AN URBAN STRATEGY TO SUPPORT SLOW NETWORK ORIENTED SELF-ORGANIZATION. THE CASE OF DELFT
Amsterdam is rijp voor 'spontaan bouwen'

Nu de banken de kredietkras in de bouw hebben dichtgetrokken, doet een gouden kans op voor kleinschalige bouw door woonconsumpten.

Illustration 1. Collage of recent newspaper clippings regarding the issue’s relevant to this graduation project. Author

15-04-2011  Graduation Report P5  Suzan Christiaanse
This graduation project is an exploration on solutions for flexible planning. It touches upon a number of currently relevant (much discussed) topics in the field of urban planning and design in the Netherlands (see Illustration 1). This particular project is an urban planning strategy for sustainable densification. A void in the city will be developed into a neighbourhood with a mix of living and working on a small scale. This development is not top down planned by the municipality, but is a step-by-step community development. It also has the ambitious aim of creating both a research based methodological framework for this, well as an actual design to test it.

At first sight this might seem much too ambitious for a graduation project. In the time span of one year all the facets of this graduation project cannot be as carefully and scientifically founded as during a PHD-programme. However, this project should not be seen as the ultimate reformation of Dutch planning, but an exploration on the topic of flexibility in planning. The research documented in this thesis plan inspired the concept of a ‘framework’ for flexible planning. The design for a project location in Delft attempts to test this theoretical approach.

This graduation project therefore does not aim to result in a waterproof method for flexible planning, but to simply draw some lessons from this test case. Hopefully these lessons can accelerate the first step towards more research and implementation of flexible strategies in Dutch planning practice.

Suzan Christiaanse 2011
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**NOTE for reading:** If the meaning of a word is unclear appendix A can offer a clarification of the terminology
Illustration 2.
The human brain is an example of a complex system. The ‘junctions’ of this complex systems are called synapses and it is estimated that the brain has more than a 100 trillion of them.
Source image: http://www.jasonshields.org/brainwave_entrainment_therapy
1.1 Today’s issue in the field Dutch urban planning and design

Time travelling to 2011: Changing needs for the urban environment
Imagine you are a 17th century merchant from Amsterdam. Through a freak accident you have travelled 300 years through time and landed in the same city. Imagine the shock to see cars, aeroplanes and trains instead of carriages to get around; fridges for food storage; and telephones to communicate to the other end of the world. There are now highways, sky-high buildings, and people’s idea of a holiday is travelling to their destination by car and sleeping in a tent. Now imagine your shock when you have the same accident again after a few years, and you are transported to the year 2011. Apart from mobile phones, not so much has changed. The cars look bit flashier, but we do not travel by hovercrafts. Maybe you would settle in more quickly than after your first accident, but soon you would experience the shock of the changes in our society. Woman have joined the workforce in masses, the president of the United States of America is a black man and all the children seem to have some sort of mental problem like ADD, autism or dyslexia. Either that or they suffer from obesity. All Dutch cities have grown to at least two times their size because of population growth and because a house for a family of thirteen is now occupied by just one couple! (Roughly based on Florida, 2002.)

This slightly exaggerated anecdote illustrates how society has changed though time and how this influences the urban environment. Today’s city changes very fast due to developments such as climate change, technological innovation, mobility, changes in demographics, globalization processes, and also developments in politics and the economy. The city’s spatial form needs to adapt time and again to these developments, but how can you make urban plans for the future, if the future is so fickle? This question can be supported by a scientific theory about complex systems because the city is such a system.

Complexity and the complex-city
Complexity theory is a big trend in various fields of science. It deals with complex and sometimes even chaotic systems, and aims to determine this system by understanding the relationships between the different components. In a complex system the components and interconnections are so numerous that it becomes very difficult to unravel them. The density of connections can cause a small change to effect the whole system. A popular term to describe this is the butterfly effect (Manson, 2001). This describes the example that in a complex system such as an ecosystem the flapping of a butterfly’s wings can cause a tropical storm miles away. Other examples of complex systems are a brain or a tree, but also the city. This means that a small change in one part of the city can cause a much bigger effect on a different part or the whole city. This is the foundation for strategies such as urban acupuncture (small interventions causing a bigger effect). However, the uncertainty and unpredictability is also the main difficulty for all that deal with complexity but especially for city planners and designers. Apart from the unpredictable effect of change, we are also often not able to predict what the phenomena causing change will be. The unpredictable occurrence of phenomena is defined in complexity by the term emergence (Manson, 2001). For instance, the technological development of the car and its major effect on the urban environment was an emergent phenomenon that few could have predicted. This makes designing and urban planning for today’s complex city somewhat paradoxical. It is an act of controlling and creating boundaries for future development, but we do not know for sure what developments and what effects they will have (Abbott, 2005). This is a difficult notion in urban planning.
1.2 Problem statement

Traditional top down planning & urban design; how does it work in the Netherlands?
The problem with the traditional way of urban planning is that it is too rigid to adapt to emergent phenomena. To explain why this is the case I will first explain the current traditional way of planning and its history and future. The traditional way of urban planning and urban design in the Netherlands can be described as top-down planning. What is meant by this is the traditional directive planning initiated by planners or designers that has been the norm in the Netherlands for the last century. An example of a top-down oriented solution is a master plan. These big urban plans are the most common method for municipalities to introduce urban development. Examples are the ‘Spoorzone’ in Delft, ‘IJburg’ Amsterdam, or ‘Kop van South’ in Rotterdam. They have all been a master plan designed by an urban planner or an architecture agency. Before the municipality engages this agency to make such a plan, it consults the ‘structuurvisie’: a plan with little legal meaning, but which can help the municipality to communicate its vision on spatial development. These visions on municipal level are influenced by higher governmental levels. After the urban design is made and all is approved the ‘bestemmingsplan’ is made. This is the legally binding policy that defines local land use. Sometimes it is very detailed and all the plots and its functions will be defined and sometimes it leaves larger areas for different functions. The street pattern is always clearly defined. It is quite uncommon that citizens will buy their own lot in such a large urban plan. Usually project developers will buy (whatever the legal construction may be) land and build whatever they believe will make them the most money on the housing market. This process of urban development starts at the ‘top’ and ends with a ‘user’ that has no say in the matter. That is why it is called top-down.

Traditional top down planning & urban design; why is it so common in the Netherlands?
The problem is that today’s top-down way of planning is so fixated on large-scale interventions, that it does not allow spontaneous evolution which is necessary to adapt to change (Salingaros, 2005; Secchi, 2007). As the first chapter of this thesis plan indicated, this is exactly what is necessary to tackle the complex interwoven issues of today’s urban society. So why are we planning this way? This could partly be because a conceptual coherent view of complexity is hard to link to reality (Manson, 2001), but it is also because in the past architects and planners seemed convinced that they could solve societal problems by their designs. A well known Dutch modernistic Planner, Cornelis van Eesteren, wore a doctor’s coat to illustrate how planners should ‘cure’ the densely populated inner cities. Urban planners of the early 20th century carefully determined our living environment so that we would be healthy, safe, and happy, but failed to leave some space for individual adaptations (Jacobs, 1961). The modernistic approach to complexity was separation and fragmentation (Secchi, 2007). Everything was documented in surveys, and the urban structure was divided into zones of predefined functions. In these zoning plans work, life, and leisure were carefully separated. The city was a machine and architects and planners where obsessed with simplicity to try to diminish urban complexity, but this did not lead to better solutions (Salingaros, 2005; Jacobs, 1961). The modernistic neighborhoods are now dealing with problems of high crime rates and decay and rank among the least popular places to live. Maybe the city is just too complex to be able to plan its future so deterministically.

Though times are changing, we are still left with a heritage of urban planners and designers that think top down. Designing a master plan that initiates the ‘bestemmingsplan’ is still the most common way of working. Not to mention the unchanged status of top-designers: Today we don’t have planners in doctor’s coats, but we do have ‘starchitects’ like Rem Koolhaas. The user still finishes last in top-down oriented planning. If this orientation were to reverse, the user could have much more influence and show initiative in the design process. This opposite of top-down planning where civilian initiatives are stimulated is called bottom-up. This approach is becoming more popular in the field of urban planning and design.
Shortcomings of Urban Design and Planning Strategies; Top Down versus Bottom Up
Over the last 30 years, there has been a shift from top-down oriented zoning plans toward more entrepreneurial development-oriented planning (Boelens, 2005). Small-scale economic activity by civilian initiatives is very important for vitality and city-life (Jacobs, 1961). In the early 60s Jacobs described the mix of small shops, bars and culture mixed with residential purposes as vital elements for a healthy urban environment. The very rigid zoning plans of that time where lethal for such a small scale mix of uses. Today the ideas of Jacobs know many followers. Nonetheless today's traditional (Dutch) zoning plan, the ‘bestemmingsplan’, is still often too rigid to support individual entrepreneurship (Tan, 2009).

Often bottom-up strategies are social policy strategies to solve socio-economic problems. There are various, and a bit uncoordinated, of examples such strategies. Two examples are empowerment and participation which are tools to give more responsibilities to the local people, include them in the design process and support citizen’s initiatives (Jacobs and Dutton, 2000). However useful for restructuring existing neighbourhoods and instigate smaller developments, these methods are not integral spatial urban planning strategies.

The ultimate spatial opposite of the traditional zoning plan is self-organization. Self-organization is actually the intrinsic ability of open and complex systems to organize their own internal structure (Portugali, 2000; Zamenopoulos, 2010). But as a spatial strategy it means that citizens and private businesses decide upon their own spatial environment. Experiments with self-organization such as the ones executed by Alexander (1977), Portugali (2000), and recently Tan (2009), all draw the same conclusion: self-organization can lead to a mix use diverse urban pattern which is very desirable, but not a clearly organized structure. Apart from a lack of ‘wholeness’, the danger exists that the main motivation in market driven planning is money instead of liveability or climate-friendly solutions (Alexander, 1977). Since the 1980s planners have had a pragmatic approach to the uncertainty: just let the market drive the decisions and this will automatically result in the right approach (Secchi, 2007). However, the absence of a clear overall urban vision has lead to “incoherent choices about the location, dimensions and aesthetics of new building projects” (Secchi, 2007: 8). Control by planning policy is necessary to guide development in a positive and sustainable direction (Salingaros, 2005). There is a lack of a successful combination between bottom-up (civilian initiatives) and top-down (traditional directive planning) strategy. Sometimes bottom-up strategies are applied without the spatial design to support it, and sometimes the mistake is made the other way around. A typical example is the attempts of bottom-up strategies that appeal to the creative and cultural industry to catalyze development and make an area ‘liveable’. In itself this is a good idea, but these industries cannot be forced to move there and automatically be successful. A supporting spatial strategy is necessary. Also, on the other side there are spatial strategies that do not combine with social policy strategies. For example one can design a park in a place where nobody because to come.

A sustainable plan for the complex city should therefore consist of a balance between freedom and regulation (Drewe, 1993), but there is no coherent methodology that combines this need for regulation and self-organization in planning.

Problem Statement
Urban planning and design seem to be lacking in the ability to tackle the complex interwoven issues of today’s urban society because it does not allow spontaneous evolution and civilian initiatives. Top-down urban planning and design are not able to solve everything and the experiments with bottom-up strategies lack clear overall vision and spatial organization. There simply is no coherent vision on how the balance between regulation and freedom, top-down and bottom-up, should take form.
Illustration 4. What is the purpose of a frame? That it can support different infill. That is what makes it a flexible structure. Author
2.1 The goal and relevance of this project

The goal of this project; introducing flexibility in an urban planning strategy

The introduction discussed that the current rigid traditional top-down way of planning is not able to suit the needs of the complex city, but the experiments with self-organization in the Netherlands does not work either.1 Some problems need bottom-up solutions, some need top-down solutions. What is needed is a balance between the two: a framework for flexible planning. Not just a theoretical framework, but one that can be used in actual planning practice. In this thesis plan ‘flexible city planning’ means: strategic urban planning that leaves space for self-organization (bottom-up) while safeguarding a sustainable future by guiding development (top-down). This definition refers to planning process. While this graduation project might be the first step towards a blueprint for such a sustainable planning process, it will also result in a design. The final conclusions regarding this end results can instigate a debate on whether ‘flexible city planning method’ can result in a ‘flexible city plan’. A flexible city plan, or design, is able to react to changes without compromising a sustainable future. This means that economic considerations should not be the guiding principle and the (urban) environment that results from this plan remains healthy, safe and usable for future generations. Preserving something for future generations is actually the most basic definition of sustainability which is a misused and mingled concept. Literally it means that a sustainable system is one that ‘sustains’ or persists’, but it actually refers to characteristics we desire to arrive at (Costanza & Patten, 1995). This might be climate friendly solutions, a child friendly environment or an adaptable urban structure through a process of negotiation. In this sense flexibility is also a sustainable concept; it provides more possibilities for small scale economic development which are important for the vitality of the city (Jacobs, 1961), and because it can be adapted to future uses, it saves the loss of energy due to demolition.

Scientific and social relevance

In general the aim of all urban planners and designers is, or should be, to create a vital and sustainable urban environment that people enjoy living in. This project supports the presumption that people would be even more successful in enjoying the urban environment we live in, if we have the possibility to co-create it! Perhaps we would take better care of the communal space we co-designed, feel more at home in a place we helped to bring about and feel more involved in the community we live in. Apart from the social relevance of bringing about such happiness, some even argue that there is such a thing as a right to the city, and that “the freedom to make and remake ourselves and our cities is one of the most precious yet most neglected of our human rights” (Harvey, 2003: 1-2). The challenge is to give back this freedom with the proper governmental guidance to ensure vital, liveable and sustainable neighbourhoods.

The preface has already tempered the goal of this project a bit. It should not be seen as the ultimate reformation of Dutch planning, but as an exploration on the topic of flexibility in planning. Therefore it does not aim to result in a waterproof method for flexible planning, but to make a step towards more research and implementation of flexible strategies in Dutch planning practice. If this project could contribute in such a way to the body of knowledge of planning practice, it also has scientific relevance. It is especially relevant to add knowledge on how to link the theoretical knowledge on complex cities to actual planning and design practice (Manson, 2001).

1 This can be concluded from introduction and the theoretical foundation of review paper appendix B, and the case studies on self-organization appendix C. There is a clear missing link between complexity theory and planning practice (Manson, 2001). NOTE: very recently a book has been published called ‘the spontaneous city’ by Urhahn Urban Design. This study bears much resemblance to the aim of my graduation project. I am very interested to see if it is already the first step to bridge this gap!
2.2 The two frameworks in ‘framework for flexible planning’

**The Concept of frame and infill**

In order to achieve that something is flexible, you need a structure that can support different contents. Take for instance a flexible structure that everybody knows and owns: the picture frame. A picture will not stand still on itself; it would fall flat on the table. You can hang it on the wall with a pin, but that would damage the picture. The most common solution is to put the picture in a frame. And if you get tired of looking at it, you can put another picture in it. The frame itself is a fixed structure that allows different contents (see Illustration 4). In nature a similar system exists. An organic material often consists of a **frame** (skeleton, branches, fibres, neurons, etc.) and **infill** (tissue, pores, cells etc) (see Illustration 5 and illustration 2 on page 6). What is interesting is that these structures, like a tree, a brain, or a human body, are also complex systems. The fact that these examples show the same organization of frame and infill in different levels of scale is attributed to their **fractal** nature. This means that they have the same attributes or irregularities in organization on successive scales. (Batty, 2005). For instance, a tree consists of a tree trunk and branches and leaves. The leaves in turn have veins and pores that look similar. Recent research by G. West of the Sante Fe insitute supports the assertion that the city can in fact be seen as a complex growing system (Anon, 2010). However, the fractal nature of cities should not be taken too literally. Alexander (1966) wrote an entire book called ‘The city is not a tree’ to argue that the structure of the city is not literally like that of a tree, but is a complex system of social organization. But the concept of a structure consisting of frame and infill can be useful and is not a new metaphor for flexible design. In the 1970s the SAR-movement led by John Habraken (2000) advocated the use of a Casco structure and a prefab (prefabricated) secondary structure (Illustration 6). If the building should ever change function it could easily be changed by replacing the prefab elements. In a traditional structure, in which the facades are the load-bearing structure, this would be much more difficult. If the city is also a complex system and also fractal (Batty, 2005; Manson 2001), maybe it could be argued that there is such a thing as an urban frame and an urban tissue. This could be a basis for cities to ‘naturally grow’.

The term ‘framework’ in the title is actually a dual concept: it refers to the spatial urban structure that is the **city’s ‘frame’** and to the policy that is necessary to guide the self-organization of the urban tissue, or the ‘infill’ of this frame. The concept of frame and infill can support a flexible city planning method that is able to react to changes without compromising a sustainable future. (see illustration 8) In order to find the spatial and governmental guidelines that are necessary, we should first examine what elements of a sustainable future that should not be compromised.

**The Slow City**

An example of a movement that promotes and measures sustainable urban planning according to certain criteria is the slow city movement. Actually, a **slow city** is a city with a slow “pace of life and the capacity of urban settings to facilitate the routine encounters and shared experiences” (Knox, 2005), which will lead to a more vital and social living environment. The slow city movement originates from the ideal to promote this slow pace of life of rural settlements, but in a sustainable way. Nowadays the idea is also used in urban contexts. Even our own ‘Rijksbouwmeester’ Liesbeth van der Pol promotes slow architecture and planning. In a documentary she said that we should not in think in big steps anymore but in small carefully taken steps (Tegenlicht, 15-11-2010). The criteria to which a slow city must comply are (1) the attention for ecology quality and quantity in the city, (2) promoting the use of energy generated by wind, sun, water or biomass, (3) creating space for water storage to provide a solution for the rising sea level and changing climate, (4) reducing the city’s footprint by for instance urban agriculture, and (5) a good network and facilities for slow traffic such as bike and pedestrian paths. For city planning, this last topic is one of special interest. Apart from its obvious contribution to sustainable mobility, pedestrian (and bike) use is essential for the city’s vitality (Jacobs, 1961; Alexander, 1977; Salingaros, 2005). While being neglected for a long time, slow traffic is increasing in popularity in planning. It is known to support
Illustration 5.

Illustration 6.

Illustration 7.
The famous map of Rome by Nolli with in white the system of public space. Source: http://www.archined.nl/nieuws/2010/juli/zoektocht-naar-onzenuutur/

Illustration 8.
The concept of an urban frame an infill. Author
small scale economic development and as Salingaros (2005: 160) states: “The pedestrian city is an emotionally nourishing environment.” Though the awareness about slow traffic is growing, it is still too often underexposed in urban planning on all scales: local, regional and national. Another topic of the slow city that is very important but underexposed in urban planning is climate change and water management (Vigano, 2010). Apart from the need for water storage to adapt the rising sea level and peak rainfall, water could also have a structuring ability (Vigano, 2010; Tjallingii, 2005). In order to find a spatial framework that can support incremental sustainable growth, it is necessary to look for elements with such a structuring ability.

**Spatial Framework; Slow Network**  
(CARRIERS & BARRIERS OF SLOW TRAFFIC)

An important term to introduce is the slow network. The slow network is a combination of the water network and main routes for pedestrian and bike traffic. The concept of a slow and fast network is created as a sustainable strategy for development in the Netherlands by Tjallingii (2005). This strategy ensures that low dynamic and high dynamic functions of the city do not conflict. The water networks are the carrier for low dynamic development (nature, residential uses, parks, leisure and bike and pedestrian use) and the traffic network for car and train is the carrier of high dynamic use (stations, offices, high densities). These two can offer a frame for flexible infill (Tjallingii, 2005). Today most urban development is focussed on carriers for high dynamic use. However, it is commonly agreed upon that the pedestrian realm is essential for sustainable small scale (bottom-up) development (Salingaros, 2005; Jacobs, 1961; Alexander, 1977). In most Dutch settlements all public space is accessible for pedestrian and bike use, with the exceptions of N-roads and the highway. This means that the pedestrian realm is actually the network of public space (see Illustration 7). On top of that both water and public space are spatially structuring elements for the city (Vigano, 2010; Salingaros, 2005). This leads to the concept of an urban frame consisting of the spatial elements that carry the slow traffic and the elements that are barriers for this use. (see Illustration 9). The carriers are the main elements of the slow network: the main water structure and main routes for slow traffic. The barriers are the elements of the fast network such as major roads for cars and train tracks but also water can be a barrier. The water network is both a carrier and a barrier of slow movement! The train track and a highway are also both carriers and barriers of movement but for slow traffic they are just barriers. The reason this concept is introduced is to create a structure that can support incremental growth. The slow network frame can be the organizing structure that allows for flexible infill.

This theory is supported by additional literature and some case studies on flexibility (see appendix B and C).

Illustration 9.  
Urban frame consisting of carriers and barriers for slow traffic. Author.

**Carriers:** water + pedestrian realm  
**Barriers:** water + fast traffic network

**Slow network** = routes for boats, bike and pedestrian use  
**Fast network** = routes for car/train/tram etc.
**Policy framework; Guidelines for self-organization**

We have established that, apart from a supporting spatial structure, self-organization also needs to be guided by rules. These rules are dependent on what kind of self-organization is permitted. Appendix C contains a number of examples in urban planning and design that offer options for self-organization. A famous, and infamous, example of a plea for private entrepreneurship is that of ‘het Wilde Wonen’ (Weber & Vanstiphout, 1998). In 1997 Weber stated in a newspaper article that the Dutch government was much too controlling when it comes to housing, and suggested that people were given the opportunity to build their own house. An avalanche of criticism was the effect. It was feared that this would cause urban sprawl and a monotonous environment of cramped saddleback roofs. Ironically it was the major project developments of the 1970s and 1980s had exactly this effect (Kuenzli & Lengkeek, 2004). A voice of criticism that added a refinement to Weber’s plea was Duivesteijn (1997). He suggests a form of ‘collective planning’ with ‘individual infill’. The examples of both the 16th-century canal structure of Amsterdam and a large expansion of Lima in the 1970s introduced an urban grid system of streets (and canals) that allow ‘organic growth’ (Duivesteijn, 1997). What would be another option is if this incremental growth is a form of community development. In this way higher densities can be achieved and other urban typologies except freestanding houses can be made. Community development is actually becoming more popular in the Netherlands. Forms of a community of private entrepreneurs called ‘Collectief Particulier Underneemerschap’ (CPO) are being used to build new groups of houses or renovate existing houses. The CPO hires an architect and contractor as a group. That way the building costs and materials are cheaper and also a sense of community between the clients is formed even before they are all neighbors. Collective entrepreneurship and development is a good basis for small scale mix use, but also a way to achieve social cohesion. A second reason for stimulating (collective) private entrepreneurship is that it can attract the enterprising, wealthy, creative middle class (Kuenzli & Lengkeek, 2004). According to Florida (2002) this creative class has the ability to stimulate a cities economy because these people attract businesses. The situation is probably not that black-and-white, but the ‘creative class’ is a popular target group.

2.3 Main Research questions:

Chapter 1 and 2 have introduced the context and led us to a certain approach for flexibility in urban planning. The main research question for this graduation project relates to how to create a ‘framework’ for flexible planning. Because this is a dual concept relating to both the spatial framework and policy framework, the research question is also twofold. The first relates to the method for creating a spatial urban structure and will result in a map on city scale. The second relates to the policy for guiding incremental community development and will result in a booklet of guidelines and a test case on an urban project location.

**Main research questions:**

- How to create a slow network structure for Delft that can be the spatial framework for self-organizing development?

- What are some spatial and governmental rules necessary to guide this self-organization to a sustainable future?
Illustration 10.
Urban renewal has shifted from demolition of degeneration housing stock towards cherishing the architectural heritage. Source image: http://csudigitalhumanities.org/exhibits/items/browse/3?collection=6
3.1 Why densification?

The interdependence of the type of planning assignment and location choice

The choice of location is interdependent with the type of urban planning assignment. A flexible planning strategy in a small village in the rural north of the Netherlands will need different guidelines for development than a flexible strategy in a big city. The previous chapters have explained the benefits of flexibility in planning practice in general, but the accent will be on urban regeneration.

Urban regeneration

The major future challenge for urban design and urban planning for western society lies not in expanding but in regenerating cities (Robert and Sykes, 2000). This basically means that planners should not focus anymore on expanding cities into the surrounding landscape, but that planners should focus on improving the urban environment inside the municipal borders. Urban regeneration, also sometimes referred to as urban renewal, is not only relevant for big cities, but for all urban environments. Any strategy that aims to tackle problems in an urban environment, being cities as well as smaller towns and villages, with a longer term strategic purpose in mind can be called urban regeneration (Robert and Sykes, 2000).

Definition Urban Regeneration by Robert and Sykes: “comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change” (2000: 17).

The major tasks of urban regeneration

The era of large scale modernistic expansion plans has passed. All Dutch cities have grown explosively in size the last 50 years and the common consensus is that we should not anymore expand at the expense of the surrounding natural (or polder) landscape. Actually the prognosis is that, apart from the major Dutch cities, most urban settlements will shrink in population (de Jong & van Duin, 2010). The major tasks of urban regeneration can be divided in three:

- Urban regeneration of the existing housing stock
- Urban regeneration strategies for shrink scenario’s
- Urban densification within city border as a more sustainable alternative to expansion

The first mainly deals with the improvement of degenerated housing stock and the socio-economical problems in the modernistic post-war neighbourhoods. (Examples: Bijlmer in Amsterdam, Pendrecht Rotterdam or Poptahof Delft) The urban structures of this age of determinism have proved to be a white elephant, but the demolition of the social housing stock is not a suitable answer. Apart from this being a very unsustainable approach because of the loss of energy, economic value and existing social communities, this approach also creates a housing shortage for the poor (Thompson, 2004). Of course the post-war neighbourhoods are not the only ones in need of regeneration. Also the VINEX (Vierde Nota Ruimtelijke Ordening Extra) neighbourhoods with its rigid mono-functional urban structures, that do not allow spontaneous evolution, are in need of regeneration. Both need more flexible spatial urban regeneration strategies.

The second task in urban regeneration is creating apt strategies for urban shrink scenarios. Apart from the major Dutch cities of the Randstad most urban settlements will shrink in population (de Jong & van Duin, 2010). This is the harsh future reality for a lot of smaller Dutch Towns. This category of urban regeneration also needs flexible planning strategies that focus more on temporary and creative use of the voids in the city.
The third task in urban regeneration is **densification**. This is an urban regeneration strategy where more buildings are added to the existing housing stock to increase the density. This can mean the densification of one block, one neighbourhood or the densification of a city. The major cities of the Randstad (Amsterdam, De Haag, Rotterdam and Utrecht) as well as some smaller cities (Haarlem, Leiden, Delft) still have a growing housing demand and need to solve this problem inside their municipal borders in order to preserve the ‘green’ rural landscape in between (see Illustration 11). Moreover, there is a growing sense of agreement regarding the sustainability of a ‘**compact city**’. In the 1960’s Jacobs advocated a compact urban environment because this creates the conditions for vital and participatory city life (Jacobs, 1961). Nowadays, it contributes to sustainable economic growth and supports more sustainable ways of transportation. It can be argued that in a compact city where facilities are close by, the necessity to own a car is lower. A more densely populated area can support a public transport system such as tram or subway, and daily shopping can be done on foot. Small example: my parents live on a farm and need to take the car to the supermarket. I live in the city centre of The Hague and can walk to the supermarket. The opposite of densification is often seen as urban sprawl. **Urban sprawl**, or suburban sprawl, is when the city spreads to its outskirts where it results in low-density neighborhoods. Besides eating up the rural landscape and encouraging car-dependency these neighborhoods are also often very mono-functional. Even so there is no absolute consensus on whether densification is better than urban sprawl. And let’s not forget that the post-war high-rise neighborhoods from the Modern Movement are also of relatively low density because of the abundance of public space. In this graduation project the choice for large-scale densification is mainly made because it fits the demands of the project location and because it is, in my opinion, the most neglected segment for flexibility in urban planning.

**THE MOST NEGLECTED SEGMENT FOR FLEXIBILITY IN URBAN PLANNING; LARGE SCALE DENSIFICATION**

The project location is a former industry site in Delft. Delft is a medium-sized city in the Randstad and still has a growing demand for housing, a growing University and new developments in high-tech industry. Expansion into the valuable surrounding polder landscape is not desirable. Apart from Delft there are many cities that are now transforming former industry areas for mix use residential purposes. Today the traditional approach is creating a vision regarding the site before an architect or planning agency is signed on and a definitive top-down master plan is made. This is exactly the large scale urban planning that does not allow bottom-up spontaneous development that is discussed in the previous chapters. So how do we, planners, make sure that we do not make the same mistake again and create a master plan that ends up to be in the first category for urban regeneration? It seems that this is especially hard for large scale projects to adapt to a more flexible approach. There are numerous creative examples to be named regarding regeneration post-war problematic neighbourhoods, and a colleague of mine, Annemarie Buijs, is currently graduating on a strategy for urban shrink. However, large scale densification is still tackled the same way it has been for the last century; top-down. It is time to start working on some alternatives, especially in the current economic climate. Apart from the difficulty to support civilian initiated development, these master plans are a time-consuming and costly enterprise. The result is that these areas often stay vacant for much longer than is necessary.

### 3.2 Why Delft?

Apart from the above, the reason for choosing Delft is because it is a very slow traffic oriented city. In Netherlands the car is still the number one choice for transportation, but in Delft the bike is the number one choice (See Illustration 13 page 23; de Groot en van Oers, 2005). This can be contributed to the attention over the last decade for the bike-network and the fact that Delft is a relatively small city. You can cross the city in approximately 20 minutes. In the ‘Fietsactiviteitenplan’, A policy document devoted to bike use, a number of improvements and missing links to the bike network are suggested.
Illustration 11.

2 The ‘Randstad’ is the urban agglomeration of the major cities Utrecht, Amsterdam, Den Haag and Rotterdam. The protected landscape in the middle is referred to as the ‘Green Heart’. Author.
Apart from a vision on the slow traffic network there is also a ‘waterstructuurvisie’ that makes suggestions for water storage and missing links in the water network. But this advantage of a good Slow Networks structure is not utilized to its full potential. Delft is not innovative in its solution for urban renewal and still focuses on large urban projects. In Rotterdam numerous examples of regeneration by social policy and creative solutions can be found, as well as in The Hague and Amsterdam. The cultural projects and opportunities for starting entrepreneurs and artists in Delft all have a temporary character. In other words: Delft has the framework for flexible planning, but does not plan flexible.

3.3 Why former industry area Schieoevers Top-Noord?

**INTRODUCING THE STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS OF THE NOORDELIJKE SCHIEOEVERS**

The chosen project location in Delft is the ‘Schieoevers Top-Noord’. Located close to the city centre and the Technical University (TU) it is an ideal location for densification. ‘Schieoevers Top-Noord’ is a part of the Schieoevers: an industry area trapped between the rail track, the Schie and the N470 (see Illustration 12 & 14). Most of the industrial companies will move or have already relocated, and it is expected that the two major companies that currently occupy Schieoevers Top-Noord will do the same. The municipality imagines a form of mix-use densification to fill in the void. The goal is to attract young, freshly graduated entrepreneurs in the creative industry, and use this target group to trigger an impulse of development. Coupled with this small-scale economic development a mix-use program of retail, cultural facilities and residential areas can be developed. However, the location is enclosed by a highway, canal, the train track and some major blocks of shopping facilities (Gamma) and thus isolated and poorly accessible (see Illustration 14). Apart from the lack of external connections, that cause the isolation, internal connections are also lacking. Currently there is no internal slow network structure and ‘Top-Noord’ is not accessible for pedestrians. To support the small scale mix of functions that is envisioned a denser network of pedestrian streets is necessary. A common term that is often used in relation this network density is ‘**grain**’. The grain is refers to the space enclosed by the network, similar to the Pores between the veins of a leaf. (see illustrations 5&7) The current industrial area of the Schieoevers has a big grain of the urban tissue which cannot support the desired functions. (see Illustration 12) Often industrial areas, shopping malls or University campuses have a big grain while residential purposes, economic and cultural development thrive more with a small grain (Jacobs, 1961; Rocco, 2008) and a small grain is also more suitable for flexible planning. [This will be further explained in the next chapter.] On the plus-side the historical waterfront, the proximity of train station Delft South and the possible stop for the stedenbaan (a future light rail connection from The Hague to Rotterdam) enhance the possibilities for the location (see Illustration 12). Maybe the poor connectivity of the train station ‘Delft South’ can even be improved in combination with improving the connectivity of the Schieoevers Noord, using the slow network.

**CRITIQUE ON THE CURRENT DEVELOPMENT VISION FOR THE NOORDELIJKE SCHIEOEVERS**

There is a development vision for the southern part of the Noordeelijke Schieoevers called ‘Ontwikkelsvisie Blauw voor Schieoevers Noord’ (Anon, 2008), but the manner in which the municipality’s ambitions are shaped into a design is a bit questionable. It states the ambition to be flexible, but only offers the option of executing the predefined master plan in phases. All the plots and functions are still top-down defined. Also the space for a new road alongside the rail-track is very narrow and there is no possibility for water storage or the additional future light-rail track, which are both necessary according to the municipality (see Illustration 12 & 15). A good idea is to move the station Delft South a couple of hundred meters to the north in order to improve its connectivity and put it in line of the new pedestrian bridge over the Schie. Also, the idea to renovate the large industry hall, the ‘Schiehal’, and develop it into a centre of small scale ateliers,
Illustration 12.
Map showing
- The major planned developments in the municipality of Delft,
- and more specifically for the Schieoevers.  Author.
shops and little companies is very smart (see Illustration 16). The internal street through the Schiehal can connect to the pedestrian bridge and the station. The biggest miscalculation of the Ontwikkelingsvisie Blauw is the master plan for the southern part of the project location. It is to be developed into a residential area, but this is not possible because of the combined sound and crill (‘fijnstof’) nuisance of the rail track and highway. Municipal planning policy does not allow residential development in such areas. This part would be much more suitable or larger scale companies that need direct access to the highway.

**WHY TOP-NOORD AS A PROJECT LOCATION FOR FLEXIBLE PLANNING?**
The Northern part of the Noordelijke Schieoevers is actually much more suitable for residential mix use development than the south. Even more so because of the realization of the ‘spoorzone’ project that puts a major part of the train track in a tunnel. (see Illustration 12). Top-Noord will experience fewer nuisances from the rail track. Secondly the city of Delft has already recognised the isolation of this location and has stipulated plans to fix the missing links in the slow network structure. Missing links like the pedestrian bridge over the Schie and a tunnel under the rail track are already planned and this slow network can be used to support the incremental development and regeneration of this area. It can also connect Top Noord to the cultural centre of Lijm&Cultuur and the new train station Delft South. The opportunities for and the vision for development make this location very suitable for urban regeneration, but why a flexible strategy? A flexible strategy would be much more feasible for realization than the Ontwikkelingsvisie Blauw voor Schieoevers Noord, especially concerning the current economic recession. The Schieoevers Top-Noord can be gradually developed by CPO-initiatives and the parts that are not developed yet can have special temporary uses. This process can be started straight away. There is no need to wait for a completely finished master plan or investors for this entire master plan.

### 3.4 Program of Demands for Schieoevers Top-Noord

The program of demands of the municipality for development Noordelijke Schieoevers:
- an urban mix of dwelling and working;
- small scale (or fine grain) is very important to support this;
- after realization the possibility of functions to change, for instance an office to a dwelling or vice versa;
- temporary use should also be possible;
- for the program of the Schiehal: cultural studios and expedition places for starting companies;
- target pioneers that can give an impulse to further development;
- also create student housing.

Additional project goals are:
- to link the Lijm&Cultuur cultural centre with the Schiehal and the new station Delft South;
- to improve the accessibility of the project location.
Chart showing that car use in the Netherlands is the number 1 choice but Bike use is number one in Delft. Source: GROOT, I., DE & OERS, M., VAN, Delft - Wijke en stadszaken - Mobiliteit. 2005, Fietsactieplan II

Current situation of the isolation of the Noordelijke Schieoevers, and the project location: 'Top-Noord'. Author

Design Schiehal and surrounding. Ontwikkelingsvisie Blauuw.

Illustration 17.
Grain of Pores enclosed by the frame. Author.
4.1 What kind of development: small scale mix use.

**What is mix-use and what is fine grain?**
When the term ‘mix-use’ is used in relation to urban planning it denotes a diverse distribution of functions in the urban environment. For instance in the city centre of Delft people often live, work, recreate and shop within a radius of a few hundred meters. This indicates that the term is closely related to a smaller scale or ‘fine grain’. The ‘grain’ of the urban tissue can relate to the size of urban block or the size of plots. Jacobs was an advocate of small blocks because that limits the size of single developments, thus increasing the potential variety of both function and urban form (Jacobs, 1996). If the plots are small too, the uses can be mixed even more fine grain. Mix use and fine grain are also closely related to the concept of the ‘compact city’. A densely built urban environment can accommodate more function in a smaller radius. One can argue that both compactness and a fine grain are conditions for sustainable small scale mix use development.

**Why should these be components of self-organizing densification?**
The most important arguments in favor of promoting mix-use development in urban design are safety and environmental quality (Roberts & Lloyd-Jones, 1997). The idea that mix-use neighborhoods are more safe is based on the idea that with a multitude of uses there are people around 24 hours a day. When we think of the opposite - a mono-functional office complex that is deserted after 5 pm - this makes sense. However it cannot be said that mix use always results in a safer urban environment. The ‘environmental quality’ is related to the notion of ‘vitality’ that Jacobs speaks about (Jacobs, 1961). Urban Vitality can be described as “the intensity and diversity of pedestrian-based activity in the public realm and the pattern of such activity over time” (Roberts & Lloyd-Jones, 1997: 150). According to Jacobs (1961) a multitude of mixed uses results in a livelier, stimulating public realm and a sense of community. Such an urban environment is a breeding ground for smaller scale entrepreneurship. If a fine grained mix-use urban environment can adapt to a multitude of uses, bottom-up development is more common. Many classic examples of mix-use fine grained urban environments have indeed turned out to be very resilient to change (Jacobs, 1961). We can now understand why small scale mix use development fits so well for this project for flexible planning. The slow network framework can support the pedestrian realm that is needed for a small scale mix of functions, and vice versa. On top of that small scale mix use development fits for bottom-up densification. A true strategy for flexible planning could indeed fulfill the wishes of the municipality of Delft to create a mix of living and working that can interchange function after development.

4.2 Strategy: Slow Network Oriented Development (SNOD)
The strategy that links the development of the infill to the slow network frame I call ‘Slow Network Oriented Development’ (SNOD). SNOD describes what conditions are needed for the slow network frame to support an infill of emerging small scale, mix-use, and pedestrian based development. The frame and infill concept is embedded in this strategy because the slow network is the carrying structure called the ‘frame’. This is what supports small scale economic development. After all, smaller enterprises such as culture, retail and leisure are very dependent on slow traffic.

**Transit Oriented Development** (TOD) and **Transit Joint Development** (TJD).
SNOD is actually a Dutch extended version of ‘Transit Oriented Development’ (TOD). TOD is the creation of compact, pedestrian based communities around high quality train or light rail systems. By densification near transit nodes it attempts
to counteract urban sprawl and car-dependency. Around the transit node the pedestrian routes should be efficient and well-designed in a way that the station is always in walkable distance. Small scale Transit Oriented Development is also sometimes referred to as ‘Transit Joint Development’ (TJD). TJD is a public-private partnership to develop real estate near transit nodes. Though TODs vary in size, form and execution the general common elements are Mix use development around a transit-node, compactness, pedestrian and cycle friendly environments and public spaces near stations (Cervero, et al., 2002). Two definitions of TOD are:

“The practice of developing or intensifying residential land use near rail stations” (Boarnet and Crane cited by Cervero, et al., 2002: 5).

“A mixed-use community that encourages people to live near transit services and to decrease their dependence on driving” (Still cited by Cervero, et al., 2002:5).

**Why adapt the strategy to Slow Network Oriented Development (SNOD)?**

According to the last definition the project location of Delft Schieoevers is also a Transit Oriented Development. It is mix-use densification near a railway station named ‘Delft South’. So why adapt the strategy to Slow Network Oriented Development? In chapter 2.2 it was described how the Dutch water networks and pedestrian realm can be the carrier for low dynamic development (nature, residential uses, parks, leisure and bike and pedestrian use) and the traffic network for car and train, the carrier for high dynamic use such as stations, offices and high densities.3 (Tjallingii, 2005). Like most urban development today Transit Oriented Development is focussed on high dynamic use. Slow Network Oriented development focuses more on both low dynamic use and high dynamic use. In a city both high dynamic and low dynamic uses are needed. Focussing on one or the other does not suffice. SNOD is a strategy that maps the slow network on city scale, identifies the missing links and can thus be the frame for infill on any location. TOD is a strategy that can only be applied near transit nodes. The basic components for SNOD are compactness related to low or high dynamic use; a mix of uses on the scale of the city, neighbourhood and block; a fine grain; and a high Permeability for high dynamic use. The *permeability* describes that accessibility of the urban tissue for slow traffic. This last mentioned concept, which is new, is explained in paragraph 4.3

4.3 The external parameters for mix use emergent development: Grain and Permeability

**Accessibility for slow traffic**

Apart from compactness and a fine grain, which are elements of urban density, another concept that is related to successful mix use development is accessibility. An example of high dynamic use, such as a train station or a shopping district must be accessible for cars, public transport (bus) but especially for pedestrian and bike traffic. Big shopping malls or the IKEA are not dependant on slow traffic. But we have established that designing and planning all developments with this car-dependency is not very sustainable. High dynamic use such as smaller scale retail, culture and trade thrive at well designed places that are accessible for pedestrian traffic. (Jacobs, 1961; Hillier 2009; Salingaros, 2005) According to Jacobs (1961) there is a need for a multiplicity of routes for the pedestrian realm. However the success of pedestrian-based development is not so much to do with the multiplicity of routes, as with the continuation of main routes that are connected to other streets. The best connected streets are the ones that are connected to a lot of other streets. Continuous routes are the ones with the least angle changes. If these are also highly integrated in the street network, connected to a lot of other streets, they are often main routes that coincide with concentrations of economic activity and high level of activity. (Hillier, 2009)

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3 The spatial structuring role for the water network is a typical Dutch phenomenon, but if the strategy where to be used in other countries the pedestrian realm in combination with the park structure could be the carrier for low dynamic use
Illustration 18.
The components of the main frame, secondary frame and infill. Author
Main frame and secondary frame
These main routes for slow traffic are what I call the city’s ‘main frame’. The conclusions from literature research regarding the ‘structuring components for the complex city’ resulted in not only a subdivision in frame and infill, but also main frame and secondary frame (see appendix B). The main frame consists of the main carriers and barriers of flows of slow traffic movement (see Illustration 18) In chapter 2.2 it was indicated that the Carriers are the elements of the slow network: the main water structure and routes for slow traffic, sometimes referred to as the pedestrian realm. The barriers are the elements of the fast network such as major roads for cars and train tracks, but also water. The main frame is basically the most important structuring elements of the slow network. This is the carrying structure for high dynamic pedestrian based development. For instance a main shopping street would be part of this main frame, or an important route to cycle from the station to the university, or a continuous route that goes past some major facilities such as the theatre, the market and a school. These main routes are well-accessible busy streets that can support higher densities and are ideal for retail, trade, culture, and housing as well. The secondary frame contains all the streets that are not part of this main frame. These are less accessible, but can be very nice quiet residential streets. By defining the main frame and the secondary frame, a relationship between the infill and the frame is created. Certain types of development fit a certain type of frame. In order to be more specific than just ‘low’ and ‘high’ dynamic use, the notion of Permeability is introduced.

Permeability is the accessibility between pores defined by the main frame
If an area is Permeable it means that it is connected to the main frame and is suitable for high dynamic use. The main frame is a carrier for high dynamic use because it is accessible for slow traffic. While Accessibility is a characteristic of the route to one point, Permeability is a characteristic of the area of infill that is connected to this route. Vigano (2010) describes Permeability as the connectivity between ‘pores’. A pore is basically the functional area that is enclosed by the frame; an area of infill (see Illustration 19). This concept is closely related to the grain of the urban fabric. The grain refers to the size of the pores, and it has already been noted that a fine grain supports small scale mix use development (Jacobs, 1961). A big grain, big Pores, is more suitable for big scale functions such as universities, industry and shopping malls. A high permeability means an accessible well connected area. This matches with facilities such as shops, cultural facilities and retail. Low permeability matches well with residential areas. The structuring elements of the city (carriers and barriers of movement) should be organized in such a way that it creates a system of permeability that supports the local densities and functions of the city. Illustration 19 visually represents how the main frame defines the permeability, and the total frame defines the grain of an urban fabric. The total frame encloses the Pores, thus defining the grain. If a Pore is connected to a Slow Network Main Route, it is Medium Permeable. If the Pore is connected to a junction of two Slow Network Main Routes it is high Permeable and if it is not connected at all it is low permeable (see Illustration 20). The Barriers for slow traffic can prevent a Pore from being connected to the Slow Network Main Routes. That is how the Main Frame defines the Permeability of a Pore.

Comparing definitions of Permeability and Grain
The concepts of grain and permeability are used differently throughout the field of urban planning. On top of that there exists a difference in terminology: there are many descriptions for more or less the same thing. Vigano (2010) describes the ratio between the urban tissue (the pores) and the network of flows (the frame) as Porosity. A high porosity corresponds with a fine grain or a ‘high urban granularity’ (Rocco, 2008). Comparable to Porosity, a concept that is used as a ratio between the urban tissue and the street network is the street network density. Berghauser Pont uses ‘mesh’ to describe the grain and street ‘network density’ for the average grain in an area (Berghauser Pont & Haupt, 2010). “The density of the network refers to the concentration of networks in an area.” (ibid: 107) The main difference is that the street network density measures the sum of the lengths of streets and the porosity measures the surface of streets in an
Illustration 19.
The total frame is what defines that grain and the main frame carriers is what defines Permeability. Author
area. Using porosity to define grain can be a tricky thing because it measures the surface of streets. For instance an area with one big highway that covers a lot of surface would result in high porosity, and an area with a lot of smaller streets such as a historical city centre would also result in a high porosity. It is therefore not a useful concept to describe fine grain. I choose to simply work with the concepts of grain because this the most used and recognized concept. The only pitfall is confusion about the level of scale. We talk about the size of an urban block and not the size of plots. The second concept I use to relate frame to infill, is **Permeability**. Permeability is sometimes used to indicate the level of transparency of the ground floor facade of a building, but that is completely different meaning on a different level of scale. Another definition for Permeability is: “the notion that good urban development allows a ‘democracy’ of choice in pedestrian movement through it” (Roberts & Lloyd-Jones s, 1997: 157). This is in accordance with the views of Jacobs (1961) who argues that pedestrians need a multiplicity of routes to choose from. However, it has already been mentioned that this definition does not account for angle changes, integration or barriers for main routes (Hillier, 2009). If the Permeability of a Pore relates to the accessibility of this area for slow traffic, why not just use accessibility as a concept? **Accessibility** is a more well-known concept, but the accessibility of a Pore, is something different than the accessibility of one point or the spatial integration of a street. The difference between the use of my definition of permeability and that of Vigano (2010) is that she defines the accessibility or ‘connection’ of pores by the impermeable tissues surrounding it (Vigano, 2010). This is a rather vague description and difficult to measure. My definition relates to connection to main frame. 1x connected: high perm 2x connected: med perm. Not connected: low perm. In this system the permeability is divided in three types. However, it could be measured by five, or six or ten types of Permeability if the frame is given more attributes. The Space Syntax method could support such a more specific subdivision. This method calculates the number of angle changes from a certain point, for instance the main frame (Hillier, 2009) (see Illustration 20). This project will only use three types of permeability in order to keep it simple.

<table>
<thead>
<tr>
<th>Connected to main frame?</th>
<th>Permeability</th>
<th>Supports:</th>
<th>Urban typology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main frame</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x connected</td>
<td>High Permeability (very well accessible)</td>
<td>Major shopping/cultural facilities/landmarks</td>
<td>HIGH URBAN</td>
</tr>
<tr>
<td>1x connected</td>
<td>Med Permeability (well accessible)</td>
<td>Retail, trade, cultural and commercial activities.</td>
<td>URBAN</td>
</tr>
<tr>
<td>0x connected</td>
<td>Low Permeability (more secluded)</td>
<td>Low dynamic Residential purposes</td>
<td>LOW URBAN</td>
</tr>
<tr>
<td>Secondary frame</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 step away from main street</td>
<td>(pretty well accessible)</td>
<td>This will start to cause problems</td>
<td></td>
</tr>
<tr>
<td>2 step away from main street</td>
<td>(not bad accessible)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 step away from main street</td>
<td>(more secluded)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 step away from main street</td>
<td>(very secluded; isolated)</td>
<td></td>
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</tr>
</tbody>
</table>

Illustration 20. How is Permeability defined by the main frame and what kind of development does it support? Author.
**THE EXTERNAL PARAMETERS FOR MIX USE EMERGENT DEVELOPMENT: GRAIN AND PERMEABILITY**

We have established two parameters that can be used to guide self organizing mix-use development: Grain and Permeability. The structuring elements of the city (carriers and barriers of movement) should be organized in such a way that it creates a system of fine grain and mixed permeability that supports the local densities and functions of the city. This is why, if the city is dysfunctional, the frame should be transformed first (Salingaros, 2005). However, a mismatch is not always caused by missing links or flaws in the frame. The permeability and grain are external conditions for small scale mix use development, but they are not the only conditions. Within a pore there are internal conditions such as sufficient density, flexible governmental policy and a suitable urban form. This is the first step towards finding a relation between the frame and the infill. If a pore is connected to the main frame, it is Permeable and therefore is suitable for more high dynamic functions. The use and function of such a pore can be characterized. Of course this general typology does not mean that there is no difference between two LOW Permeable Pores, but it can be useful to subdivide in some basic categories in order to stipulate a general description of the type of development that is suitable for a certain location.

According to the 3 categories of permeability I have defined 3 types of urban typology:
- High Permeability - High Urban
- Medium Permeability - Urban
- Low Permeability - Low urban

The next step is to define the rules for development of each of this categories The internal conditions are the ‘guidelines for self-organization’ that the second research question of my thesis refers to. In the next chapter the methodology for finding these guidelines, as well as the methods for analysis and design, are explained.

**Main research questions:**

Answered:

How to create a slow network structure for Delft that can be the spatial framework for self-organizing development?

**NEXT STEP:**

What are some spatial and governmental rules necessary to guide this self-organization to a sustainable future?
Illustration 21.
The circular process of this graduation project. Author
5.1 Five Components of this graduation project

**TWO TYPES OF ‘FRAMEWORK’ FOR FLEXIBLE PLANNING AND THREE TYPES OF END PRODUCTS**

The term ‘framework’ in the title is actually a dual concept: it refers to the spatial urban structure, that is the city’s ‘frame’, and to the policy that is necessary to guide the self-organization of the ‘infill’. The ‘spatial framework’ and ‘policy framework’ result in different end products for the graduation project. The first is a spatial design on city scale and a detailed urban design on the scale of the project location. This design for spatial slow network is the frame in which self-organizing development can take place. The second product is a set of governmental and spatial rules for development, the ‘policy framework’. The third type of end product is a simulation of a possible self-organizing development. Naturally, I cannot design a self-organizing structure, because it is a bottom-up process. However, by organizing one or more GAMES, the self-organization process guided by rules can be simulated. In a GAME the participants play a role that provides them with certain wishes and demands. According to this role, they play the game within the rules that are given. They would have to find partners, and work with the other participants in order to ‘build’ their own house, office or shop in a model version.

**STEPS IN THE PROCESS**

There are five components, or steps, in this graduation project. The methodology of each of these components will be discussed individually, but first the relation between them must be explained.

1- The first component is research on the problems relating to the notion of flexibility.
2- The second is an analysis that will lead to the definition of Delft’s slow network main frame.
3- The design for Delft’s main frame is twofold:
   a) Design of the city’s slow network main frame and suggestions for the interventions needed to optimise this,
   b) Zooming in on the project location will lead to a more detailed design for the missing links in the main frame. The frame should initiate optimal external conditions for grain and permeability.
4- The next component is the set of guidelines for development of the infill.
5- These guidelines will be tested by GAMES that simulate one option for the infill of the project location.

**CIRCULAR PROCESS**

The former paragraph might give the impression that the steps in the process are linear. It is however a circular process (see illustration 21). Every step will result in feedback and tweaking of the previous parts. Sometimes this can lead to drastic changes and sometimes it will not. Especially the feedback resulting from the GAMES is important because it can show if the guidelines have the desired effect. Apart from the GAMES, I can test some extreme scenarios by possible designs of the infill. This research by design can lead to tweaking of the rules. However the GAMES are essential to test the rules because they are executed by other people than myself. Therefore they work outside my own frame of reference and can lead to different results. Also the participants of the GAMES can give feedback whether if the guidelines are easy to work with.

The final moment of feedback is at the end of the graduation project. The conclusions in Chapter 13 will assess the generic qualities of this graduation project. Could this methodology for flexible planning also work in other contexts? And if so, what could be improvements to the methodology?
Illustration 22
Delft by Blaeu.
6.1 A combination of layers

There are a lot of different ways to analyse the city’s structure. One of the first man to do this was the famous Jan Willem Blaeu (1596-1673). He mapped the cities, land and oceans of the Netherlands with meticulous ability. The maps show surprising detail and are quite true to scale, though this was very difficult to measure in the 17th century (see illustration 23). Today we can make maps, photographs, 3d-models, cartoons, models and computer-simulations to analyse an urban structure. Because of the cities complexity there are many different facets to analyse; demographics, urban typology, urban form, public space, green, water, soil, building height, building density, population density and so on. That is why it is important to keep in mind to what purpose the analysis should be made. In the case of this graduation project we are looking for a spatial urban structure that can support self-organizing development. We have defined this spatial urban structure as the city’s ‘main frame’ that results in three types of ‘Permeability’ of the urban tissue. To map this ‘urban frame’ a number of methods for Analysis are used.

**Five methods of analysis**

To map the grain ad permeability is easy because it is defined by the total frame and main frame. Mapping the total frame is not difficult because this is a blueprint of the public realm. To map the main frame however is a difficult task. How can the city’s main routes be identified? And if only one specific method of analysis is used to map the main frame, is this not very subjective? It is very important that definition of the main frame is as accurate as possible, because this is the basis for the definition of the city’s permeable tissues. In order to be as objective as possible, the method for the analysis of the city’s main frame is a combination of five different methods of analysis.

1 One analytical representation of the city’s networks is that of the slow and fast networks (Tjallingii, 2005). Dividing the technical networks into slow (bike, foot and water networks) and fast (public transport and car) networks can offer insight to conflicting points. The downside is that it does not offer any information about the level of connectivity or the intensity of use of these networks. That is why two other methods of analysis, closely related to each other, are introduced.

2 The first is the Space Syntax method that can use computer software programs (Depthmap software) to calculate the level of connectivity. There are three main results of analysis using Space Syntax: the local integration, the global integration and the angular analysis. The local integration measures the connectivity of the neighbourhoods in relation to each other. The Global integration measures the best connected areas in the city. The best connected streets in both local and global integration are the ones that are connected to a lot of other streets. The angular analysis highlights the paths with the least angle changes (Hillier, 2009). These continuous and integrated routes often coincide with concentrations of economic activity and high levels of action. The routes that are highlighted in all three results are the person that are best connected to the rest of the network. This is the main frame or what Hiller (2009) calls the foreground network (see appendix D).

3 The second method for analysing the level of connectivity is the three step analysis. In this method the ‘steps’ or ‘number of angle changes’ in all directions from a certain point are illustrated (see appendix D). This method, if executed correctly, can measure the level of connectivity and ‘quality’ of the networks. Using certain anchor points as starting point, the number of steps that have to be taken to arrive at a destination are indicated. Which anchor points are chosen is very dependent on the information that must be derived. For instance, to analyse the connectivity of public transport to the slow network, the stations can be used as anchor points and the steps taken should only represent usable bike and...
pedestrian routes. Where the Space Syntax software uses the angle change to determine if there is a change in direction, the three-step analysis can also take into account visual barriers, bad pavement or a lack of a pedestrian crossing. This freedom in judgement makes the method of analysis more sensitive, but also more dependent on the skills and judgement of the one who executes the analysis. This can be both an advantage and a pitfall.

4 Another method for analysis is mental or cognitive mapping. In “The Image of the City” Kevin Lynch (1960) describes five structuring elements for the city: paths, edges, districts, nodes and landmarks (see appendix D). These elements are embedded in our ‘mental map’ of the city and we use them for orientation. If the elements are easily recognized (legible) for the inhabitants, there is a clear and good organization of the city. Lynch introduces two methods to map the city using these five elements as legend. The first map is made by personal experience and interpretation in the field. The second is computed from the results of different interviews with inhabitants about how they perceive their city. In my project I will only use the first. This will be combined with a traditional geographical map of the city.

5 The last method of analysis is that of the geographical setting of the city in different points in time. This historical analysis can show what routes were important structuring elements for the city growth. For instance in the case of Delft the ‘Schie’ and the ‘Buitenwatersloot’ have been main routes from and to the city centre since the 15th century until today (see Appendix D). Often these routes coincide with continuous highly integrated routes that are picked up in the Space Syntax analysis. The historical analysis can also give insight to the type of soil a city is built on. This often has influence on the city’s structure. An analysis of the geographical setting is traditionally the first step in analysing a city in the well known method for analysis in urbanism; the layer approach.

THE LAYER APPROACH
In the traditional method of analysis the ‘geographical and urban layers’ of an area are mapped. In the layer approach of Meyer, Westrik and Hoekstra (2008) the urban environment is split up in:

1) soil
2) city plan (footprint)
3) structure of public space
4) buildings (morphology)
5) use (as is defined in the ‘bestemmingsplan’)

However, the first step in this graduation project is to find the main structuring elements of the urban network (frame). For that reason the layer analysis for ‘network operation’ is used. Dupuy (2005) recognizes three levels of network operation, but Rocco (2008) adds two more for a complete analysis: (see Appendix D).

- The level ‘0’ of the geographical setting. This corresponds to the first layer of ‘soil’.

- Governance is an interface level between nature and the three levels of networks operation:
  1. technical networks (such as roads, sewer systems, train tracks, cable lines)
  2. production and consumption networks (the pattern of economic activity)
  3. household related networks (density, level of income and other characteristics)

The first layer is added because it obviously influences urban structure and networks through time. The interface layer represents the “power struggle” between the different parties concerned in urban planning (Rocco, 2008: 155). In this sense my definition of governance somewhat differs from that of Rocco (2008). He defines governance as the “tension between the public sector, private sector and civil society”, whereas I refer to the governmental policy that is necessary to guide this tension (Rocco, 2008: 155). For the analysis of Delft, it is useful to investigate all these layers, but the layer of the technical networks is of special concern because this leads us to the main frame. Illustration 23 shows the full scope of the methods for analysis; for the frame, the infill and the relation between frame and infill.
TECHNICAL NETWORKS GENERAL (Layer 1)
(roads, traintracks, sewer systems, waterstructure etc)
- HISTORIC ANALYSIS OF GEOGRAPHICAL SETTING (layer ‘0’)
- THE SLOW AND FAST NETWORKS (Tjallingii)
- SPACE SYNTAX (Measuring Connectivity)
- FIELD MAP LYNCH (Main structuring elements)
- 3-STEP ANALYSIS (Measuring Connectivity)

Pore = functional area enclosed by the total frame

Grain = size of the pores

Fine GRAIN matches with smaller mix use urban development
Big GRAIN matches with bigger monofunctional areas. (like industry)

High Permeability: Connected to Slow network Main routes
matches with higher density high dynamic areas

Low Permeability: Not connected to Slow network Main routes
matches with lower density residential areas

PRODUCTION / CONSUMPTION NETWORKS (Layer 2)
(the pattern of economic activity)

HOUSEHOLD RELATED NETWORKS (Layer 3)
(density, income level and such characteristics)

GOVERNANCE (intermediate layer)
(the policy guiding the different interests in planning)
Illustration 24.
The Pores defined by the toal urban Frame of Delft. Author.
7.1 Analysis of the Grain and the Slow and Fast networks of Delft

**THE PORES ENCLOSED BY THE TOTAL NETWORK**  Illustration 24
Illustration 24 actually is a graphic representation of this grey area that is enclosed by the fast and slow networks. The functional areas enclosed by the total (fast and slow) networks are the Pores. These Pores contain both built and non-built and both public and private functions. If the size of the Pores are small we call the area ‘fine grain’. A fine grain area is said to be more suitable for residential purposes mixed with small scale retail, trade and business (for argumentation: see previous Research part). To investigate this, the functional use of the Pores should be checked with the Grain and the permeability.

**THE ANALYSIS OF THE SLOW & FAST NETWORK**  Illustration 25-26
In mapping the technical networks of Delft we are looking to extrapolate what is the Main Frame. To find this we need to start by mapping the total frame and finding out what are carriers for slow traffic (slow network) and barriers for slow traffic (fast network). Illustration 25 shows the Slow Network of Delft. It consists of all the paths and streets that can be used by bikes and pedestrians. Illustration 26 shows the Fast network. This consists of the rail track, highway and N-roads that are not accessible for bikes and pedestrians. Illustration 26 also shows the relation between the networks and the urban tissue. The grey area is the ‘built environment’ consisting of buildings but also parking lots, grass-land, gardens and sheds. The way this urban tissue is shaped is related to the networks that slice through it.

7.2 Linking the frame to the infill: Analysis of urban tissue

**THE CURRENT AND FUTURE GRAIN OF THE SCHIEOEVERS ILLUSTRATION 27-28**
Illustration 27 shows the current Grain of the Schieoevers. It is clearly visible that the grain is much bigger than the surrounding residential neighbourhoods. Though the grain is a result of the street network density, it is also closely related to the built form of the area. Illustration 28 shows that the buildings on the Schieoevers are also much bigger. It makes sense that the streets surrounding them are wider apart causing a bigger grain. The Schieoevers can be subdivided into four areas: North-West (NW in illustration 27); North-East (NO in illustration 27); South-East (ZO in illustration 27); and South-West (ZW in illustration 27). The Schieoevers North-West has the biggest grain. It has an average of .75 businesses per hectare. Since in these industrial areas one Pore often belongs to one business, this means that the average Pore is more than 13 000 square meters. This is comparable to two soccer fields. This makes the Schieoevers unfit for mixed use development. The grain has to be adapted.

**THE CONCENTRATION OF FACILITIES AND PERMEABILITY ILLUSTRATION 29-30**
There is another relationship between frame and infill. Both Grain and Permeability have an influence on the current use and form of the urban tissue, and the options for future development. In the introduction of the project location in chapter 3 it is indicated that the project location is very isolated. This means that the Permeability is not very high. This is not good for residential purposes but also effects the concentration of facilities. Illustration 29 shows the concentration of retail-facilities in Delft. The TU and the Schieoevers show as a gap in the facility-map (See Illustration 30). This makes sense because the University and an industrial area are very mono-functional areas. Though mono-functionality is generally concerned undesirable, it is not necessarily a bad thing. However the Schieoevers are to be transformed from a strictly industrial area into a neighbourhood with a small scale mix of living, businesses and facilities. This mix of functions is related to both the grain and permeability of the Pores. A smaller grain and High Permeability (good accessibility of Pores) support small scale businesses, and for residential purposes a smaller grain is also necessary.
Illustration 27.
The Grain of Delft and the project Location. Author.
Map of the major future developments in Delft. Also it can be seen that the grain of the buildings corresponds to the grain of the Pores. Author.
The concentration of facilities in Delft (retail). The final map of the main frame and Permeability (illustration 43) shows that the facility clusters actually correspond to the main frame. The urban frame has an influence on the infill of the urban tissue. Not only facilities cluster around main routes for slow traffic, also for residential purposes it is popular. People don’t because to live next to a highway, but do because to live close to the water and in easy distance of the city centre.

Author.
The concentration of facilities in Delft is related to the grain and permeability. Smaller grain and High Permeability (good accessibility of Pores) support small scale businesses. The TU and the Schieoevers have a large grain and show a gap in the facility-map. See Illustration 28. The final map of the main frame and permeability (illustration ...) shows that the facility clusters correspond to the main frame. Author.
Illustration 31.
The 4 methods of Analyses that support the argumentation of the main frame. Author.
7.3 Overlap Analysis of the main frame (carriers & barriers for slow traffic)

Illustration 31 shows the four methods of analysis that support the argumentation for the main frame of Delft. The barriers for slow traffic can be recognized by a ‘field map’. The carriers of slow traffic, or the main routes for bike and pedestrian traffic, are mapped by using three methods; a historical analysis of the urban structure, a space syntax computer analysis and a manual 3-step analysis. Overlapping the conclusions of these three different methods can lead to a more objective approach to Delft’s main frame.

RESULTS OF THE HISTORICAL ANALYSIS

Over the last decade, Dutch cities have grown explosively in size. This is also the case for Delft. However, some major lines from the 17th century are still very much recognisable in today’s urban structure. For instance the Schie, the ‘Rotterdamseweg’, de ‘Binnenwatersloot’ and the rail track are prominent structural features. (see also Appendix D)

RESULTS OF THE SPACE SYNTAX ANALYSIS

Illustrations 33, 34 and 35 are obtained from computer software called ‘Depthmap’. This program can perform a ‘Space Syntax analysis’ based on a vector map of the street network of a city. The Space Syntax analysis can run three types of analysis on the same set of vectors: an angular, global and local integration map. It has already been explained that the angular analysis measures the number of angle changes of a street and thus maps the most continuous routes. The Global integration map shows how easy it is to reach a certain location from any other point in the city. The Local integration map shows the same on a smaller scale. The square highlighted by the first two is a shopping centre. The local integration map highlights the city centre of Delft. Other main routes that appear in both maps are the ‘Rotterdamseweg’, the ‘Binnenwatersloot’, the N470, the ‘Hooikade’ and the ‘Westvest’.

RESULTS OF THE 3-STEP ANALYSIS

Explained earlier, the 3-step analysis is a manual form of the angular analysis. It measures how far one could walk/bike from a certain point whilst changing direction only three times. (see also appendix D) As anchor points the primary schools, main facility clusters and stations are used because these are functions that are important destinations for slow traffic. The TU Delft and the Schieoevers do not appear in the illustrations because they do not have a lot of facilities; in other words, no anchor points. Illustration 37 shows the accessibility of Delfts train stations. The poor accessibility of Delft South is clearly visible. The illustration shows the plans for the train stations and future lightrail stops. This improves the connectivity considerably.

RESULTS OF THE FIELD ANALYSIS

The field analysis is a subjective form of mapping that makes use of the elements that Lynch proposes in his book ‘The image of the City’ (1960) (see appendix D). The main barriers for slow traffic (edges) are the water ‘de Schie’, the rail-track, the highways and the N-470. It also shows the main routes to the various districts of the city.

7.4 Delfts main frame and permeability

Overlapping the results of the different methods of analysis leads to the final urban main frame (see illustration 42). The Pores that are connected to the main carriers for slow traffic (main bike and pedestrian routes) are Medium Permeable. The Pores that are twice connected are High Permeable and the Pores that are not connected are Low Permeable. Because the grain of the Schieoevers is so big, the pores are Medium Permeable. If the grain would be more fine however, the location would have a lot of low permeable tissue due to its isolation.

7.5 Maps main frame Analysis
Illustration 32. A compilation of the historical analysis. For each time period the new connections are indicated in red. Author.
Illustration 33: The angular analysis. Red indicates highly integrated streets and blue poorly accessible streets. Author.
Illustration 34. The global analysis. Red indicates highly integrated streets and blue poorly accessible streets. Author.
Illustration 35. The local analysis. Red indicates highly integrated streets and blue poorly accessible streets. Author.
Illustration 36.
A 3-step analysis using as starting points the primary schools in Delft. The schools are more accessible from their neighbourhood than from the other end of the city. The illustration clearly shows the impermeable tissue of neighbourhoods 1 and 2 (these can be classified as ‘Bloemkoolwijken’). Author.
Illustration 37.
A 3-step analysis using as starting points the main facility clusters. The city centre is actually the major concentration of facilities. This will lead to almost all streets turning up in the 3-step analysis. That is why for this map the city centre is left out of the analysis. The other facility clusters are located on more continuous lines, accessible from the entire city. Author.
Illustration 38.
A 3-step analysis that uses the train stations in Delft as starting points. Author.
Illustration 39
A 3-step analysis that uses the FUTURE train stations and light rail stations in Delft as starting points. Author.
3-STEP ANALYSIS OF SOME OPTIONAL DESIGN INTERVENTIONS

To improve the connectivity of the train station ‘Delft South’ as well as the permeability of the project location an east-west connection is needed. The Delft municipality is already planning to make such an intervention. For that reason three options are tested with the 3-step analysis method.

**Top Left:** the current connectivity for train station ‘Delft South’. It is clearly very poorly accessible for bike and pedestrian traffic.

**Bottom Right:** an option for a new future lightrail stop. This already improves the connectivity of the project location.

**Bottom Right:** option for new light rail stop OR new station Delft South. This connection has the best integration in the slow network. (In other words, it is the most accessible) The connection through the Schiehal can also provide an interesting opportunity for development, making the grain of this huge block smaller. Smaller blocks are more suitable for a mix-use development (Jacobs, 1961).
Illustration 41. The main paths and edges as recognized in Delft. (Lynch method field map). Author.
Illustration 42. Current Main Frame & Pores. Author.
Illustration 43. Current main frame & permeability. Author.
Low permeability: not connected to main carrier
Medium permeability: 1x connected to main carrier
High permeability: 2x connected to main carrier
Illustration 44.
Internal and external connections for the Schieoevers. Author
8.1 Methodology Design: urban acupuncture

The design for the Noordelijke Schieoevers will focus on the interventions that are needed to complete the urban main frame in such a way that it can support the envisioned mix-use small scale development of the project location. The missing links are identified by the analysis. It can be suggested that the missing links are ‘treated’ with acupuncture interventions. Urban acupuncture is a strategy for urban design and planning in which a small intervention causes a bigger effect, for instance on the whole neighbourhood or city. One of these acupuncture interventions is the initial step towards a detailed design. However, in this design, the project location Top-Noord will stay blank. Instead, a simulation for collective self-organizing development will function as the design for filling the frame. The simulation of self-organization will result in the internal connections (secondary frame) of the project location Top-Noord.

8.2 Suggestions external interventions & effect on permeability

In order to improve the permeability of the project location two new connections are added to the urban main frame. The first is a north-south connection along the rail track. The second is an east-west connection through the Schiehal, connecting the new train station to the technical university. For this connection a pedestrian bridge over the Schie and a tunnel under the rail track must be realized. (see illustration 44) Whilst lifting the isolation of the project location these new connections do not suffice in making the location fit for development. To improve the grain some internal connections are also needed.

8.3 Tests internal connections & effect on grain and permeability

**Testing Options Internal Connections** (see illustration 45)

Illustration 45 shows the effect of the two new external connections on the permeability of the project location. (compare to illustration 43) This is misleading - due to the large grain, almost the entire project location appears to be high Permeable. If a smaller grain is applied this changes. What is needed is a subdivision of the project location that results in a smaller grain, but also in a well-balanced permeability. For the envisioned program of the project location, low, medium as well as high permeability are needed to support a mix of urban functions. To investigate what subdivision is ideal, a few references are used. (see illustration 46) The first example, from a paper on flexible planning, results in a grain that is either too big or too small. The units are comparable to some small pores near Delft’s city centre, but a subdivision of all pores of this size will lead to a permeability that is much too low. The reference of the urban blocks of New York are also too big in comparison to the surrounding Dutch neighbourhoods. San Francisco’s ca. 450 square meter blocks seem to fit quite well. After a comparative study on the grain of Delft, the best fit would be between 15 and 36 units.

**Rules for Internal Connections**

This conclusion actually leads us to one of the first rules for development in the guidebook. Because the Schiehal, the station area and the South are different design assignments, the grain tests are translated into a rule for only the northern area. The Schiehal can only be divided into four Pores and some parts of the south are not even fit for development. Taking this into account, the project location for self-organizing development (Top-Noord) should have between 10 and 24 Pores. (see illustration 47)
Illustration 45. External connections improving the permeability and some tests for internal connections to improve the grain. Author.
Illustration 46. References for the size, or GRAIN, of cells-units and plots. Author.

1. Cell
   250x250 m

2. Unit
   2500 m²

3. Plot
   200 m²

4. Unit
   2600 m²

5. Plot 10 - 13

2 units residential neighborhood Delft:
2500 m² & 2200 m²
31 - 27 plots

block / Unit = 15 250 m²
reference: New York
max 62 plots

block / Unit = 10 463 m²
reference: San Fransisco
max 34 plots

The two new connections for the Main Frame cause the junctions (the waterfront and the station area) to be high urban. The development alongside the railtrack is Urban. Because the development alongside the Schie are single plots the rest is Low urban. The optimal grain for the Project Location Top-Noord is between 10 and 24 Pores.

Illustration 47. Author.

Schiehal is High Permeable. Rest should be mix of Low and Medium Permeability.
8.4 The interventions to the main frame and assignments for infill

The design for the project location of Delft Schieoevers consists of the interventions needed for the two new connections of the main frame (see illustration 50). After the frame is designed there are seven areas that remain to be developed (the infill). One of these areas is Top-Noord. Because the most of these current buildings are low quality, the industrial building stock will be demolished (see illustration 49). This results in a blank project area of 15 hectare that can serve as the test case for an experiment with self-organization. The remaining area’s are not designed, but simply indicated. The municipality can take notice that these are projects to be realized (see illustration 48).

**High, medium and low permeable areas in the project location**

Because the station area and the waterfront are on a junction of main routes, they are high permeable. This fits very well with their high dynamic public function. Alongside the Schie are single plots for development. Because the Schie-road is part of the main frame these plots are medium permeable, so urban typology. Though a villa typology does not seem to fit as ‘urban’ typology it continues the tradition of free-standing houses alongside the Schie. Also money can be made from development of these expensive plots to fund the rest of the project. The effect of this decision is that the project location **Top-Noord will consists of low urban typology development, and urban typology development alongside the main boulevard; the ‘Spoorstraat’** (see illustration 47).

**The seven assignments for development of the infill (of Delft Schieoevers):**

1) the internal development of the Schiehal into a creative factory with small ateliers, businesses and offices but also events, nightlife, student housing. Reference: NDSM Amsterdam.

2) The development ‘Schieoevers-South’. Residential purposes are difficult because of train and highway nuisance.

3) The development of the direct surroundings of the new train station including public space, bus-stops, bike-parking etc.

4) The development of the waterfront into an attractive public space formed by new buildings and landscaping.

5) The development of the buildings facing the train track (one of which is also a sound barrier).

6) The development of the ‘vrije kavels’. Plots for individual private development (i.e. not community-based).

7) The self-organizing development of ‘Top-Noord’. The design of the internal street pattern, urban blocks, plots, typology and public space will all be defined by the future residents of this area.

Illustration 48. The seven design assignments for development. Note that the waterfront and station area developments are High Permeable (junction main frame routes). Top Noord is the project location for self-organization. Author.
Some of current companies on the ‘Noordelijke Schieoevers’ are leaving, which makes this location suitable for re-development. The buildings that have a spatial/architectural quality must be preserved, and the rest can be demolished. The industrial ‘halls’ that are to be demolished have very little spatial quality. One industrial hall does have spatial quality: the Schiehal. The huge building can be partly torn down in order to make room for the new developments (such as a new train track, a road and a water connection). The part to be demolished was built in a later period in time, so demolishing it will not cause structural problems.

The two buildings that are demolished for the new east-west connection are both in a state of degeneration. One of the buildings is currently vacant.

**MINIMAL DEMOLITION**

**YELLOW: DEMOLITION FOR THE NEW EAST-WEST CONNECTION:**
A: LIDL
B: VACANT BUILDING OCCUPIED BY ‘AD HOC’
**YELLOW: DEMOLITION OF FORMER INDUSTRIAL BUILDINGS.**
Q: DEMOLITION OF A PART OF SCHIEHAL
THE 2 MAIN FRAME INTERVENTIONS
The analysis concluded that there are two missing links in the slow network main frame. The first of these missing links is the slow traffic east-west connection. Major interventions for this new connection: (see illustration 53-56)
- expropriate zone for the road from the Boo and connect Balthasar vd Polweg to the Schie
- make a pedestrian bridge over the Schie
- create an internal public street through the Schiehal
- slow traffic tunnel under rail track (combined with station!)
- demolition of two buildings
- make new connection and pedestrian bridge in west direction

The second missing link is the north-south connection along the railroad track. This will be developed simultaneously with other elements, such as the new train station, the water network and a sound barrier. The north-south connection is a canal-type boulevard for pedestrian, bike and car traffic. There are one-way streets on both sides of the canal. Buildings on the sides create functions on both sides of the main boulevard. This improves intervisibility and will have a major impact on the spatial quality of this main route (see illustration 57).
THE NEW STATION ‘DELFt SOUTH’ ON THE JUNCTION OF 
THE TWO CONNECTIONS OF THE MAIN FRAME

The accessibility of train station Delft South for slow traffic is currently very poor. This can be improved by moving the station 250 meter further to the north. That way, it will be in line with the new east-west connection, and thus linked to the cultural centre ‘Lijm&Cultuur’, the creative factory the Schiehal and the main routes of the Voorhofdreef and Balthasar vd Polweg. By way of the new pedestrian and bike bridge over the Schie, the station is also better connected to the Technical University of Delft (TU Delft).

The new station area is high permeable because it is on a junction of the main frame for slow traffic.

NOTE: building ‘B’ is of a special kind; it is both a public building and a sound barrier. The other buildings can be carried out as regular buildings because the rail track goes into a tunnel. (this development is currently being realized: Spoorzone project)

RECAPITULATION OF ALL THE DESIGN INTERVENTIONS

For realizing the two new connections for the main frame a number of design interventions should be made:
- Demolition of the industry halls with little to no architectural quality.
- A new connections for slow traffic alongside the rail track
- A new connection in east-west direction connecting the Schiehal to Lijm&Cultuur and the Technical University
- Moving the train station to the north to be on the new junction of main routes
- A new ring of canals to solve the problems with water storage. Water is also part of the main frame. It has both a structuring ability, visual quality and supplies the project location with sufficient storage capacity.

8.5 Detailed maps and sections of the design interventions

The squares in illustration 51 indicate more detailed maps of 100x100 m on scale 1:1000. Each map is combined with a profile sketch of the part of the frame. These maps and sections show how the urban design works on a more detailed level. See page 70-77.
Illustration 52. Design interventions for Schieoevers. Frames for detailed designs page 70-77.
Illustration 53. OLD situation Balthasar vd Polweg. Author.
Illustration 54. NEW situation: connection to Schiehal. Autor.
Illustration 55. OLD situation Jackes Per klaan. Author.
Illustration 56. NEW situation connection Jaques Perklaan and HermanHeyermanslaan. Author.
Illustration 57. NEW situation: new main frame boulevard alongside rail track called the ‘Spoorstraat’. Author.
Illustration 58. NEW situation: secondary frame. ‘Fabrieksstraat’ connecting ‘Spoorstraat’ and existing Schieweg. Author.
Illustration 59. Author.
An impression of the street view of an urban unit. A low urban unit would have a profile width of 14 meters and between 2 and 4 floors instead of 3 to 5 floors that can be seen in this illustration.
max 5 verdiepingen
max 4 verdiepingen

profiel is 18m
profiel is 14m

Illustration 60. The principle for plugging in. Author.
9.1 Introducing communal self-organizing development

GUIDELINES FOR SELF-ORGANIZATION [POLICY]
The guidelines for development are the result of the conditions and demands for flexible planning and the programme that is envisioned for the project location. These conditions are shaped into rules that can be supported by additional research and case studies on other projects for flexible rule-based planning. To test and refine the rules, a number of test designs should be made (research by design). The first rule already results from the external conditions of grain and permeability: the minimum and maximum size of a pore. One pore will represent one unit of development by a group that can collectively make an urban design.

COLLECTIVE DEVELOPMENT IN UNITS
In ‘Top-Noord’ there are a number of single private plots for development, but the majority of the infill of the 15 hectare of land will be developed collectively. Dutch term: Collectief Particulier Ondernemerschap (CPO). The reason for this is to enforce the social cohesion in the future neighbourhood and stimulate a democratic process of creating public space. Another advantage is that by collectively employing architects and contractors the building costs can be significantly lower. One CPO can develop one urban ‘Unit’ consisting of a number of plots. Since every unit must have a mix of functions this is often a public-private partnership (PPP). To ensure a fair collaboration between partners with more or less building potential (for instance a big commercial retail developer and a family home owner), all units must employ a building-consultancy agency for mediation and advice. The municipality can make recommendations for such agencies.

9.2 The system of plug-in-unit development

To meet the requirements for sustainable urban development there are rules for development regarding the building process, density, mixed-use, fine grain and urban form. Three of these rules are already mentioned: the development in Units, the minimum and maximum size of the units and the need to work with partners. The rules for density, street width, building height and the continuation of the street façade are all linked to the urban typology. Another rule describes how the Units should be plugged in.

PLUG IN SYSTEM OF UNITS
A unit is a pore and the surrounding streets. By linking the units to each other a street pattern is formed. So the units can be plugged in on to the main frame and on to another unit. For project location Top-Noord there are two types of units:
Plug in on main frame  medium permeable  urban  surrounding streets are 18 m wide
Plug in on other unit  low permeable  low urban  surrounding streets are 14 m wide
The surrounding streets are 18 or 14 meter wide, dependent on the urban typology, but the street profiles must be continued. This means that a street (and related building height) can be upgraded or downgraded to continue the profile (see illustration 60). Rule 5 is the rule for plugging in and the system of upgrading.

THE RULES LINKED TO THE URBAN TYPOLOGY
Rule six, seven and eight explain how density, street width, building height and the continuation of the street façade are all linked to the urban typology. It makes sense that a development at the main frame should be of a higher density. A higher density is often related to building height, and building height is related to the street width. A bit more obscure rule is about the continuation of the street façade.
Illustration 61. Testing different densities for URBAN and LOW URBAN units according to the rules for self-organization (max height, FSI, GSI, OSR and street facade continuation). Pictures range from low density to highest density. The first illustration uses the exception to rule 8. Author.
The continuation of the street façade relates to the typology of the urban form. The vitality of the street is very much dependent on the manner in which the buildings are related to the street (Jacobs, 1961 and Gehl, 2001). In the post-war modernist neighbourhoods the buildings are not linked to the street, but are freestanding slabs in a field of grass. This does not support a vital street life with shops, bars and ateliers on the ground level. To create an urban neighbourhood more similar to the historic Dutch city centres the rule for the continuation of street façade is created. The buildings must be aligned to the street. The percentage of the street that is ‘open’ is defined according to urban typology.

The relation between urban typology and rules for density and continuation of the street façade:

urban  higher densities  street width is 18 m and maximum 5 floors  street façade openings 20%
low urban  lower densities  street width is 14 m and maximum 4 floors  street façade openings 30%

To test if these rules have the desired effect a few tests where done, prior to the Games. (see illustration 61)

9.3 The ten rules for collective development:

1  Collective development in units.
2  Minimum and maximum size of the units: 0.6 and 1.5 hectare. This rule is to ensure a fine grain that can support smaller scale residential and retail development.
3  Distribution of functions. A mix of functions is guaranteed.
4  To find a balance between individual and public interests there is a rule for collaboration. To come to a democratic design of public space, to temper eccentric architectural outbursts and to stimulate social cohesion it is compulsory to find at least six partners for the development of one unit.
5  The plug in rule. The units are plugged in on to the Main Frame or to each other.
6  The rule for street width and building height according to urban typology.
7  Rules for Density according to urban typology.
8  Rule for the continuation of the street façade according to urban typology. Leading to block-typology.
9  Rule for public space.
10  Rule for temporary use.

Apart from the rules there are also recommendations on architectural aesthetics and sustainability. These are not compulsory, but some are strongly recommended. The reason for making as less rules as possible is to provide developers with the maximum amount of freedom without compromising the common interests.

9.4 Booklet A: Guidebook for self-organizing development Top-Noord Delft

Booklet A is the extract of the information that future developers need to engage in the self-organization process. In this booklet all the rules are explained step by step in relation to the moment in the development-process. Also it shortly introduces the project location. Booklet A is the main end-product for this graduation project.
The first game was organized to simulate the self-organization of the first group of developers. These pioneers could choose any location in Top-Noord. The thirteen participants (see page 85) voted on the subject and chose the corner closest to the station Delft Zuid. Because the unit is connected to the main frame, it has to apply to the rules for ‘urban units’. Author.
10.1 Recollection Game 1

GENERAL METHODOLOGY FOR GAMING

A game can be a tool for participation. The municipality can organize a game to engage the future inhabitants in the urban design of their neighbourhood. In the end this project will make a suggestion for what such a game should look like if it was to be used to actually execute this graduation project in real life. However, in the process for this graduation project it was used as a tool to simulate a self-organization process. The participants play the role of persons who want to engage in the self-organizing development.

Three GAMES were organized. The first represented the pioneering group of people that creates the first unit of development. This will be a group with little or no experience in the field of urban planning to test if the rules are easy to work with. The role of the architect they have hired to make their communal urban design is crucial because this person is the mediator between the municipality and its rules for development and the civilians. In the games I played the role of the municipality that has to supervise the process. The second game simulated the creation and linking of multiple units for development. In this game it was important to see if developers can find partners to work with in order to make a communal plan for development. The third game started where the second had ended and filled in the project location Top-Noord. All roles were representatives of an already formed group. In this game the rules for plugging in and linking the units, creating public space and forming the secondary street pattern were tested.

All GAMES have the following composition:
- an introduction by the municipal representative on the location and the rules
- each participant picks a role
- the participants find partners if possible or necessary
- the participants pick a location for their house or unit and make a suggestion for design
- the initial design is tested if it fits all the rules
- the design should be adapted to fit the rules and to collaborate with its neighbours
- the final design is approved or rejected by the municipality

THE COURSE OF GAME 1

The first Game was to simulate the development of the first unit (see illustration 62). The participants had little or no affinity with urban planning and design. They played the roles of small or larger parties that together could develop the minimum size unit of 0.4 ha (excl roads). Illustration 63 on page 84 shows the course of the first Game from introduction to end result. In the first Game there were thirteen participants. They could all pick one role. On the back of their name-tag, mentioning their role, the demands of this particular role were stipulated. Ranging from a preferred location at the main street, a garden next to the municipalities park, to the norm for parking. One role was that of the architect. He or she was the middle man between the municipality (me) and the civilians. The architect advised how to solve parking problems, design issues or mediated in conflicting interests. Next to the architect there where three roles representing a group of people. These where the senior-dwellings, the ‘woningbouwcorporatie’ and the ‘starterswoningen’. The other roles where individual private developers. The list of the 13 roles can be found on page 85.
Illustration 63. The Course of the first Game for Self-organization of a Unit. Author
**The Roles in Game 1**

<table>
<thead>
<tr>
<th>People</th>
<th>Roles</th>
<th>Surface bvo</th>
<th>Opp bvo total</th>
<th>Parking norm +Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gwen</td>
<td>The architect</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2 Tine</td>
<td>woningbouwcorporatie</td>
<td>13x60 + 6x90</td>
<td>1320 m²</td>
<td>1.7</td>
</tr>
<tr>
<td>3 Tante Tini</td>
<td>Seniorendwellings</td>
<td>17x60 =</td>
<td>1020 m²</td>
<td>0.6</td>
</tr>
<tr>
<td>4 Jasmien</td>
<td>Startersdwelling(en)</td>
<td>19x60</td>
<td>1140 m²</td>
<td>1.7</td>
</tr>
<tr>
<td>5 Danielle</td>
<td>Studentshuis</td>
<td>3x80 = 240 m²</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>6 Babs</td>
<td>Large familydwelling</td>
<td>3x96 = 288 m²</td>
<td>1.7</td>
<td>= parking on private ground so</td>
</tr>
<tr>
<td>7 Alena</td>
<td>Large familydwelling</td>
<td>3x96 = 288 m²</td>
<td>1.7</td>
<td>don’t calculate</td>
</tr>
<tr>
<td>8 Marietta</td>
<td>Large familydwelling</td>
<td>3x96 = 288 m²</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nog 2 familydwellings</td>
<td>6x96 = 576 m²</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Small companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Hans</td>
<td>Woon/werk Cafe</td>
<td>96 werk en 96 m2 bvo dwelling</td>
<td>1.7 &amp;3</td>
<td>4.5</td>
</tr>
<tr>
<td>10 Dick</td>
<td>Woon/werk platenzaak</td>
<td>Werk 90 woon: 90 m2 bvo</td>
<td>1.7 &amp;2</td>
<td>2.3</td>
</tr>
<tr>
<td>Large companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 ZhenZhen</td>
<td>Dansstudio</td>
<td>4x80= 320 m2</td>
<td>2-3</td>
<td>10</td>
</tr>
<tr>
<td>12 Koosje</td>
<td>Kantoor (architecten)</td>
<td>5x96= 480 m2</td>
<td>2.5-3</td>
<td>14</td>
</tr>
<tr>
<td>13 Ingrid</td>
<td>Bed &amp; breakfast</td>
<td>240 m2 in model (= ca 9 rooms) (above = dwelling)</td>
<td>0.5-1.5 per kamer.</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>één blokje in model = niet gedefinieerd:</td>
<td>3x80= 240 m2 bvo</td>
<td>1.7</td>
<td>4</td>
</tr>
</tbody>
</table>

TOTAL companies = 1130 m² bvo
TOTAL dwelling surface area (bvo) = 5346 m² bvo en ca. 55 dwellings
93,5 parking lots needed for these dwellings and companies

### 10.2 Conclusions of Game 1

The first Game resulted in 3 options for a final result:
- a design with the communal garden on a parking garage on ground level.
- a design with a parking-basement under the buildings and an additional folly in the central public courtyard.
- a design with a parking-basement under the buildings and a large public courtyard on ground level.

pages 86 to 91 describe the three models and calculate the differences in density, parking facilities and green facilities according to the Guidelines for self-organization.

*For the guidelines for self-organization (including the requirements for density) see booklet A.*
Illustration 64. Option 1: public courtyard on parking garage ground level. Author
**OPTION 1: INNER COURT YARD ABOVE PARKING GARAGE ON GROUND FLOOR.**
This is difficult because of too few parking places. Otherwise it is a good model.

In short:
- Parking on ground level. 60 places = too few because 100 are needed
- Large inner courtyard (920 m²) on top of parking garage
- Density is ok
- Average of 39 m² green per dwelling. Green = garden, roof terrace and public green courtyard.

The blocks:
- 2 small companies/3 large companies (larger than 100 m²). Total bvo companies is 1130 m².
- 5 large family homes with parking on private ground: each 240 m² bvo
- Student house 240 m² bvo. Parking norm is 0.3
- Total senior-dwellings (Dutch: “seniorenwoningen”) 960 m² bvo. Parking norm is 0.6
- The rest is 3682 m² bvo dwellings with a parking norm of 1.7

Calculation Parking:
- 63 places dwellings + 6 places senior and students + 10 bed&breakfast + 21 for other companies = 100 parking places (dwellings eastside have parking on private grounds).
- Parking garage ground level: 60 places = not enough

Calculation Density
- Plan area = 64x64 + hoh roads = 4096 + 2960m² = 7056 m²
- Bvo total = 7212 m²
- Footprint = 1620 m² (incl overhanging: 1800 m²)
- FSI = 1.00 = OK
- GSI = 23 % = OK, but rather low
- OSR = 0.75 = OK

Calculation Gardens
- 1x80 + 116 (terrace south) + 120 (terrace north) + 5x60 (roof terraces) + 5x80 (large gardens) = 1016 m² private
- 921,6 m² public green
- Total is 1937,6 m² green. This is about 26 dwellings with 75 m² green per dwelling.
Illustration 65. Option 2: parking under buildings and folly in courtyard. Author
OPTION 2: BUILDING IN COURTYARD AND PARKING IN BASEMENT

The density is not extremely high because the edges could build higher. Building higher would be better than building in the courtyard because it creates more high quality public space. On top of that the family dwellings should lose their view. This option, like the first model, does not supply enough parking places.

In short:
• Basement Parking under edges buildings. 60 places = too few because 111 places are needed. (This is more than option 1 because there are also more dwellings)
• Inner courtyard (800 m2)
• Density is ok, but the buildings in the inner courtyard are not needed
• Total 36 m2 green per dwelling (garden/roof terrace or public green) = few?

The blocks:
• 2 small companies / 3 large companies (above 100m2), total bvo companies 1130 m2
• 5 large family dwellings with parking on private ground, each 240 m2 bvo
• Student house 240 m2 bvo with parking norm 0.3
• Total senior dwellings 960 m2 bvo with parking norm 0.6
• The rest is 4342 m2 bvo dwellings with parking norm 1.7

Parking:
• 74 places dwellings + 6 places senior and students + 10 b&b + 21 for other large companies = 111 parking places (dwellings east side have parking on private ground)
• Parking garage under edges dwellings: 60 places = to few
• Possibility: expand parking under inner courtyard

Calculation Density
• Plan area = 64x64 + hoh roads = 4096 + 2960m2 = 7056 m2
• Bvo total = 7932 m2
• Footprint = 1878 m2 note: was more, ca. 2100 m2
• FSI = 1.12 = OK
• GSI = 28% = OK
• OSR = 0.64 = OK

Gardens
• 1x80 + 116 (terrace south) + 120 (terrace north) + 5x 60 (roof terraces) + 5x80 (large gardens) = 1016 m2 private
• 921.6 – 120 = 801.6 m2 public green
• Total is 1817.6 m2 green. That is ca. 36 m2 green per dwelling
Illustration 66. Option 3: public courtyard on ground level and parking garage in basement under buildings. Author
**OPTION 3: PARKING UNDER GROUND AND LOWER DENSITY**

Under de dwellings and inner courtyard is a large parking garage. The inner courtyard is on ground level. Less dwellings and more roof terraces. The average green is 60 m² per dwelling.

In short:
- Parking under edges buildings and under courtyard. 120 places = enough
- Inner courtyard (920 m²) on top of parking garage
- Density is low, but ok
- Total 60 m² green per dwelling (garden/roof terrace or public green) = a lot

The blocks:
- 2 small companies / 3 large companies (more than 100m²), total bvo companies 1130 m²
- 5 large family dwellings with parking on private ground, each 240 m² bvo
- Student house 240 m² bvo with parking norm 0.3
- Total senior dwellings 960 m² bvo with parking norm 0.6
- The rest is 2950 m² bvo dwellings with parking norm 1.7

Calculation Density
- Plan area = 64x64 + hoh roads = 4096 + 2960m² = 7056 m²
- Bvo total = 6480 m²
- Footprint = 1590 m²
- FSI = 0.9 = OK
- GSI = 23% = OK, but low
- OSR = 0.85 = OK

Gardens
- 1x80 + 116 (terrace south) + 120 (terrace north) + 5x 60 (roof terraces) + 5x80 (large gardens) + 7x60 (extra roof terrace) = 1436 m² private green
- 921,6 m² public green
- Total is 2357,6 m² green. That is ca 60 m² green per dwelling = OK

final model is the model according to option 1
- Bvo total = 7272 m²
- Footprint = 1650 m²
- FSI = 1.0 = OK
- GSI = 23% = OK, but low
- OSR = 0.75 = OK
- Parking garage under edges dwellings: 60 places = to few because 111 are needed
Illustration 67. The Course of the second Game for self-organization of multiple units. Author
11.1 Recollection of Game 1

**Method Game 2**
The second game simulates the creation and linking of multiple units for development. In this game it is important to see if developers can find partners to work with in order to make a communal plan for development. The third game starts where the second has ended and fills in the project location Top-Noord. As a result of this game the rules for the number of participants changed. When the game was played the rule stipulated five participants per hectare. This was too difficult because at the stage of finding partners you don’t know exactly how big the unit will be. The size of the unit results from the number of participants. On top of that this game initiated the notion that project developers can also participate in development, as long as they have partners. Illustration 67 shows the course of game 2.

11.2 Conclusions Game 2 Calculation of the four new units that resulted from game 2

Game 1 resulted in one unit. The roles of game 2 resulted in four collaborations, so four units. In total now 5 units are filled. The two units at the main street and the rail track (main frame) are URBAN and the other three are SUBURBAN. These have a lower density and don’t need to be a closed block.

**Unit 1, result of Game 1:** URBAN
- Representative senior dwellings
- Café
- Bed & breakfast
- Fitness studio
- Record shop
- Student dwelling
- 5 Family dwellings
- Representative starter dwellings
- Dwelling ‘Building corporation’

**Collaboration unit 2:** LOW URBAN
- Hippie community restaurant
- Gwen
- Hippie community dwellings
- “
- Hippie community theater
- “
- Hippie community shop
- “
- CPO for 20 dwellings
- Jose

• The hippie community could develop an unit on its own, but wanted a location on the eastside at the water. The CPO which could not fill a unit on its own wanted a corner location so the hippie community could connect to this. This way the collaboration was born.

• The calculations for the min/max building height, the gsi and the openings in the street façade were inside the margin, so the unit was approved.

• But is it allowed to see the hippies as multiple participants?

• **Calculation:**
  o Step 1: building height: 2-4 floors is ok
  o Step 2: GSI = 3056+84-256=2884 ; 2884/11900 (unit area) = .24 is ok
Illustration 68. The result of the second Game: the flags indicate if the development fits the rules. Author
Step 3: street façade openings. Long side 150m, opening is 30m< 45m. Short side is 60m. 15m<18m. ok
Step 4: spacemate calculation fsi= .73 is ok (0.75 is the max for low urban units.)
(OSR is 1.04)

Collaboration unit3: URBAN
- Elementary school
- Student club collective
- Autonomous builder: furniture maker
- Autonomous builder: bookshop
- Large developer: Albert Hein
- Small collective: 6 families with small children

Tine
Rolf
Sven
Birgit
Alena
Floris

- Not allowed because the total result does not fit 50% living and the GSI is too high
- Solution: this could be solved by building in partnership on top of the Albert Hein, and developing a bigger unit with more open space. In this case the unit split up into two separate units with other partners in Game 3.

Calculation:
- Step1: building height: 3-4 floors is. School and Albert Hein are too low
- Step 2: GSI = footprint 5152/10094 (unit area)= .51. This is too high!
- Step 3: street façade openings. Long side 85m, opening is 10m<17m. Short side is 80m. 15m<16m. ok
- Step 4: spacemate calculation fsi= (5000+1300+875+3000)/10094 = 1.01 ok for urban units

Collaboration unit4: LOW URBAN
- 3 types senior dwellings + community centre

Elbert&Thomas

- Not allowed in case of project developers. Number of participants less than 6.
- Solution: Seniors have to form collectives.

Calculation:
- Step1: building height: 2-4 floors is ok
- Step 2: GSI = footprint 3111/11900 (unit area)= .26 is ok
- Step 3: street façade openings. Long side 150m, opening is 45m=45m. Short side is 60m. 10m<18m. ok
- Step 4: spacemate calculation fsi= .78 is a bit too high. 0.75 is the max for low urban units.
Solution: lower a couple of dwellings.

Collaboration unit5: LOW URBAN
- Large developer: garden centre
- Duwo: temporal student dwellings

Elbert
Thomas

- Not allowed. Number of participants less than six.

Individual plots alongside Schie (are not units!):
- Villa rich old man with horse stable
- Villa large family with children (at the bridge)
- Villa riche family
- Villa lawyer’s office

Elbert
Thomas
Floris
Thomas
Illustration 69. The Course of the third Game for self-organization of multiple units; filling Top-Noord. Author
12.1 Recollection of Game 3

**METHODS FOR GAME 3**
The third game starts where the second has ended and fills in the project location Top-Noord. All roles are representatives of an already formed group. That way the step of finding partners can be skipped. In this game the rules for plugging in and linking the units, creating public space and forming the secondary street pattern, are tested.

**THE COURSE OF GAME 3**
Illustration 69 shows the course of this game. First the 2 units of game 2 that did not comply with the rules had to be removed. This means there were three units left from Game 1 and Game 2. At that time the representatives of the four new units pick a location and make an initial design. During the process I asked them to think about a non-orthogonal street pattern. Unit ‘5’ and ‘6’ were already finished, but unit ‘4’ and ‘7’ decided to curve their form. Unit ‘5’ decided to keep the temporary use of the urban farm and linked this to the function of the primary school. When the initial designs of the units were formed I asked where they would prefer the public space to be, in what form and functions. The middle seemed the most logical point, because it is accessible for all units. The Westerpark in Amsterdam was mentioned as a reference because of its mix of functions in the park. All people can enjoy it all day.

The four representative roles of Game3:

* **Alena: Representative UNIT 4: min. size 0.6 ha / SUBURBAN / cooperation of:**
  - Elementary school incl. play ground: 4000 m2 bvo (preferably not at the main street)
  - Day care center (preferably not at the main street)
  - 5 family collective with small children
  - Project developer for the realisation of the remaining (ca. 30) dwellings
  (50% has to be for housing purposes. Total housing area ca. 4300 m2 bvo spread over 3-5 floors)

* **Laura: Representative UNIT 5: min. size 0.6 ha / URBAN / cooperation of:**
  - Autonomous builder: record shop (preferably at the main street)
  - Autonomous builder: late night shop (preferably at the main street)
  - Autonomous builder: tattoo shop (preferably at the main street)
  - Autonomous builder: cafe ca. 1000 m2 bvo (preferably at the main street)
  - Bank location, only cash dispenser (preferably at the main street)
  - Collective 10 starter dwellings (upper layer with roof terrace)
  - Project developer for the realisation of the remaining dwellings above the shops and on the other side of the unit.
  (50% has to be for housing purposes)
Illustration 70. Example composition of unit 7. Author
* Gwen: Representative UNIT 6: min. size 0.6 ha / URBAN / collaboration of:

- Autonomous builder: Albert Hein, 1000 m2 bvo (preferably opposite to the Gamma store)
- Autonomous builder: shop/atelier furniture maker (preferably at the main street)
- Autonomous builder: bookshop (preferably at the main street)
- Autonomous builder: print shop, ca. 1000 m2 bvo (preferably at the main street)
- Project developer for the realisation of the remaining dwellings above the shops and on the other side of the unit.
(50% has to be for housing purposes)

* Marjolijn: Representative UNIT 7: size 1 ha / (SUB)URBAN / collaboration of:

- Student rowing club, incl. pavillon (preferably at the Schie bank)
- DUWO wants to create a number of student dwellings
- Fitness studio with dwellings on top
- Day care centre --> changed to animal shelter (day care is combined with elementary school)
- Project developer realizes 7 luxurious detached dwellings

* Attention: this unit could give inconvenience due to the rowing club. Choose right spot.

Illustration 70 shows the different participants and design of unit 7 by Marjolijn.

12.2 Conclusions Game3

After the 3rd Game ‘Top Noord’ is still not completely filled in. Games 1-3 have lead to seven Units and one unit for public space. The ninth unit is a simple square of the minimum allowed size. This can easily be promoted by the municipality. The last (10th) unit can be one large unit that follows the curved form of the park. Or it can be 1 standard minimal sized and one even smaller unit. According to the rule for leftover space, a unit can be smaller than the minimum size. The municipality could make example designs to promote the development of the last units. Until that time temporary uses can be found for the remaining spaces. The participants helped with brainstorming on what these temporary functions could be

Temporary uses of the leftover spaces could be:
- DUWO student boxes: temporal dwellings
- Urban agriculture place
- Festival area / ice-skate ring
- Soccer field
- Camping
- Large natural play garden

Illustrations 71 and 72 on the next pages show the final result of all the three Games.
Illustration 71. This collage shows the course of all the Games and the final end-result.

GAME 1
- remove two units

GAME 2
- do units follow rules?
- keep temporary use?

GAME 3
- keep urban farm
- public park

END GAME 3:
- options to fill the leftover space:

OPTION 1
OPTION 2
Illustration 72.
Four views of public space. **Top left:** an inner courtyard in a unit. **Top Right:** view on the trees alongside the canal. The main boulevard is the largest public shopping street. **Bottom left:** view on the public park. **Bottom right:** view of the urban agriculture. This used to be a temporary use, but was adopted by the primary school. Author.
The municipalities of the Randstad need to densify within the municipal borders. They could benefit from the strategy ‘framework for flexible planning’. For example the former Industry area ‘Houthavens’ in Amsterdam could be developed by communal self-organization. To apply the strategy to this project location a ‘tabula rasa’ is not necessary. Existing features such as roads, buildings or trees can be taken into account. Dependent on the size of the project location an amount of units can be developed. Development of a small location can also exist of only one unit, for example the one in Schiedam. Author.
13.1 Reflection on the graduation project

Conclusions regarding the research
A note of criticism regarding the research is that the terminology (permeability/main frame/slow network/fast network/secondary frame/pores etc) can be confusing. They are valuable definitions for the research, because they define a concept more precise, but should be converted into more common language when used in planning practice. This means that booklet A and booklet B should be reviewed and adapted accordingly.

Conclusions regarding the design
A design is very much location specific. I do believe that more generic rules for development can be stipulated, but actual design interventions cannot be predefined. The review of the ‘quality’ of a design is always subjective. Therefore I leave the review of the main-frame design interventions for Delft to others. However, the strategy of using urban acupuncture interventions to repair/add the missing links in a main frame structure could be applicable to many locations.

Conclusions regarding the rules
Though the ten rules and the additional recommendations for development make a starting point for developing a more flexible strategy of Dutch municipal planning, it is not the ultimate solution. For instance the recommendation on the distribution of functions in a unit is founded more on a notion than on actual research-data. This is partly because specific data is more difficult to find. Today almost everybody agrees that mono functional areas are not desirable, but the exact figures on an ultimate mix of functions do not exist (though research is currently being done on the subject). For instance in rule 3, distribution of functions, a minimum of 30 m2 ‘green’ is stipulated. This estimation is based more on the results of Game 1, than actual data. The minimum of 50% and maximum of 80% dwelling-function per unit is based more on the programme of demands that Delft made for this project location than on research. This indicates that for other locations the rules would have to be adapted. Also rule 7, that sets the margins for density, is dependent on the type of development a municipality envisions for a certain project location. Though some rules are very much related to the specific project locations, research can also be found on more generic qualities of healthy and pleasant living environment. Two qualities that seem to find their way into a lot of different sources of research are a fine grain and mix use urban environments. However a simple definition of mix-use (as it is in the current gebiedsvisie Blaauw) does not suffice. “Elaborations must be offered taking into consideration notions of scale, grain, intensity of use, pedestrian experience, the disposition and nature of uses, definition of public and private, conflict and security.”(Roberts & Lloyd-Jones, 1997: 149) Another rule that I have confidence in is the rule for collaboration. Apart from significantly strengthening the social structure of the neighbourhood, it can lower the costs for private developers and prevent extreme eccentric architectural designs of individual participants. If more property owners are involved, the public realm is created by a democratic process. Many classic examples of fine grained mix use urban environments are actually owned by such a public private consortium. (Roberts & Lloyd-Jones, 1996) Meaning that the strategy fits the goal for the end-result.

Conclusions regarding the games
As a result of the second game the rules for the number of participants changed. When the game was played the rule stipulated five participants per hectare. This was too difficult because at the stage of finding partners you don’t know exactly how big the unit will be. The size of the unit results from the number of participants. On top of that this game initiated the notion that project developers can also participate in development, as long as they have private partners in development.
Finally I would like to include some comments of the participants of the Games: (freely translated in English)

- “I have the feeling that there are a lot of rules, and this limits the creativity.”
- “The identity of the units that will become separate little neighbourhoods can be very different. Though they are all located on one street. But on the other hand... this is not necessarily a bad thing.”
- “I really liked it! I feel very much involved as an inhabitant of this neighbourhood.
- “If this were a real project I would join it.”
- “Maybe there is a need for guiding more specifically to an urban typology.”
- As reaction on this last comment: “No, the opposite! I think there should be less steering into a certain direction of urban typology. I think you (meaning me playing the role of the municipality of Delft) unconsciously steer us in a certain direction.”
- “I agree. The rule for the continuation of the street facade is very deciding for the urban form. But I do believe that the urban block typology is a very good urban form.”
- “I think the project is very do-able for people with no professional experience in urban planning”
- “I found the whole process much easier than I expected. Also there was not a lot of conflict when we played the game.”
- “Maybe there can be some exceptions for the rule for building height: what if an architect wants to build a landmark of some sort?”
- “The finding of partners for development is more difficult than the actual collaboration.”

13.2 Recommendations

In the preface it was mentioned that this graduation project does not aim to result in a waterproof method for flexible planning, but to simply draw some lessons from it. Hopefully these lessons can accelerate the first step towards more research and implementation of flexible strategies in Dutch planning practice. In order to define the next steps that could be taken in this direction, a number of recommendations can be made.

**Recommendation regarding the rules for development**

What could be the next step is more specific research on densities, urban form and the distribution of functions that support a healthy safe and vital urban environment. Also the rules regarding size, use and implementation of public space should be given additional attention.

If this strategy for flexible planning where to be executed on another location, some of the rules would need to be revised or at least reviewed before putting them into practice. Especially regarding the density and distribution of functions, which are dependent on the program of demands of the municipality. In booklet B an attempt is made to indicate which rules should be reviewed before implementing them (though the generic process for flexible planning is the focus point, see 13.3).

**Recommendation for finding project locations**

Not all locations are suitable for residential purposes, but the grain and permeability can be improved by means of some design interventions. Only locations close to heavy industry or locations that suffer from extreme nuisance due to air traffic, a highway or a rail track can prove to be unsuitable for ‘flexible development’. This project for Delft was a large Tabula-rasa area, but this does not have to be the case. Existing features such as buildings, trees,
water or valuable public space can be interwoven with the design of the individual units. (see illustration 73 on page 103) To find possible project locations the function of the cities ‘pores’ can be mapped. Where a pore has no function, it can be considered for development. The number of units is variable, even one unit can be developed if the project location is small.

**Recommendation regarding the price of building grounds**

The Dutch policy of ‘bundled deconcentration’ caused the prices of building land to rise to exorbitant proportions and this is one of the factors that make private bottom-up entrepreneurship difficult (Weber & Vanstiphout, 1998). An alternative to the standard system is to remove the ‘residuele grondwaarde’ (the price of the building-ground related to the sale-value of the building) and work with a standard price per square meter. An example of a developed project that used this standard price for building ground is ‘Roombeek’ in Enschede. Roombeek is a Dutch Neighborhood that experimented with a more flexible approach on planning. In Roombeek the price for building ground was linked to an urban typology. Because the urban typology defines the (prime) location and possibilities for development it can be linked to a standard price per square meter. This price can be defined by comparing similar locations and prices (Kuenzli & Lengkeek, 2004). For this project the price of building ground can also be linked to urban typology. However this could make it necessary to create more than two three types of urban typology, because within one category there is still too much difference in ground price.

**Recommendation regarding the terminology**

Some of the terminology (such as permeability/main frame/secondary frame/pores) should be converted into more common language when used in planning practice.

**Recommendation for additional research**

Additional research, like for instance a phd-study, can be made. Research on the process of self-organization and how games can contribute to this would be valuable. But the main topic that needs more specific research is the rules for development. Especially to support some of the assumptions that are now made regarding the rules.

### 13.3 Booklet B: general policy protocol for flexible planning

Last but not least an attempt to create a more general applicable approach for flexible planning is made. The information about the project case of Schieoevers Delft is filtered out. Booklet B is an extract of this graduation project intended for municipalities that would be interested to start a project for flexible planning. It describes the methods of analysis, design interventions and the process for self-organization from the standpoint of a Dutch municipality.
REFERENCES


MEYER, H., WESTRIK, J., & HOEKSTRA, M.,2008, Stedenbouwkundige regels voor het bouwen. Amsterdam (Neth.): SUN


Anon, (2010). In some ways, cities are like elephants: they get more economical with size. But as scientists apply metabolism to the metropolis, they are uncovering the surprising paradoxes of urban growth. The Living City § Seedsmagazine.com, [Online] 3 May. Available at: http://seedsmagazine.com/content/print/the_living_city/ [Accessed on 3 May 2010]

Municipal Documents (author Anonymous):
- Bestemmingsplan Spoorzone. By Gemeente Delft. 2005
A flexible city plan, or design, is able to react to changes without compromising a sustainable future.

Bestemmingsplan is the legally binding policy that defines local land use. Sometimes it is very detailed and all the plots and its functions will be defined and sometimes it leaves larger areas for different functions. The street pattern is always clearly defined. It is quite uncommon that citizens will buy their own lot in a large urban (master) plan.

Bottom-up is the opposite of top-down. Urban development is initiated by Civilians instead of urban designers and planners. Often these are not spatial strategies but social policy strategies. Butterfly effect is a popular term to describe the effect of how a small change influences the whole complex system.

‘Collectief Particulier Underneemerschap’ (CPO) is a form of collective private development and it is being used to build new groups of houses or renovate existing houses. The CPO can hire an architect and contractor as a group. Collective entrepreneurship and development is a good basis for small scale mix use, but also a way to achieve social cohesion.

Complexity theory deals with complex and sometimes even chaotic systems, and aims to determine this system by understanding the relationships between the different components. In a complex system the components and interconnections are so numerous that it becomes very difficult to unravel. The density of connections can cause a small change to effect the whole system.

Creative Class refers to the enterprising, wealthy, creative middle class of western societies. Apart from the working-class and service industry there are a group of people that can be classified according to their creative profession and individuality in their personal lives. Architects, engineers and designers are members of the creative class. (Florida, 2002)

Densification is an urban regeneration strategy where more buildings are added to the existing housing stock to increase the density. This can mean the densification of one block, one neighbourhood or the densification of a city.

Emergence is the unpredictable occurrence of phenomena in a complex system.

Fine grain of the urban tissue relates to the size of urban block or plots. If city blocks and plots are small, the uses can be mixed more with a more fine grain than if plots are big. A fine grain is generally considered as a condition for sustainable mix-use living and ‘vitality’ of the urban life (Jacobs, 1961; Gehl).

Flexible city planning: strategic urban planning that leaves space for self-organization (bottom-up) while safeguarding a sustainable future by guiding development (top-down). This definition refers to planning process.

GAMES are used to involve civilians in the planning process, or simulate this self-organization process. In a simulation GAME the participants play a role that provides them with certain wishes and demands. According to this role they play the game within the rules that are given.

Grain refers to the size of the pores. A fine grain, small pores, supports small scale mix use development.

Main frame is the city’s main continuous and integrated routes. These often coincide with concentrations of economic activity and high level of activity. The main frame consists of carriers of slow traffic (the streets used for slow traffic and the water/green structure) and barriers of slow traffic (the water network, highways and train tracks). The pores that are connected to this main frame are well accessible; have a high permeability.

Mix use is used in relation to urban planning it denotes a diverse distribution of functions in the urban environment. For instance the city centre of Delft people often live, work, recreate and shop within a radius of a few hundred meters. This indicated that the term is closely related to a smaller scale or ‘fine grain’.

Pedestrian realm is the complete network of public accessible space for pedestrians. In the Netherlands this is basically the public realm minus the highways and other fast networks.

Permeability, in this graduation project, means the accessibility of a Pore for slow traffic. It is defined by the connection to the slow network main frame. If it is on a junction of main the main frame, i.e. route, it is high permeable, if it is once connected to the main frame it is medium permeable and if it is not connected to the main frame it is low permeable.

Plot, or lot, is a piece of land owned by one owner (or more in vertical direction). Dutch: kavel.

Policy framework refers to the rules that are necessary to guide the self-organization.
- **Porosity** is the ratio between the urban tissue (the pores) and the network of flows (the frame). A fine grain corresponds to a high porosity.
- **Public realm** is the complete network of public accessible space. This is the white space in the famous map of Nolli in illustration 7 on page 13.
- **Self organization** is the intrinsic ability of open and complex systems to organize their own internal structure (Portugali, 2000; Zamenopoulos, 2010). When used as a planning strategy it can be regarded as bottom-up.
- **Slow network** is the routes for slow traffic, bike and pedestrian and the water network. The slow and fast network strategy is a concept by Tjallingii (2005). The slow network can be the carrier of low dynamic use such as recreation and residential purposes. The Fast Network, routes for car and train, are more suitable for high dynamic use. (Tjallingii, 2005) In this graduation project the slow network main frame is what defines permeability.
- **Slow Network Oriented Development (SNOD)** describes what conditions are needed for the slow network frame to support an infill of emerging small scale, mix-use, and pedestrian based development. These conditions include compactness, mix-use, fine grain and permeability. SNOD is actually a Dutch extended version of ‘Transit Oriented Development’ (TOD).
- **Spatial framework** refers to the main frame that is the supporting spatial structure for self-organization.
- **Starchitect** is a word-play for a very famous architect. For example Rem Koolhaas is sometimes called a starchitect. Sometimes it is implied that such an architect is a bit arrogant as well.
- **Structuurvisie**: a plan with little legal meaning, but which can help the municipality to communicate its vision on spatial development.
- **Sustainability** literally means that something ‘sustains’ or persists’, but it actually refers to characteristics we desire to arrive at (Costanza & Patten, 1995). Preserving something for future generations is actually the most basic definition of ‘sustainability’.
- **Top-down planning** is the traditional directive planning initiated by planners or designers that has been the norm in the Netherlands for the last century. In top down planner (future) user of the urban environment has no influence. Total frame is the complete network of public space, also sometimes referred to as the public realm.
- **Transit Joint Development (TJD)** is a public-private partnership to develop real estate near transit nodes.
- **Transit Oriented Development (TOD)** is the creation of compact, pedestrian based mix-use communities around high quality train or light rail systems.
- **Urban acupuncture** is a strategy for urban design and planning in which a small intervention causes a bigger effect, for instance on the whole neighbourhood or city.
- **Urban regeneration** (also sometimes referred to as urban renewal) basically means that planners should not focus anymore on expanding cities into the surrounding landscape, but focus on improving it inside the municipal borders. Any strategy that aims to tackle problems in an urban environment, being cities as well as smaller towns and villages, with a longer term strategic purpose in mind can be called urban regeneration. Definition by Robert and Sykes: “comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change” (2000: 17).
- **Urban sprawl**, or suburban sprawl, is when the city spreads to its outskirts where it results in low-density car-dependant neighborhoods.
- **Urban Vitality** is “the intensity and diversity of pedestrian-based activity in the public realm and the pattern of such activity over time” (Roberts & Lloyd-Jones, 1997: 150).
- **Zoning plans** are plans in which the urban structure is separated into zones of predefined functions such as working, living and leisure. This kind of urban planning was very popular in the mid 20th century, but a ‘Bestemmingsplan’ is also an example of a zoning plan.
Organizing Complex Cities

Spatial framework for flexible urban planning and design

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Abstract – The paradox in ‘planning for complex cities’ lies in planning being an act of controlling and a complex system being unpredictable. (Abbott, 2005) The inability of some urban structure’s to react to change together with the inflexible urban planning policy responsible for this, causes an unsustainable and harmful trend of demolition. We need new planning tools for flexible urban regeneration. The city can be considered as a complex system in which emergent phenomena arise by self-organization. However to create a ‘sense of a whole’ and safeguard a sustainable future, organization is needed. The balance between regulation and freedom can be approached by finding the main spatial elements that can organize the complex city. While the views vary, there is a common denominator; spatial elements that carry or block flows of people are the main structuring elements. These carriers and barriers for flows of people constitute a main and secondary urban frame. A strategy for flexible urban regeneration could be to match these to the corresponding land use patterns. The future step is to find the optimal conditions for a flexible urban pattern on street level.

Key words – complexity; urban regeneration; spatial elements; urban web; flexible urban structure; self-organization; regulation; new planning tools; urban frame and pattern;

1 Introduction: A lack of flexibility in urban design and governance

The title of this paper, ‘Organizing Complex Cities’, is somewhat paradoxical because organizing means applying structure, but an intrinsic quality of complexity is that it is impossible to plan or predict. (Abbott, 2005) This is the main difficulty for today’s urban planning which changes very fast due to technological, social and economical developments. So while urban planning has to respond to uncertainty it is in itself an act of controlling and creating boundaries for future development. (Abbott, 2005) These future developments in urban planning will not be creating new towns or expanding cities, but regenerating the urban environment.

Urban regeneration is a comprehensive and integrated vision and action which leads to the resolution of urban problems and … lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change.” (Robert & Sykes, 2000: 17) A similar term is urban renewal. Though the emphasize sometimes lies more in replacing instead of repairing the urban environment.
existing urban environment. (Robert and Sykes, 2000) Apart from the major Dutch cities, which need densification, most urban settlements will shrink in population. (de Jong and van Duin) Both require new urban planning tools for an adaptable and flexible city environment. The difficulty is the balance between regulation and deregulation. With not enough complexity the city is dead, but complexity without organization leads to chaos (Salingaros, 2005)

1.1 Demolition trend in urban regeneration

The inability of urban structure to adapt to change has caused a demolition trend in urban renewal. Over the last decade urban renewal shifted from a focus on demolition of degenerated housing, to maintenance, repair, and improvement of the urban environment. (Priemus & Metselaar, 1993) However there is still a significant increase in the demolition of the social housing stock. (Thompson, 2004) Apart from this being a very unsustainable approach because of the loss of energy it also creates a housing shortage for the poor. Demolition as an urban regeneration strategy does not solve the problems of neighbourhoods with a high level of socio-economic problems, but only moves them. (Thompson, 2004) The reason there is no adequate answer for problematic neighbourhoods can be attributed to lack of flexibility in two areas; design and governance.

1.2 Inflexibility in urban design and governance

The typical problematic neighbourhoods, called ‘probleemwijken’ in Dutch, can often be recognized by spatial urban structures and architecture of modernism. These designs do not support a healthy liveable city and are not adaptable to change because the answer to complexity was separation and fragmentation. (Jacobs, 1961; Secchi, 2007) Architects and planners who obsessed with visual simplicity which diminished urban complexity. (Salingaros, 2005) But time has shown that in the urban environment less is not more. The simplification of the urban environment has lead to a poverty of urban life.

This being said, the demolition trend extends to urban structures that have proven to be very adaptable. For instance the former working-class neighbourhoods the Jordaan and the Pijp in Amsterdam where almost demolished in the late seventies. Now they rank among the most popular and liveable areas of the city. Jane Jacobs (1961) noticed in her famous book *The Death and Life of Great American Cities* that often neighbourhoods where discarded as ‘slums’ while the spatial structure was very promising and offered enough options for street life. This can be attributed to a lack of vision and flexibility in governance. Apart from the narcissistic tendencies of planners and architects described by Jacobs (1961), policy and the traditional zoning plans are often too rigid to support individual entrepreneurship. (Tan, 2009) Today’s planning is fixated on large-scale interventions, and does not allow spontaneous evolution which is necessary to adapt to change. (Secchi, 2007:)

1.3 Structure of the paper and reviewed literature

The main problem concerning planning and designing for today’s complex city is the inability to adapt. In order to establish how urban planning and urban design should react to this side effect of complexity, it is necessary to first discuss how this discipline is linked to general complexity theories. Therefore Section 2 matches Manson’s general review of complexity to work by Zamenopoulos, Hillier, Batty and Salingaros. The next step in finding a practical spatial approach for urban complexity is to reflect on some efforts that have already been made for flexible urban planning. This leads up to the research question: What are the basic spatial elements that can organize complex cities? By reviewing Lynch, Jacobs, Alexander, Salingaros, Drewe, Secchi, Tjallingii (and Gehl) actual spatial elements are found that contribute to vitality and could maybe structure and organize complex cities. In the conclusions, recommendations and discussion a suggestion is made for a graduation project.

2 Linking Complexity to Complex-City; theory versus practice

A complex system is a large collection of elements that interact with each other on micro-level. (Tan citing Batty, 2009) The relationships in the subsystems and between subsystems are so numerous and sometimes chaotic that it is hard to predict changes. This chaotic behaviour is in a popular term referred to as the “butterfly effect”; the flapping wings of a butterfly can cause a tropical storm miles away. Complexity theory is a current dominant scientific trend in many disciplines that seeks to translate a complex (and sometimes chaotic) system by a few simple rules. Recently it has come into vogue in the fields of study concerning the urban environment.
Zamenopoulos (2009: 1) states that “cities are perhaps the larger and most complex artefacts created by human activity.” Others have shown that the nature of cities is fractal (Batty, 2005; Manson 2001) which means that it shows the same organization of networks on different scales. For instance a tree is a complex system with a fractal nature so the same laws of structure govern all scales; form roots, to trunk and branches to the veins of the leaves. An analogy with the city also shows many different networks with subdivisions on smaller scales; streets, train lines, but also the sewer systems, telephone cables and the water network. (see illustration 1) The analogy between the fractal nature of a tree and a complex city should not be taken literally. The city is not a tree. (Alexander, 1966) According to Salingaros (2005) cities are fractal because different types of complex interacting systems overlap to build up complexity.

Though a lot of different disciplines use complexity and borrow techniques and views from each other, but there is a common misconception that they have exactly the same theoretical background. Manson (2001) breaks complexity down in tree divisions: (1) algorithmic complexity; (2) deterministic complexity and (3) aggregate complexity. Aggregate complexity is most consistent with the views of Salingaros, Portugali, Hillier and others that deal with the relationship between complexity and urban design. The goal of aggregate complexity research is to understand the system by understanding the relationships between the different components. On top of that it is “also concerned with how systems change and evolve over time due to the interaction of their constituent parts “(Manson, 2001: 406) If we regard the city as a complex system, this is an interesting topic.

The intrinsic characteristic of complex systems is that they are hard to predict and control. This is the main difficulty for all that deal with complexity but especially for city planners and designers. The unpredictable occurrence of phenomena is defined in complexity by the term emergence. For instance the technological development of the automobile was an emergent phenomenon that caused drastic changes to the physical form of the city. This occurrence of emergent phenomena has increased over the last century. The social environment is becoming more complex and changing faster and the developments that cause change are hard to predict. (Abbott, 2005) In this attribute of complexity lies the pitfall of today’s planning for complex cities: How to plan or design for something that cannot be predicted?

3 Attempts to deal with Uncertainty

Today’s urban planning needs to be able to respond to complexity and uncertainty. (Abbott, 2005) The future has always been complex and uncertain (Abbott citing Popper, 2005) but society keeps increasing in complexity and changing faster. In the introduction it is discussed that there are two facets related to the inability of current urban planning to respond to this: design and governance. The heritage of modernism, who’s answer to complexity was separation and fragmentation until the end of the 20th century has left us with mono-functional, actually dysfunctional, neighbourhoods and a tradition of planning trough zoning (separating land use). Since the 1980s planners have had a more pragmatic approach to uncertainty: just let the market drive the decisions and this will automatically result in the right approach. (Secchi, 2007) How has this total opposite to the rigid control of modernism paid off? Is complete freedom the right strategy to deal with complexity and uncertainty?

3.1 Traditional planning versus Self-organization

The ultimate opposite of the traditional zoning planning method is when we let the citizens and market of the city organize itself. As a matter of fact self organization is the intrinsic ability of open and complex systems to organize their own internal structure. (Portugali, 2000; Zamenopoulos, 2010) Besides computer simulations on self-organizing complex systems there are also strategies for urban planning letting citizens organize their own environment. The most well know example is by Portugali (2000). The claimed advantaged of self organization is the
diversity and flexibility of an urban structure. (Portugali, 2000) Traditional zoning plans often obstruct individual expression and entrepreneurship (Tan, 2009) whereas self-organization leaves more space for this.

In ‘A New Theory of Urban Design’ Christopher Alexander (1977) constructed a theory for urban planning based on a few ‘simple’ rules for self-organization. In conclusion of this he simulated an experiment of self-organization in a set context (San Francisco bay area) His hypothesis for this was that it would create a diverse mix-use environment and a clear and balanced organization would arise on its own. It did create a mix use and diverse urban pattern, but not a clearly organized urban structure. In 2008 E. Tan, J. Portugali and A. Reijndorp organized an experiment for urban growth by self-organization, similar to Alexanders for Almere Haven (the oldest part of new town Almere in The Netherlands). In this the same problem, a lack of a greater vision, occurred. (Tan, 2009) Manson (2001) describes that all types of transition cause change of the city structure but stabilize at a final stage. However this final stage does not contribute to a greater vision, nor is it necessarily good for the city and its inhabitants.

Different actors have different motivations for development (Alexander, 1977) and most often money is the main motivation instead of liveability or a climate friendly solution. In a market driven planning the absence of a clear overall urban vision has lead to “incoherent choices about the location, dimensions and aesthetics of new building projects.“ (Secchi, 2007: 8) Without guidance and stimulation civilians and entrepreneurs will relocate from unsuccessful neighbourhoods which will in turn deteriorate even more. Control by planning policy is necessary to guide development in a positive and sustainable direction. (Salingaros, 2005) A sustainable plan for the complex city should therefore consist of a balance between freedom and regulation. (Drewe, 1993)

3.2 A balanced approach: top town and bottom up

This balance between regulation and freedom is often referred to with the popular terms top down and bottom up; traditional regulating planning being top down and civilian initiatives bottom up. Both Petit (2005) and Salingaros (2005) argue that urban regeneration should be such a balance, but they don’t share the same concept of ‘bottom up’. According to Petit strategic planning is a bottom up concept. A Strategy is a method aiming for lasting and bigger effects of a (design) intervention. (Roberts, 2000) But while strategic planning can serve a bigger long term goal, it can still be very rigid and directive and leave no space for future change. Most bottom-up-strategies are actually not spatial interventions but social policy strategies for community regeneration. However fascinating, in this paper we are looking for the spatial aspects that have organizing capacity without determining the total structure.

3.3 ‘Wholeness’ and ‘organized complexity’

Two concepts of spatial organization without total rigid determination of the structure are wholeness and organized complexity. The overall vision that was missing in the planning experiments with self-organization is what Alexander (1977) calls ‘wholeness’. He describes this wholeness as being unpredictable but coherent, growing bit by bit and being ‘full of feelings’. This is rather vague. Lynch (1960) uses a similar concept: the sense of the whole. This is the ‘orchestration’ of all structuring spatial aspects of the city; paths, edges, districts, nodes and landmarks. For Lynch the way we perceive the City is what is most important. Is it easy to imagine and recognize the parts and are they organized into a coherent pattern? If so, the cities structure has a successful organization. The term he uses for this is legibility. It is especially important for the structure of today’s complex cities. (Lynch, 1960)

Salingaros (2005) agrees that Complexity without organization causes chaos. But with not enough complexity the city is dead. The balance between the two is what he calls ‘organized complexity’. This coherency in seemingly random processes arises from a balance between spatial geometry and connectivity. (Salingaros, 2005) This paper aims to find these generic spatial qualities are that cause a form of ‘geometry and connectivity’ or a ‘sense of the whole’ that can organize complex cities.

4 Conflicting views on the organizing principles of urban structure

In the past urban planners, designers and architects have regarded cities as machines or organism, but now they are
often regarded as complex systems or as a compilation of networks with a complex structure. Salingaros (2005) regards the urban web as the main organizing principle of cities. The urban web is the space between buildings forming a network for flows of people. (Salingaros citing Gehl, 2005) Because this urban web is fractal it actually has a similarity with the historic metaphor of the city as an organism, which also has a fractal nature. (same organization on different scales) Fractal natural growing systems often consist of a supporting structure (such as a skeleton, branches or fibres) and a filling pattern (such as tissue, pores, and fabric). The urban web is such an organizing supporting structure, or frame.

4.1 Elements of urban frame or urban pattern?

Hillier (2009) and Salingaros (2005) agree that the networks of non-built space, such as the urban web, link the urban pattern of buildings together. Also Jacobs (1961) mentions the street (non built public space) as the most important structuring element of cities that enables encounter and city life. A division in built and non-built space is possible but Nolli’s famous map of Rome (see illustration 1) divides the urban structure in public and private space. Another subdivision could be in networks for movement and places for staying. (Gehl, 1987) Network theories often use this concept classifying places as attractors of activity or human activity nodes and the paths that connect them the urban network. (Salingaros, 2005)

While all agree on the subdivision of urban structure in a supporting frame and an urban pattern, they disagree on the exact classification. For instance a church is in Nolli’s map part of the (white) frame of public space. (see illustration 1) In Salingaros (2005) and Hilliers (2009) view a church is a building and therefore part of the urban pattern. As it is mentioned before, Lynch (1960) defines organization of the ‘whole’ urban structure with 5 elements: path, node, edge, district and landmarks. The first 4 elements match Salingaros view of the urban web being a network consisting of connections between activity nodes. But the last element, landmark, is a build object. Lynch (1960) argues that landmarks are used for orientation and are often included in our routes from one place to another and are therefore a structuring element for the flows of people. It depends on the line of reasoning if such a spatial element belongs to the urban frame or the urban pattern.

4.2 Main frame and secondary frame

Apart from a subdivision in frame and pattern, a distinction between main,- and secondary frame can also be made. Continuing on the topic of the anchor points that we use to chose our routes. We often use the longest path first before we have to change direction only a few times to reach our destination. Software programs using a method of analysis called Space Syntax highlight the routes in a city that are most continuous and best connected to the rest of the network by measuring the least angle changes. (Hillier, 2009) These routes can be seen as the main frame or what Hiller (2009) calls the foreground network. Hillier and Salingaros agree that there is such a thing as a main organizing and a secondary organizing structure. However they disagree on what part of this dual framework is more adaptable to change or is more constant.

Hillier (2009) describes the foreground network as consisting of long continuing lines and a background network consisting of shorter lines. The foreground network often coincides with main centres of economic activity and the background network coincides with residential areas. Hillier (2009) argues that the background network is less likely to change because of the conservative residential character. Salingaros (2005) indentifies the main frame as hardware and the total system of all connections as software. In contrast to Hillier he labels the software as flexible and the hardware as more fixed. The software shows chaotic behaviour, a slight change can cause drastic implications for the rest of the system, whereas wit the hardware slightly different starting points will give rise to similar end points.” This is consistent with the ideas of Braudel (1992) about the shorter and longer lifespan of certain elements of our living environment.

The hardware such as a natural path following a creek can still be a prominent feature of an urban structure after the creek and natural landscape have been gone for decades. An example where this can be seen is the street pattern of the neighborhood de Jordaan in Amsterdam. In an old map (see illustration 2) it is clearly visible that the street pattern follows the original landscape structure of canals. The reason for this was that because of the limited budget for this simple working class neighborhood, the ground was not raised. If historic lines such as the water network are structuring elements, should it also be considered as part of the urban main frame?
4.3 The slow network and the fast network

In the 17th and 18th century times the water network was definitely the main frame of the city, and it has shaped our historic urban centres. (Hooimeijer, 2006) In those times transportation over water easier than transportation over Dutch wet lands. However through time technological developments such as the car has changed the speed of our movement and its main carrying structures. The fast networks such as train tracks, tramlines and roads for motorized traffic began to dominantly guide urban planning and design. The water network and slow traffic, bike and pedestrian, was pushed to the background.

Recently the importance of the slow traffic network for the liveability of the city is becoming more predominant. Some even argue it is the most important feature for a city and it should be the first thing to consider in urban planning. (Alexander, 1977) The pedestrian city is an emotionally nourishing environment. (Salingaros, 2005; Jacobs 1961;
Alexander, 1977) Tjallingii (2005) argues that a city should be planned using the spatial networks of water and traffic as carrying conditions to accomplish ways for more sustainable urban development; the traffic or ‘fast lane’ supporting dynamic economic and social activities and the water networks or ‘slow lane’ supporting activities such as leisure and nature and bike and pedestrian use. (Tjallingii, 2005)

5 Conclusions: The urban frame consisting of ‘Carriers & Barriers of flows of people’.

Now that some different views on the organizing principles of the urban structure are reviewed a suggestion can be made for the design of an organizing frame for flexible city planning. Despite their differences all reviewed authors agree on that the flows of people are what define the major spatial structures of the complex city. These networks of flows can be both carriers and barriers of movement and can interchange over time. The water structure used to be a major carrier for transportation, and has greatly defined the urban structure of historic cities. Now it is more often considered a barrier for movement. A train track is both a carrier of movement and a barrier for other types of movement. The fast and slow traffic network both define the street network, but attention for the slow traffic is much more important for small scale economic development and flexibility. (Vigano, 2010) If the two networks do not conflict they can form a “sustainable frame that allows for flexible infill.”(Tjallingii, 2001: 150) The carriers and barriers should intertwine in such a way that it creates a system that supports the connectivity needed for the corresponding land use patterns.

6 Recommendations for the graduation project

The overlapping question for the graduation project is: What should the spatial structure of the city be in order for it to further self-organize and regenerate? There are two tracks that must be regarded in order to find this spatial structure that supports self-organization: (1) The main organizing spatial elements that configure the city’s frame, and (2) the conditions for a flexible urban pattern. The first are considers organization on city scale and the second the spatial conditions on street level. This paper has (hopefully) contributed clarity on the first track. The next step is finding the spatial conditions of the urban pattern that allows and support self-organizing development.

The project location of the graduation project can be tested on the outcome of both studies. If spatial structure of the city (both frame and pattern) meets certain demands for a healthy and adaptable living environment, there is no need for demolition. If not: the two tracks can serve as instigators of an urban regeneration strategy improving the missing links in the frame, and in some places updating and adding on the urban pattern. In the very worst case scenario the urban structure is completely worthless. Then and only then can demolition be considered. However it should never be the first step for urban regeneration. Improving and completing the slow network structure can already be a sound basis for urban regeneration, and a wise first step to take.

Bibliography


In order to get more grip on the notion of flexibility and the balance between the ‘fixed’ en ‘flexible’ some case studies are examined and compared to the project proposal for this graduation project; a ‘framework’ for urban regeneration supported by SNOD. To define the level of flexibility in the urban structure and/or in governance case studies of (1) adaptable urban structures; (2) flexible design/planning and strategies and (3) case studies of self-organization.

The chart indicates the level of similarity between the notion and execution of ‘flexibility’ in the case study and my own project. All case studies are tested on 4 issues related to the project:
- A frame and infill
- Urban regeneration
- Possibilities to grow and adapt. (possibilities for self-organization)

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Similarities</th>
<th>Differences</th>
</tr>
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</table>
| Self-organization: KCAP Kaisersrot simulation for Madestein Den Haag | - the urban web is the carrier of development  
- the grain is fine | - the neighborhood is mostly mono-functional  
- it is not an urban renewal, but an urban extension project. (situated between Den haag and the sea in a natural, not urban, surrounding)  
- it is not design to support small scale economic development |
| Het Wilde Wonen: Almere Carel Weber | - planning should offer a framework in which civilians can take their own initiative with freedom in architectural form and function | - there is no clear view on organization.  
- complete freedom of architectural form will lead to some problems in the Dutch conservative atmosphere.  
- it is not quite fit for urban densification, and will more likely lead to urban sprawl |
| Self-organizing urban growth: Almere Haven City Game Ekim Tan | - the existing urban web is the carrier of development  
- a mix-use of functions is desired and attained by self-organization. | - it is not an urban renewal by densification, but an urban extension project, or sprawl. (situated at the edge of Almere haven)  
- there is a lack of a coherent structure and organization |
Self-organization: KCAP Kaisersrot simulation

Het Wilde Wonen; Almere Carel Weber

Self-organizing urban growth: Almere Haven City Game Ekim Tan
3 examples of adaptable urban structures that have a frame and infill

### Flexibility of the Grid system: Manhattan New York (US)

**Similarities:**
- In the grid street system the blocks can be filled with different functions. The designations have changed over the years.
- This means that the urban web is the carrier of the development.
- The blocks allow different gain sizes: the original plots where 8x30 meter, but now some high rise block take up the whole block.
- So there is flexibility in both form and function.

**Differences:**
- Most Dutch cities are not realized with an orthogonal street (grid) system.
- The grid is very fixed in grain. Perhaps a system with more freedom could be found and blocks could vary.

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### Buildings of longue duree: Entrepot do Amsterdam

**Similarities:**
- Regulation made it possible for the buildings to change function over time. (though by renovation)
- There is a system of frame and infill; the frame being the buildings construction.

**Differences:**
- On different scale level: architectural.
- Minimal change in form is possible.

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### Water structure as grid: de Jordaan - Amsterdam

**Similarities:**
- The canal structure serves as a kind of grid. The streets and urban pattern follow the water structure.
- This means that the slow network is the carrier of the development.
- Within this structure there was some extent of flexibility in both form and function.

**Differences:**
- The Jordaan was built by project developers and not by the inhabitants themselves. (It was for many years a poor working class neighborhood)
- Also we must remember that it was built a long time ago. The politics and planning policy climate has changed.
Manhattan New York
The commissioners map of New York 1807 showing the grid struc-
ture. Source: google images

Entrepot-doc Amsterdam
Old warehouses that are now new appartments. Entrepot doc Am-
sterdam. Source: google images

Jordaan Amsterdam
The old canal structure is still recognisable in the Jordaan; an old
working class neighborhood which is now a popular place to live.
Source: google images
**Flexible infill in a frame of public space: KCAP barracks in Osnabrück, Germany**

**Similarities:**
- This project offers ‘space for development in the different stages of progress’ (bit by bit development)
- The network of public space is determined and the rest is undefined, which means that the urban web is the carrier of the plan.
- The infill with buildings is undefined in both form and function. (it could support economic development)
- The site used to be for industrial uses.

**Differences:**
- The street network is completely fixed whereas in this graduation project there is also a possibility for the flexible development to influence the secondary street network.

**Piecemal growth: LA 4 Sale in the Grooterschermee polder, Netherlands**

**Similarities:**
- Flexible spatial framework for urban planning.
- Using strict guidelines for minimal and maximal desired development, where is decided how growth should take place and what it should look like. So the planning policy is flexible.
- The slow network is the basis (frame) for the plan.

**Differences:**
- This is a plan for urban growth (sprawl), not urban renewal or densification inside the city borders.
- Another difference is that this project is for a rural area, not a city.
- The ‘cookbook’ is a catalogue of 3 village typologies, so it is actually less flexible than it seems at first.

**Grammar for urban renewal: Wimby Logica by Maxwan for Hoogvliet, Netherlands**

**Similarities:**
- This is an urban renewal project,
- without a masterplan but using a catalogue; a sort of grammar for urban renewal projects in order to give all separate urban renewal projects in Hoogvliet some common grounds.

**Differences:**
- These are more recommendations than actual policy.
- A big part of the urban renewal plan was the demolition of housing stock. 15000 social houses were demolished, not because they were not fit, but because of a wish for ‘differentiation’. I don’t see this as a very sustainable approach.

(source: [http://www.project.vrom.nl/project.asp?code_prjt=10703&code_prgm=1](http://www.project.vrom.nl/project.asp?code_prjt=10703&code_prgm=1))
KCAP’s plan for the barracks in Osnabruck, Germany
Reuse of an barrack complex in Osnabruck germany. Source: www.architectenweb.nl

Wimby Logica;Maxwan
a guidebook for the urban renewal of Hoogvliet Rotterdam. Source: Googe images

LA 4 Sale
Illustration 26. A Space Syntax angular analysis of Delft. It highlights the most continuous routes. Author
Illustration 27. The 1,2,3 step analysis of two shopping streets in Delft. Same scale. (location indicated in space syntax map, a correlation is visible) It shows the connectivity and reach of the shopping street by visualising 3 times a change of direction. Author
Illustration 28. The 5 layers of network analysis. (an edited version of the tree layers by Dupuy)

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