions to the area, high end architecture, which gives the area a unique image or investments in for example infrastructure. If this approach can bring long term benefit to the city and is worth the often large financial injections of the government is something to be considered.

Size
Although the term ‘large urban projects’ suggests a
common size in all the projects, this is not the case. The Zuidas is one of the largest projects at the moment with 225 hectares, Rotterdam Kop van Zuid is 125 hectares, and Amsterdam northern Ij-shores comprises 100 hectares. Other locations that are considered large urban projects (S&RO, 2004) are however smaller in size: like Breda Chassé-area (13 hectares), Den Bosch Paleiskwartier (30 hectares) and Maastricht Céramique (23 hectares). Most of the current station areas which are under development also are 12 to 26 hectares in size, with Utrecht as an exception with 90 hectares. These projects however sometimes involve developments in larger areas than only the station itself, which means that some of the projects can also be larger. The size of the projects might influence the time it takes for them to develop and with that the amount of uncertainty about the future that is involved. Also the larger the project, the smaller the chance that it is a simple project. This means that for some smaller projects it might be possible to develop fast, strongly directed and relatively mono-functional, but for larger locations this will probably not be the case.

**Instruments en methods**

With the diversification and increasing complexity in spatial developments, different methods and instruments are developed to organize these projects and developments in a more effective way. Some of these approaches and planning documents are explained below.

- **Development control planning vs. development planning (Toelatings vs. ontwikkelingsplanologie)**

  Development control planning used to be the way spatial developments where organized. The municipality identified locations where something had to be done, developed a plan for that, fixed that plan in the local land-use plan and allowed or contracted developers to realize that plan. This way of developing however, doesn’t recognize the interests and potential roles of other stakeholders, who could contribute something to the project. Also the complexity of realizing plans that provide answers to current and future needs and anticipate possible changes are mostly not recognized in this way of planning. As a reaction on this, development planning was developed. This way of planning allowed a larger role for private parties and organized the initiation and development of projects as a cooperation between the government and private parties. In this way projects where supposed to answer better to market conditions and the specialized roles within the process where divided in a more appropriate way. Although development planning is used more and more, for some developments development control planning, might still be an appropriate approach.

- **Plan cycle and iterative planning (Cyclische planvorming)**

  Principles of change, uncertainty about the future, learning and development of knowledge during the development process are recognized by the plan cycle approach. Cyclical working and planning recognizes the fact that not everything in a development process can be determined and designed in advance. Things can be developed on a basic level in the beginning and evaluated and improved during the process. This means that a development process is not linear anymore, but the different steps in a process are taken multiple times at an ever more detailed level. This approach makes it possible to perform the different steps already early in the process and for some aspects work on the basis of assumptions. When more knowledge or understanding becomes available the steps can be redone with more information and a better result. This might seem inefficient, but makes it possible to do some useful ‘tests’ already relatively early in the process. Good manage-
The iterative process needs to guarantee that improvement takes place and the project doesn’t get stuck with preliminary results.

- Integrated area development (integrale gebiedsontwikkeling)

Integrated area development comes from the development planning approach mentioned above. It can be seen as a reaction on complex urban projects that involve multiple stakeholders and disciplines (Bruil, 2004). These projects can gain benefit and success if executed in an integrated way. More and differentiated means are available and goals can be adjusted and focus can be changed during the process. This approach helps large projects to deal with internal and external changes during the development process and uncertainty about the exact final result of the project.

- Urban regeneration

The urban regeneration approach promoted by Roberts and Sykes (2000) has similarities to the integrated area development described above. They promote an integrated approach in the regeneration of urban (housing) areas. It is based on an integrated approach in multiple aspects (disciplinary, organizational and methodological). This approach tries to be very broad and comprehensive, to influence as much aspects as possible and reduce the uncertainty in aspects that can influence the success of a regeneration project.

- Development vision (ontwikkelingsvisie)

The development vision is not a very common concept and is being used for the Coolhaven Rotterdam. In contrast to a development plan (like a masterplan), which is aimed at the execution of a relatively fixed spatial concept, the development vision is a map of chances for the development of an area (Reijndorp and Reitsma, 2006). It is a useful instrument if there is not a single commissioner in the project, but a group of organizations, parties and interests for who the development is relevant. The development vision than provides an (urban development) context or framework within which stakeholders can realize their own projects and interests. The power of the development vision is that it acknowledges the constant development and transformation of the city and is not aimed at a static end situation.

- Structure plan (structuurplan)

A municipality can develop a structure plan to express future spatial developments within the municipal- ity (Hobma, 2003). A structure plan is a research and development oriented plan. It has little legal meaning, but can help the municipality to communicate its vision on an area or coordinate the development of an area. A structure plan however has two legal consequences. It means that the preparation of changes in the land use plan (voorbereidingsbesluit) can take as long as two years. Secondly it means that for areas which area pointed out as renewal areas the municipality can establish a preferred buyer right. This means that real estate owners first have to offer their property to the municipality when they are selling it.

- Local land-use plan (bestemmingsplan)

Land use plans are legally binding plans for citizens (Hobma, 2003). The execution of the land use plan is done via building permits. Land use plans regulate what is legally maximal allowed, but don’t coordinate that the maximum situation in the land use plan is actually developed. Three types of land use plans can be recognized: rough land use plan with obligation for later detailing, detailed land use plan and a rough final land use plan. The first can be used to set developments, and work this out in more detail with developers. A detailed land use plan can be used when a strict and fixed development is desired. The advantage of a rough final land use plan is that it leaves room for changes and doesn’t need to be changed so often.
• Masterplan
The masterplan is a document that can have many forms. Formally the masterplan was considered an overall plan for an area, which described the plans and design for the area in great detail. This so called ‘blue print planning’ is however not considered appropriate anymore. The meaning and content of a masterplan is changing to a more strategic plan, which still is an overall plan, but much more describes the strategy, framework and design and development principles for an area.

Phasing
Development processes exist of different phases, in which stakeholders, means, activities, organization structure or goals might be different. To be able to identify in which phases flexibility is relevant, or for which aspects in the different phases flexibility is relevant, and overview of the succession and content of the different phases is given below.

• Motive and initiation
Problems or opportunities in an area can motivate private, governmental or non-governmental parties to initiate the start of developments in an area.
• Research and analysis
Research and analysis on the area can be done to get a clearer view and sounder foundation for the start of a project. With this research and analysis the problems and opportunities can be identified and development possibilities and conditions can be explored.
• Vision and aims
On the basis of the preparations and recognition of problems and possible developments the stakeholders involved at that moment can formulate a common vision on how and why they see the development of the project. This common vision and aims need to be well considered and need to provide a sound foundation as well as a driving forces during the whole development of the project. For this reason it needs to be clear enough to set directions, but flexible enough to allow adaptations to changing circumstances during the process.
• Formation
With the vision and aims set for the start of the project, the formation of means, other stakeholders and a project organization can be done to start realizing the developments and results. In this phase the conditions to realize the project should be analyzed and met, to set the framework within which the project can be executed. Depending on the way the project is initiated this phase can also take place earlier in the process.
• Development plan
With the conditions set and means organized a start of the realization of the project can be made. The problems, opportunities, visions and aims with the given conditions can be translated in strategy and design for the development of the area. The size and period of the project can influence the detail with which this is done.
• Development preparation
For the realization of the design plots might have to be acquired, building permits and procedures have to be gone through, contractors have to be found, buyers or renters for the real estate have to be found and so on. This is all done as a preparation for the realization which takes place on short term. Mismanagement of stakeholders and legal procedures can result in significant delays in this phase.
• Realization
Realization is on a small scale mostly a relative short period in which buildings are erected and public space is realized. Depending on the location this might however have a large impact, because at this moment the actual physical changes take place. In a transformation.
area the current users might experience a large influence from the realization of new buildings and changes in their area. The realization of (part of) the project is the starting point of a period in which many structural elements will stay the same.

• Bringing into use
After the buildings and public space are realized people can start using the area and living in it. Only at this moment it will become clear how people really conceive the spaces and use them. It can be a quality if there is recognized that the designer can have ideas about how people will use his design, but leaves open room for adjustments after a project is brought into use. Christopher Alexander developed theories and methods about this.

• Urban management
After people have started using the area, little structural changes will take place. The smaller the grain, the more often changes can take place. Changes at a low scale provide opportunities for facility managers and users to adjust their environment to their current needs. The issues identified in the chapter ‘flexibility in urbanism’ show what influences this flexibility. In the urban management phase, practical problems and opportunities on a small scale are identified and dealt with.

• Urban renewal
The fixedness of some elements and layers in the build environment make it necessary that some change or maintenance cannot take place gradually, but needs to be done periodically and on a larger scale.

In larger projects the different phases might not be followed literally. Parts of the area might already be realized when other parts are not even designed in detail. The different phases can therefore be done on different scales and for parts of a project maybe even parallel.

Parties and partnerships
The way that different parties are involved and partnerships are (legally) organized might have an influence on the possibility to change things in this during the redevelopment process. To get an insight in this a short summary of possible ways of organizing partnerships are given below.

There are two ways of realizing public private partnerships in large urban projects. The cooperation between the parties can be organized in a contract or in a company. Contracts have the advantage that they are easier to change or terminate, can be adjusted to the different phases of the project, leave more room for the municipality and leave the possibility to change partners. The disadvantage however is that the municipality is not always the most effective party to coordinate the development process and that the freedom of a contract provides to little concrete appointments about the development of the project. A partnership can also be organized in the form of a company (BV, CV) or other type of legal organization (GOM, VOM, GEM). The advantages of this are that the coordination of the project is clearer, decision making is easier, the addition of new partners is easier and risks are clearly organized. The disadvantages are that business regulations apply to the partnerships, the role of municipal representatives in the company can be complicated and ending a partnership can be hard.

Next to the partnership which develops the partnerships the development organization also has to manage and organize its relations with among others parties like, investors, developers, building contractors and architects.

Aspects in which flexibility plays a role
Some of the aspects in development processes in which flexibility can play a role, which were explained in the introduction on flexibility, are listed below.

Governance: regulations, policy, goals.
Management: stakeholders, goals, means, phasing, methods, decision making, planning documents.
Design: design products, urban structure, typology, functionality, program
2. Complex networks, network city and flexibility

Introduction
The motive for this paper is a graduation project and research about flexibility in urbanism. In this research subjects have been identified that are seen as relevant when using flexibility. The identification of the subjects has been done on the basis of authors and projects using the term or concept flexibility. Many of the subjects have similarities with terms and approaches used in network (city) theory.

In this paper a comparison of some flexibility related subjects, from the research on flexibility in large urban projects, to comparable subjects in complex network theory and network city theory is made. First the different network theoreticians and the flexibility related subjects are introduced. After that some of them are compared and related to practical examples.

Network (city) theories
In this section of the paper multiple network theoreticians are presented to establish a clear perspective of network thinking. This can later be compared to the flexibility perspective and applied in concrete urban illustrations. Theories that are presented are: Dupuy’s model on the organization of space, Casos’ explanation of topology, kinetics and adaptability in networks, Salingaros’ concepts on the urban web, distribution of sizes and urban coherence, Battys’ concept of cells and agents, Barabas’ theory on organization of networks and hubs and Millers’ ideas on emergence.

Dupuy
The concept of the Network City, as described by Gabriel Dupuy in L’Urbanisation de Reseaux, is a model which tries to explain the working of the system of the city. For this three perspectives or operators have been developed. All look to the same object, seeing the three levels as one system, but from different perspectives. The first level operator are the physical-spatial or technical networks of infrastructure and services. It consists of the road network, public transport network, telephone network, sewerage network, etc. The second level operator are the functional networks within a community. Those are the networks (and places) for consumption, production, distribution and social interaction. The third level operator are the individual and household networks making use of the underlaying technical and functional networks.
**Caso**

Next to some important aspects in the notion of networking, Caso explains three basic dimensions of networks: topology, kinetics and adaptability. Topology refers to the physical configuration of networks. Networks are not only abstract entities, they are related to spatial connections between nodes in space. This involves discontinuity and heterogeneity. The topology of a network is open and united and has a more diffuse character than a zoning approach. Kinetics refers to the movement and communication between nodes in the network. The quality of a network can be measured by the rapidity of connections within a network. Adaptability concerns the evolution of networks over time and space. On the one hand the structure of a network should be able to modify to welcome new structures or extend the application of existing ones. On the other hand it should be able to adapt to changing needs of its users by offering multiple choices for the reaching of goals.

**Salingaros**

Nikos Salingaros in his book Principles of Urban Structure presents many subjects that explain how the city works. Because of his mathematical and planning approach multiple of those subjects are relevant to explain the Network City concept in both a theoretic and practical way. Some of the subjects from the book are explained below.

The urban web is a model in which the use of (public) space and the connections between those activities are explained. Hereby the design of space can be composed in a way that better fits human behavior and evaluated in a more scientific way than before. The three principles that generate the urban web are nodes, connections and hierarchy. The urban web is anchored at nodes of human activity whose interconnections make up the web. The natural and architectural environment is the context in which human activity nodes and their connective paths take shape. Connections can form between complementary nodes. When allowed to do so, the urban web self-organizes by creating an ordered hierarchy of connections on several levels of scale. It becomes multiply connected but not chaotic. The organization process follows a strict order: starting from the smallest scales and progressing up to the higher scales. Multiple types of nodes exist, from prominent building to hot-dog stand to park bench. Multiple nodes together can form units.

A spatial environment is build up of elements of different sizes. A balanced and complete distribution of sizes leads to more coherent and human urban environments. The universal rule for the distribution of sizes states that this balanced distribution is an inverse power-law distribution. This means that within a system many small elements are present and the larger the element the smaller the number of elements of that size. Similar sized elements are supposed to together form a scale level. The number of elements in a scale is called the multiplicity.

Urban coherence and good urban form are presented as defined by eight generic principles of urban form that are based on existing scientific theory from multiple disciplines. The eight rules are about: couplings, diversity, boundaries, forces, organization, hierarchy, interdependence and decomposition. They describe how elements organize in systems.

**Batty**

Batty has worked extensively on the development of models that represent the spatial order in and growth
of cities. Some interesting details in this are presented here. The basis of the models is the representation of the basic elements of the city through cells and agents. Cells represent the physical and spatial structure of the city and agents represent the human and social units that make the city work. Changes are supposed to take place bottom up or at least initiated bottom up. Change in cities is often random, but when utility and human intention are added to such processes, with geometry constraining the way they operate in space, highly ordered structures can emerge. Five drivers that are critically to an understanding of how change takes place are: randomness, historical accident, physical determinism, natural advantage, and comparative advantage.

Barabasi
In his book 'Linked' Barabasi explains the development of network theories. Over time new and more precise models have been developed that were considered to describe the behavior and organization of networks more precise. In this development new principles that play a role in the organization of networks have been discovered and used. In this way network theory has become more accurate and changed from describing the form of networks to describing the organization of networks. This science is expected to eventually grow into developing a theory of complexity.

One of the aspects that is described is connectors or nodes turning into hubs in networks. The explanation of this phenomenon required new network models, but has been clarified. The original idea that networks were random was disputed and not supported by observations. Therefore more research on the concept of hubs has been done. Hubs formed in scale-free networks and maintained and improved their position. Because of their position they are logical nodes to connect to for other nodes, which strengthens their competitive advantage.

Miller
Miller states about the complexity in networks that behavior of many complex systems emerges from the activities of lower-level components. These activities make a network sensitive and fragile to change, but also very robust in dealing with change.

Network concepts and flexibility related subjects
In this section of the paper the flexibility related subjects that have been identified in the research will be explained. During this explanation examples will be used that will also be explained from a network (city) theory perspective. After that the flexibility related subjects will be connected and compared to similar concepts in network (city) theory. On the basis of this, concrete examples will be presented that can be explained from a network theory perspective as well as from the perspective of the results of the research on flexibility.

Flexibility related subjects from research

Culture
The character of the planning culture has a relation to the need for and use of flexibility. In a rigid state planned planning culture, little flexibility is used. Developments are planned top down and long term and little room is left for (unplanned) change. This is very different from a dynamic market oriented planning culture where much uncertainty is present and dealt with and differentiation is an acknowledged result of the differences between people. The planning culture can difference between countries, times or even areas. Some areas (‘projects’) are very strictly planned, man-
aged and executed. In other cases the exact development of a project is left open to future market developments or decisions of stakeholders that are involved at a later moment in a process. The extreme case is the area where a complete lack of planning exists and whatsoever activities can be undertaken. This last case can be found in both areas that lack a spatial vision in the Netherlands and urban developments in developing countries.

Example: in the neighborhood Le Mirail in Toulouse France, large modernist blocks have been constructed in the middle of the 20th century. The highrise flats had a base of two or three layers of parking on top of which a public streets with shops was realized. Ten years after the neighborhood was build the population of native French changed to Northern African immigrants. For these people the shops were too expensive to rent or to buy from. As an alternative, workshops and shops emerged in the garages below. As a result the public space on top was hardly used and activities in the garages flourished. (Provoost, 2007)

From a flexibility perspective the planning culture in which the blocks have been build lacks the flexibility (changing prices and use) to meet the different demands of the new inhabitants. The ‘planning’ culture of the users however has the flexibility to also develop activities and a public life in a parking garage. This also illustrates that the parking garage had the physical flexibility to facilitate different functions.

Network theory could explain what happened in the blocks in two ways. Caso might say that because of the adaptability of the network in the block, the network totally changed and formed new nodes, modules and hotspots. Dupuy might state that the physical opera-
tors stayed the same but that the functional and personal operators severally changed.

**Scale/layer/level**
Buildings, and also the city exist of different layers in/levels at which change takes place. Every layer has its own time period in which it changes and the type of stakeholders that are involved in that change. (For example, objects in houses and the way the public space is used changes on a hourly of daily bases and is influenced by users. The floor plan of a building or the physical-spatial organization of public space changes every three to thirty years and is influenced by the user and owner) If you want to effectively deal with change you have to understand at which level the changes you want to deal with take place and at which levels your interventions have (unintended) effects.

Example: A municipality might experience a problem caused by the inhabitants of a neighborhood, for example large and regular amounts of waste on the streets. A possible solution could be a decision of the major to demolish the neighborhood and change the structure of the neighborhood to change the characteristics of the neighborhood. Another solution could be a different organization of the waste treatment in the neighborhood that is based on interviews with the inhabitants and decided on by the municipality and neighborhood committee.

**Grain size**
The grain size is about the division of elements on a specific level of scale. For example the division of blocks into buildings or buildings into units. Depending on the type of environment, the program and the design paradigm the division is chosen at certain scales. A division on a scale is conditional (but no guarantee) for diversity on that scale. A small grain size (at any scale) enables diversity, dynamics and gradual changes on that scale. This gradual change is the opposite of radical change which takes place when blocks or neighborhoods are static and only change when a large scale change of the whole is initiated. Changes in cities are sometimes considered to take place bottom up in the best way. For this the presence of a small grain size is necessary.

**Change**
Change is something that is constantly taking place in all kinds of ways in cities and development processes. This is however not always considered in planning and design. Too often blue print plans have been made or flexibility has been used only in a very specific niche. Those plans are not able to react on changes and are executed and managed in a way that is contradictory to how a dynamic city really works. On the other hand change has to be in some way organized (not only planned, but also naturally) to prevent chaos.

**Investments and means**
The accumulation and investment of means and money influences the change that can or will take place. If money is invested in new buildings or infrastructure those will probably not change for a longer period. In the way designs are made and means are invested the probability of change has to be taken into account.

**Diversity**
Diversity in buildings and the city facilitates the differences between individuals and organizations. In that way diversity is a way to be able to deal flexibly with differences and changes in demand. Since the need for space in buildings is not the same for everybody it is good if the building stock has a certain diversity. But the need for space also constantly changes because of
changes in for example lifestyles and demography. A neighborhood needs to be able to adapt to this. When a diverse building stock is present in a neighborhood this adaptation is able to take place much more gradual and dynamic than if all the buildings in a neighborhood are exactly the same. In that case change will only take place radically.

**Stakeholders**
Considering stakeholders in applying flexibility is important. If you want to make things flexible you have to consider for whom you intend this flexibility and who has the ability to use it. Giving the opportunity (and responsibility) to stakeholders on low scale levels to influence things can be very effective to sense and deal with changes that are taking place in a city.

**Continuity/fixation/robustness**
Since flexibility should be a balance, too little flexibility is as bad as too much flexibility. For this reasons it is also important to consider the opposites of freedom or much flexibility, namely: continuity, fixation and robustness. It is important to use those as much as possible to provide certainty and security.

**Surplus**
Surplus is a practical design aspect that can be used to provide flexibility. It enables functions and needs to change, while the building or neighborhood as a whole can keep existing and function better.

**Comparison**
After the presentation of network theories and flexibility related subjects they are in this section compared and related to each other. This is done by first mentioning one or more network theory concepts and than explaining the related flexibility subject(s).

**Adaptability vs. change**
Adaptability is mentioned by Caso as one of the three key characteristics of networking. Adaptability means the ability of networks to change to enable new uses of the network or to better or differently serve existing needs of users. Networks should continually adapt and evolve.

The need for flexibility exists because of continuous changes and developments in society and the city. Flexibility has to be used in multiple ways (diversity, grain size, stakeholders, surplus, etc.) to deal with these constant changes. (Planning and design) approaches that don’t acknowledge this change over-abstract and simplify society and the city in a way that adapting to change in an appropriate way is not possible anymore.

**Hierarchy vs. scale**
In the research on networks Barabasi gradually identified forms of hierarchy in networks. Different hierarchies have been used in different models. These organization forms of networks have been used to be able to more specifically describe the character of networks and better be able to use these concepts.
Salingaros identifies a hierarchy in cities where levels of scale exist, which are groups of elements of the same size. Change in systems takes place starting with changes on the lowest scale level.

Change in the city takes place at specific levels of scale. To be able to deal with the changes taking place one has to understand these levels. In a design proposal or other intervention in the city the effect of the intervention on different levels of scale has to be understood and directed. Only then changes can be dealt with effectively and unintended effects of scales that have not
been considered can be prevented.

**Contrast vs. diversity**
Salingaros describes that connections between nodes in the urban web only form if there is enough contrast between the nodes. Nodes of a similar type have no reason to connect and don’t strengthen or stimulate connections.

Diversity is valuable for cities and enables flexibility. Diversity in form and program facilitates different users and stimulates dynamics. The presence of this diversity and dynamics makes it possible to react on changes.

**Dynamics, emergence, change vs. change**
Dupuy and Caso describe dynamics in networks by describing how networks operate and change. Batty and Miller describe changes in networks that start bottom up as emergence in networks. All these explanations emphasize the complex and dynamic character of networks.

The presence of continuous change in the city is already described earlier as a reason for the need of flexibility and the ability to adapt. These continuous changes and dynamics in the city are complex, sometimes hard to understand and get a grip on. The use of principles from network theories might help to be able to deal with them better and prevent simplified approaches to the city.

**Network characteristics vs. planning culture**
Barabasi describes the development in network theory and the different models that have been used in this development. The different models have different views on for example the existence of hubs.

In different societies, countries or even areas different planning cultures (or approaches) are used. This influences the acknowledgement of dynamics and the use of and need for flexibility.

**Hubs, the rich get richer vs. investments and means**
Barabasi describes the existence and characteristics of hubs and the way they develop. Certain aspects like for example the age of the hub and the number of existing connections influence the position, growth and dominance of that hub in the network. A dominant position of a hub means that it is likely that it will attract new connections to other nodes more quickly and easily than less dominant hubs and nodes in the network. Because of this mechanism hubs are likely to maintain their position.

When means are invested in new large buildings or large infrastructure, that means that those will probably not change for a while. Because of their continuity and size they might acquire a dominant position in the city and network for a long time.

**Networks and flexibility in our society and living environment**
In this section of the paper the comparison of network (city) theory and flexibility related subjects is illustrated with practical examples. In this way the concepts and their potential relation should become more clear. In some of the examples the two perspectives very much support each other in explaining a phenomenon. In other examples they can both say something about a phenomenon from a totally different perspective. Three examples are used.

**Diversity, contrast and change in inner cities and**
monofunctional housing areas
Dynamic inner cities are very different environments than monofunctional housing areas. Because of a diversity in form and program inner cities are more vital and divers places that are used for housing, retail, offices, companies, culture and entertainment. People with many different lifestyles and needs use this available program all in their own way. Because of the diversity in supply of activities and space many needs can be met. The diversity in supply also enables changes in needs by shifting to other segments of supply. Monofunctional housing neighborhoods which focus on one function and sometimes also only a narrow variety of users are not that vital and dynamic. One type of houses is copied in large amounts and not mixed with other functions on a small scale. This means that changing needs can not be met in that same neighborhood, but people have to move to a different type of (monofunctional) environment. The best way in which change can take place is if small adjustments by users to their houses are possible.

According to Salingaros, connections are only established between contrasting nodes. That is what happens in dynamic inner cities on a low scale and lacks in monofunctional environments. Because of the diversity in nodes (functions, forms and sizes of for example buildings) many connections are established. Those connections form an extensive network that is constantly adapting to new opportunities and changing demands. Changing user needs use these many connections to satisfy their needs in new ways. In monofunctional neighborhoods the contrast within both supply (similar houses) and demand (similar people) is much lower. Because of this low contrast little connections are established within the neighborhood. Because of the lack of contrast and connections changing needs cannot be facilitated by the existing poor network. This lack of facilitation means that changes will not take place at all or only once in a longer period in a more radical way.

Highways as powerful hubs that don’t change because money is invested in them
If money is invested in large infrastructure that means that these civil works will not change for a while, because many effort and money have been put into them to build them and make them work. If after a while it is so that the infrastructure is used in a different way than expected small adjustments might still be possible but no large changes will occur to it. This means that they are stable elements in the environment and structure other developments that are changing more often.

Since highways are important hubs in the network they will acquire more and more connections. Because of their ever increasing position they will last long and define the character of the network on the long term.

Large changes can take place in for example the Randstad (cities can grow or shrink and local connections can change), but the connection between Amsterdam and The Hague will probably for a long period stay the highway A4. It is not probable that the A4 will be removed and replaced by a new highway running on a two kilometer distance parallel to it.

The HSL train link as a new connection between powerful hubs that don’t change and therefore legitimize large investments
The cities of Amsterdam and Rotterdam have long been and will long stay important cities and hubs in the Netherlands. Because of their position in the network of cities they are logical hubs to attract new connections.

a. Traject HSL, source: www.hslzuid.nl
So a new high speed train connection is logically to connect to those two cities. This new train connection again strengthens the position of those cities and attracts new large investments and activities in the cities.

The new high speed train station in Rotterdam attracts new investment in large buildings in the Station Area and for example the station itself. The fixation of large amounts of means can be a legitimate action because the probability that the position of Rotterdam will change and will be taken over by for example Woerden is very small. Also the existing structure of the city means that the good conditions in this area will probably stay the same. The use of flexibility might be more focused on the way the buildings can be used in case of a changing use of the structure.

**Conclusions**

The comparison that has been made in this paper between network (city) theory and the flexibility perspective has been useful to develop more insight in both. What becomes clear is that they are both very much about dynamics and change in cities. Sometimes they describe a phenomenon from a different perspective and sometimes they are very much complementary in explaining phenomena.

The relation between both approaches and explaining the city has become clearer in the cases that were studied. Network theory describes characteristics and the working of systems, but has for urbanism not yet developed in a complete and coherent way. Theories are not enough related to each other or do not give an explanation that is practical and general enough to clear and useful for the urban designer.

The flexibility research has been useful to establish more insight to presence of dynamics in cities in a more practical way than network theory. It is however not simple, sound and all-embracing because of the complex matter and the limited research.

A last insight that has been established in this paper is that in the observation of phenomena in cities and explaining them with models, a difference can be made between behavior of a city that is natural and is similar to the behavior that is predicted in the model, and behavior that is manipulated by human interventions and for that reason differs from the predictions of the model. In those cases aspects of cities are no complex networks anymore, but artificial systems.
## 3. Flexibility assessment

### Flexibility assessment form

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subject</th>
<th>Levels</th>
<th>Flexibility*</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B</td>
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<tr>
<td>Organisation</td>
<td>Culture</td>
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<td>Stakeholders</td>
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<td>Role/responsibility</td>
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<td>Change</td>
<td>Short term</td>
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<td>Long term</td>
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<td>Design</td>
<td>Robustness</td>
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<td>Scale</td>
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<td></td>
<td>Surplus</td>
<td>Unit</td>
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<td>Neighborhood</td>
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<td>City/ region</td>
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<td>Dynamics</td>
<td>Grain size (division)</td>
<td>Units</td>
<td>x</td>
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<td></td>
<td>Buildings</td>
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<td></td>
<td></td>
<td>Blocks</td>
<td>x</td>
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<td></td>
<td></td>
<td>Neighborhoods</td>
<td>x</td>
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<tr>
<td>Diversity (difference)</td>
<td>Form</td>
<td>Architectural</td>
<td>x</td>
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<td>Unit sizes</td>
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<td>Public space</td>
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<td></td>
<td>Program</td>
<td>Units</td>
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<td>Blocks</td>
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<tr>
<td></td>
<td></td>
<td>Neighborhoods</td>
<td>x</td>
</tr>
</tbody>
</table>

*-fixation vs freedom
(homogeneous vs chaotic/disintegrated)
(robust vs volatile)

### Name and location of the project or area
- Kop van Zuid, Rotterdam

### Subject of assessment
- The design and realisation of the larger Kop van Zuid area (125 ha) until 2008

### Date of assessment
- March 10th, 2008

### Name assessor
- Maarten Bouten

### Background assessor
- Urbanism graduate student with an interest in flexibility

### References project
## Aspects and questions

The development in the Kop van Zuid started with a more than average focus on the role of market activities. A cooperative approach between municipality and market. Since the project started in an area where little other activities than harbor industry were present, little stakeholders have actively been involved. The initial residents of surrounding neighborhoods that were involved left the process. Apart from the municipality, developers and their market little perspectives of stakeholders have been involved in the process. The responsibility for the development of the area has mainly been with the municipality and developers. In some cases new entrepreneurs played a role in the development process. The influence of changes in the development process played a large role eventually and has been dealt with with flexibility in the speed of the development and a constructive cooperation between developers and the municipality. Long term changes have been considered with a structure that enables spatial changes if those are needed in the area.

A clear structure has been used to guide the development of the area. This enabled a progress in which buildings can kept being added within a long time period. The project plays a role on a large scale in the city by connection the north and south side of the city. The area is also developed as an area in itself. The quality on a small scale in the area is sometimes considered in the design of buildings.

The area of the assessment is too large to take this aspect into consideration. Because the area is transforming there is still space available for new developments at this moment. The area of the assessment is too small to take this aspect into consideration.

Large investments have been done in both buildings and infrastructure in the area. This fits the ambition of the area. Very little investments have been done however in temporary uses in the area.

In part of the area a division into houses and small shops is present. Part is however also used for very large office buildings. Although most of the real estate has been developed per block or per neighborhood a division within blocks is sometimes made. A very strong division into neighborhoods is present, which reacts on the specific local qualities. The area as a whole is certainly not homogeneous in form, but on a lower scale differentiation is not always present.

A diversity in unit sizes and types of buildings is present within the area. Different type of public space is provided within the area (green parks, neighborhood squares, city scale public space). In some of the blocks a differentiation in program and use within buildings is present. Differences between buildings in blocks are not very strong. Differences between blocks in neighborhoods are not very strong. Differences in use and style between neighborhoods is strongly present.

**Conclusion:** the overall image for the Kop van Zuid is that in many aspects a good balance has been found. Aspects are never to flexible and in some case relatively fixed. The organization of the project is relatively fixed because of the history of the area and scale of the project. The design provides good guidelines for the area. Mixed use is mainly present on the scale of the building and on the scale of the whole area, but not so much on the scale of blocks and within neighborhoods.