Of the man-made things, the work of engineering and architecture and town plan are the heaviest and biggest part of what we experience. All too often, we do not realise that somebody once drew some lines on a piece of paper who might have drawn otherwise, and that now, as engineer and architect once drew, people have to walk and live (Goodman and Goodman, 1947).

The necessity of analysing cities in a comprehensive way

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Abstract

Why do we have to analyse urban development in a comprehensive way? We will answer this question by showing how city planners developed their analyses and ideas in the last centuries. City planners can have an enormous impact on human actions. They make important choices that influence how people for decades or even centuries live and travel in urban areas. The realised ideas of urban planners have large influence on social interrelations, the use of transport modes, the quality of life, the economic potential of urban districts, etc.. City developers often develop urban *Idealtypen*, theoretical models of urban configurations. Examples of urban *Idealtypen* are the Garden City, the Radiant City and the Broadacre City. What influence had those Idealtypen on urban realities and how where such *Idealtypen* influenced by changing scientific methods of thought? What can we learn from how these urban planners worked in the past and the resulting urban areas for the necessity of a comprehensive approach of urban developments? We will see, amongst others, that to understand cities, the most important habits of thought are to think about processes, to work inductively, and to seek for "unaverage" clues.

1. Urban economy and city planning

This paper deals with ideas and theories of city planners. This might look a little strange in a regional-economic study. However, both disciplines, city planning and regional economy, have and at least ought to have many linkages. City planners can have an enormous impact on human actions. They make important choices how people have to live and travel in urban areas for decades or even centuries. The realised ideas of urban planners have large influence on social interrelations, the use of transport modes, the quality of life, the economic potential of urban districts, etc.. Human behaviour is, for a not unimportant part, directed by their environment. Therefore, one of the most important actions of urban management is to think profoundly how to organise the urban environment. It goes therefore without saying that, among other actors involved, urban or regional economists and urban planners frequently look beyond their disciplinary borders, and try to generate synergetic effects by combining their knowledge.

In this paper, we will try to answer the question why do we have to analyse urban development in a comprehensive way? We want to show the relevance of an integral approach of urban developments by describing urban plans which were *not* developed in a comprehensive way. This paper partly leans on Jacobs' (1961) analysis in her *opus magnum* "The Death and Life of Great American Cities". In the second section we want to deal with the development of general scientific methods of thought, which – in the course of time- have influenced the development of specific urban *Idealtypen*. The third section deals with these urban models. Then section four goes into a comprehensive approach of urban developments, which we mention an organised complexity approach. This approach will be further elaborated in section five. Section six goes into the "urban model" of the *diversified city*. Finally, section seven concludes this paper.

2. Analyses of urban problems and general methods of thought

In this paper we will discuss several urban *Idealtypen*, theoretical models of urban configurations. Zijderveld (1987, p.68) describes the notion *Idealtype*, introduced by Max Weber, as deliberately overstressing some aspects of reality, while neglecting others. Therefore, creating more or less rational distortions of reality.

The way cities are analysed and urban theories are made has changed profoundly in the last centuries. They have changed in accordance with general methods of thought which are developed in the course of time (see figure 1). By analysing cities in another way, new *Idealtypen* of cities may spring up, and old *Idealtypen* may vanish, considered not relevant anymore. When methods of analyses are changing also the way cities are planned will change, and then in turn also the way cities are ultimately developed too. Thus, the way we build cities is indirectly influenced by changing methods of thought.

Figure 1 Relationships between methods of thought and urban analysis

For a better understanding of how we have dealt and deal with urban problems, it seems therefore necessary to discuss some general methods of thought and analysis. We like to use a summary on the history of scientific thought and analysis written by Weaver. His ideas were described and elaborated by Jacobs (1961)[1]. Later on in this paper, it will turn out that these theoretical considerations are supported by, among others, Hall and Alexander. Weaver (1967, p.25-33) distinguished three stages of development in the history of scientific thought: (1) the ability to deal with problems of simplicity; (2) the ability to deal with problems of disorganised complexity; and (3) the ability to deal with problems of organised complexity (see table 1).

Weaver explains: One may say that the seventeenth, eighteenth and nineteenth centuries formed the period in which physical science learned how to analyse two-variable problems. During those three hundred years, science developed the experimental and analytical techniques for handling problems in which one quantity –say a gas pressure- depends primarily upon a second quantity –say the volume of the gas. The essential character of such a problem rests in the fact that, at least under a significant range of circumstances, the first quantity depends wholly upon the second quantity, and not upon a large number of other factors. Or in any event, and to be somewhat more precise, the behaviour of the first quantity can be described with a useful degree of accuracy by taking into account only its dependence upon the second quantity, and by neglecting the minor influence of other factors.

These so-called methods of simplicity are deductive analyses. General patterns are deduced, with which specific problems are to be analysed. Especially in the physical sciences this method of analysis is much used and has generated many theories and discoveries. An instance is the second Newton-principle: the mass of a body is the constant quotient of the power acting on that body and the thereby resulting acceleration (F=m*a). *This method of analysis laid the foundations for our theories of light, of sound, of heat, and of electricity … which brought us the telephone and the radio, the automobile and the airplane, the phonograph and the moving pictures, the turbine and the Diesel engine and the modern hydroelectric power plant* (Weaver, 1967, p.25-27*)*.

The second method of analysis deals with problems with a very large amount of variables. *These are problems in which the number of variables is very large, and in which each of the many variables has a behaviour which is individually erratic and may be totally unknown. But in spite of this helter-skelter or unknown behaviour of all the individual variables, the system, as a whole, possesses certain orderly and analysable average properties* (Weaver, 1967, p.29).

These problems can only be studied with help of statistical methods (such as regression analyses). The outcomes of such problems are probability notions. They indicate the probability of a variable to be a within a certain probable range of results. With respect to the amount of variables, the first two categories of methods can be considered as mutual extremes: two versus many. Methods of disorganised complexity became popular in the twentieth century. Especially with the advent of powerful computers it has become possible to handle problems with a large number of variables.

A wide range of experience come under this label of disorganised complexity…. It applies with entirely useful precision to the experience of a large telephone exchange, predicting the average frequency of calls, the probability of overlapping calls of the same number, etc. It makes possible the financial stability of a life insurance company … The motions of the atoms which form all matter, as well as the motions of the stars which form the universe, all come under the range of these new techniques (Jacobs, 1961, p.431).

One might wonder why there is such a large difference between the two mentioned methods of analysis. The first one only deals with two variables, and the second with a very large amount of variables. Why was such a big step necessary, and why were intermediary situations not analysed? Weaver (In: Jacobs, 1961, p.430-431) gave a good and illustrative explanation of a billiard table:

The classical dynamics of the nineteenth century was well suited for analysing and predicting the motion of a single ivory ball as it moves about on a billiard table… One can, but with a surprising increase in difficulty, analyse the motion of two or even three balls on a billiard table… But as soon as one tries to analyse the motion of ten or fifteen balls on the table at once, as in pool, the problem becomes unmanageable, not because there is any theoretical difficulty, but just because the actual labour of dealing in specific detail with so many variables turns out to be impractical.

Imagine, however, a large billiard table with millions of balls flying about on its surface… The great surprise is that the problem now becomes easier: the methods of statistical mechanics are now applicable. One cannot trace the detailed history of one special ball, to be sure; but there can be answered with useful precision such important questions as: On the average how many balls per second hit a given stretch of rail? On the average how far does a ball move before it is hit by some other ball?…

… The word "disorganised" applies to the large billiard table with the many balls … because the balls are distributed, in their positions and motions, in a helter-skelter way … But in spite of this helter-skelter or unknown behaviour of all the individual variables, the system as a whole possesses certain orderly and analysable average properties…

Problems of organised complexity, the third distinguished category, deal with a reasonable number of factors, which are interrelated in an organic whole. These are problems with a certain amount of variables, more than two, but much less than in disorganised complexity situations. Much more important, however, than the mere number of variables is the fact that these variables are all interrelated. These problems, as contrasted with the disorganised situations with which statistics can cope, show the essential feature of an organisation (Weaver, 1967, p.31).

In organised complexity problems, relationships are analysed between a considerable and manageable number of variables. Researchers try to get (more) insight in a specific problem by analysing in a systematic way relationships between relevant variables. It is an inductive way of analysis. The aim of this method is by studying specific cases to explain or forecast the way different elements of a system influence each other in comparable situations like those that are analysed. This method is especially applied in life, behavioural and social sciences, for which the

methods of simplicity and disorganised complexity did not do to solve the relevant problems. In the sections 4 and 5, this method will be further explained and elaborated for urban analyses.

Table 1 Methods of thought and urban *Idealtypen*

Methods of thought	*Simplicity*	*Disorganised complexity*	*Organised complexity*
Period of application	17/18/19th century	from 1900	from 1930
Amount of variables	two variable problems	problems with a very large amount of variables to solve with statistical methods	Reasonable number of factors which are interrelated in an organic whole
Way of analysis	Deductive method	Inductive method	Inductive method
Examples of disciplines of application	Physical sciences	Communication and information theories	Behavioural sciences
Deduced urban Idealtypen	*Garden City*	*Radiant City* *Broadacre City*	*Diversified City*

Based on: Weaver 1967, p.25-33, and Jacobs, 1961, p.429-433.

3. Methods of thought and urban models

In the last century, based on above-mentioned methods of thought several urban *Idealtypen* were deduced[2]. The *Idealtypen* of cities to be described can be considered Utopias. For they were never ever entirely realised. Though they, actually, had a large influence on the contemporary city planning. *Many utopias became, after modification, influential elements of actual planning practice (*Le Gates et al., 1996, p.450). Because these ideas about urban planning can be found back in many places in the world, and they still have influence on many contemporary urban planners, it is desirable to know more about the backgrounds of their ideas. What were the motives, aims and considerations of the persons, who developed these influential ideas on urban planning? What specific societal and urban circumstances influenced their ideas, and what were the consequences of the (partial) realisation of their ideas?

The Garden City

The methods of simplicity influenced the so-called *Garden City*. The basic ideas for these self-contained cities were developed by Ebenezer Howard. He disliked the large city and idealised small self-supporting cities, with a maximum amount of about 30,000 inhabitants. Howard considered a careful analysis of the very numerous causes, which led to aggregation of people in large cities unnecessary. According to Howard those causes may all be summed up as "attractions". Howard considered towns as well as country-sides as magnets and persons as needles. The *Garden City,* the *ideal* city *type* he developed, had to be a perfect mix of a town and a country-side. Town and country *must be married*, and out of this joyous union will spring a new hope, a new life, a new civilization (Howard, 1898).

The *Garden City* had a clear separation of functions (see figure 2). Among other functions, work, living and commercial functions had to obtain their proper location. Around these cities an agricultural belt has to be constructed, that had to contribute to the self-supporting character of these spatial entities. The real versions of these *Idealtypen* were to be completely developed from the drawing board. In a later stage, no substantial changes to this basis concept were allowed.

Figure 2 The Garden City of Howard

In principle, the configuration of these cities was determined by two simple basic variables: the population size and the amount of necessary working places (the two variables of the simplicity approach). *These two were conceived of as simply and directly related to each other, in the form of relatively closed systems. In turn, the housing had its subsidiary variables, related to it in equally direct, simple, mutually independent form: playgrounds, open space, schools, community centre, standardised supplies and services. The town as a whole was conceived of, again, as one of the two variables in a direct, simple, town-greenbelt relationship. As a system of order, that is about all there was to it. And on this simple base of two-variable relationships, an entire theory of self-contained towns was created as a means of redistributing the population of cities and (hopefully) achieving regional planning* (Jacobs, 1961, p.435). Thus, Howard considered cities as relatively simple spatial entities, which in principle could be planned and developed entirely from a macro-level. He did not bother about all kind of (social) interactions within and between urban entities. Obviously, he did not consider them to be relevant. The *Garden-City* ideas are applied in two cities: Letchworth (leaded by a disciple of Howard, Raymond Unwin[3]) and Welwyn Garden City[4]. Howard had to compromise many of his original goals, among others things, the aims of co-operatively ownership and economically independency.

The Radiant City

Methods developed to handle problems of disorganised complexity influenced Le Corbusier who developed the *Idealtype Radiant City*. The *Radiant City* could be considered as a more "sophisticated approach" of the *Garden City*. This *Idealtype* is characterised by high buildings, "skyscrapers", in relatively large parks (see figure 3); therefore it could also be considered as the vertical version of the *Garden City*. Exactly because of the fact the inhabitants are concentrated in large buildings, there is much space to create parks. This *Idealtype* was especially influenced by the advent of the individual car, permitting a relatively large separation of urban functions.

Le Corbusier determined in a very detailed way the size and basic data of his *Idealtype* of city: *Here we have twenty-four sky-scrapers capable each of housing 10,000 to 50,000 employees; this is the business and hotel section, etc., and accounts for 400,000 to 600,000 inhabitants. The residential blocks, …, account for a further 600,000 inhabitants… At the base of the sky-scrapers and all around them we have a great open space 2,400 yards by 1,500 yards, giving an area of 3,600,000 square yards, and occupied by gardens, parks and avenues* (Le Corbusier, 1929, p.372-373).

Le Corbusier, who had a large influence on urban planning in the 20th century, strived for absolute order, symmetry and regularity. *The lay-out* of a city *must be of a purely geometrical kind, with all its many and delicate implications … The city of today is a dying thing because it is not geometrical* (Le Corbusier, 1929, p.372-373).

Also in this urban model, the need for all kind of (social) interactions was not taken into account. One of the striking differences with the *Garden-city* approach is the detailed interference of the urban planners how cities were to be arranged. With help of *"scientific"* statistical methods and computers, calculations were made how many people have to live and work in buildings, city districts and urban regions. However, how these people would live and appreciate the standardised surroundings did not appear to get much attention. Order and rationality got priority. It was the time era in which urban planners thought that they could create a better world…

In fact, with respect to urban planning and analyses there is not such a big difference between the simplicity and the disorganised-complexity approach. For both approaches avoid to consider the intricate interrelations between people and activities. The difference, however, is the way how the different *urban parameters* were determined. *Simple, two-variable systems of order were still the aim. But these could be organised even more "rationally" now, from out of a supposed existing system of disorganised complexity. In short, the new probability and statistical methods gave more "accuracy", more scope, made possible a more Olympian view and treatment of the supposed problem of the city* (Jacobs, 1961, p.436).

Le Corbusier intended to build his *Radiant City* on the right bank in Paris, after demolishing several hundred acres of the existing urban fabric. However, he never accomplished these ideas. His original but extreme ideas were not elaborated by other planners, like was the case with the ideas of Howard. However, many elements from his ideas can be found back in urban plans and realities. Le Corbusier's real impact came not from cities he designed and built himself, but from cities that were built by others and from the widespread adoption of certain planning principles that he pioneered. Most notable among these was the notion of the "skyscraper in the park," an idea that is today ubiquitous (LeGates et al., 1996, p.367).

Figure 3 The Radiant City of Le Corbusier

Broadacre City

Frank Lloyd Wright's *Broadacre City* can also be considered to be influenced by the disorganised-complexity approach. To mention this utopia "*City*" is, however, not quite legitimised. Wright envisioned the disappearance of large cities as important socio-economic entities. Wright believed that two inventions, the telephone and the automobile, made the old cities "no longer modern", and he fervently looked forward to the day when dense, crowded conglomerations like New York and Chicago would wither and decay (Le Gates and Stout, 1996, p.376). Wright predicted a total decentralisation of human activities. The advent of the car enabled a spatial segregation of functions. He foresaw the construction of very broad highways, by which car traffic could be accommodated in an undisturbed way. *Every Broadacre citizen has his own car. Multiple-lane highways make travel safe and enjoyable* (Wright, 1935, p.380).

He was a radical individualist. The American ideal of freedom was central in Wright's *Idealtype.* All people had to have freedom as much as possible, and had to be able to develop themselves as much as possible. *All regimentation is a form of death which may sometimes serve life but more often imposes upon it (*Wright, 1935, p.377). Wright called for a radical transformation of American society in such a way to restore earlier Emersonian and Jeffersonian virtues (le Gates and Stout, 1996, p.376). The government, therefore, has in his *Idealtype* a limited role.

In Wright's *Idealtype* every family obtains at least one acre of land. This could be more depending on the family size. Wright foresaw spatial zones in which about 1,400 families could live (see figure 4). These zones would accommodate all kind of necessary amenities, having a small size character, however. *All common interests take place in a simple co-ordination wherein all are employed: little farms, little homes for industry, little factories, little schools, a little university going to the people mostly by way of their interest in the ground, little labaratories on their own ground for professional men* (Wright, 1935, p.379). Wright believed that the different spatial entities had to operate in a more or less economically independent way.

Comparing the vision of Wright with his contemporary Le Corbusier, there are similarities as well as clear contrasts. Both were influenced especially by the advent of the car. Le Corbusier as well as Wright foresaw an enormous amount of new possibilities generated by this individual transport mode when available for every citizen. However, they differ in the way they elaborated the effects. Le Corbusier foresaw a centralising effect (planned), while Wright expected a decentralising effect (anti-planning). Intriguingly, the overall population density of Broadacre, on the one hand, and Corbusian visions, on the other, may not be all that different, depending on the actual acreage of the surrounding parkland or greenbelt (Le Gates and Stout, 1996, p.377). With his endeavours to integrate many non-standard elements in spatial structures and organic architecture, Wright clearly opposed the Corbusian ideas to standardise and to realise symmetric constructions as much as possible.

Figure 4 Broadacre City of Wright

The Technoburb or Edge City

The spatial configurations foreseen by Wright seem to have become reality around many American cities. New spatial entities have arisen, that operate in complete independence from metropolitan centres. Fishman mentioned such configurations *Technoburbs* or *Technocities;* others call them *Edge cities.* The *Technoburb* has to be considered as an endeavour to describe existing spatial realities, rather than the development of an urban *Idealtype.*

The techno-city has a multitude of centres. There is no urban centre, no urban heart. The technoburb is a large diffusion of spatial entities, mutual linked by highways. *The techno-city's real structure is aptly expressed by the circular superhighways or beltways that serve so well to*

define the perimeters of the new city (Fishman, 1987, p.486). A well-known example nearly approaching this urban configuration is Los Angeles.

Fishman compares the Technoburb with the suburb-phenomenon. Suburbs are dependent on an central city, which is not the case any more with respect to technoburbs. These are independent spatial entities. Compared to the suburb, there is a renewed linkage of work and residence. Suburbs, normally, have a direct (work-live) relationship with the central city. However, in technoburbs working and living locations are decentralised. They are both distributed over a larger geographical area. Consequently, traffic flows between work and residence locations will be better balanced than in the situation of suburbs. It does remove the bottlenecks, which necessarily occurred when work was concentrated in a single core within the region. The supply of high-quality public transport is in technoburbs hardly possible, because of the large diffusion of working and living locations.

The decentralised city is made possible only through the advanced communications technology, which has so completely superseded the face-to-face contact of the traditional city (Fishman, 1987, p.485). According to Fishman there have been two prophets of the techno-city: H.G. Wells, who wrote in 1900 "The Probable Diffusion of Great Cities", and Frank Lloyd Wright. *Broadacre City* represented the disappearance of all previously existing cities. Wright attempted to envision the way that a radically decentralised environment could generate that diversity and excitement which only cities had possessed. Fishman does not agree with the latter. According to him, much urban richness has been lost with the advent of the Technoburb. Fishman argues that decentralisation results in a cultural disaster. *While the rich and diverse architectural heritage of the cities decays, the Technoburb has been built up as a standardised and simplified sprawl, consuming time and space, destroying the natural landscape* (Fishman, 1987, p.491). He considers two essential disadvantages of the technoburb development: firstly, the waste of land inherent in a single family house with its own yard and secondly, the waste of energy inherent in the use of the personal automobile.

Fishman believes that the power to built technoburbs will remain strong. But there will be also strong counterforces, namely economic and political centralisation trends. Governmental organisations and large companies often still want to be located in the centres of large metropolitan regions. Moreover, they attract a large amount of related organisations and workers who want to be located in their direct vicinity. Fishman also considers the increasing consciousness for the quality of the built environment as a strong counterforce against "*technoburbing*". This enlarges the need to save natural landscapes, and, therefore, to concentrate urban activities in certain geographical entities.

4. Organised complexity approach

In the last decades, cities are more and more analysed as organised complexity problems. It has become increasingly clear that urban areas constitute complicated problems in which all kind of variables influence each other in a mutual way. There are all kinds of relationships within and between cities that has to be analysed to understand the way urban areas develop. When these

relationships are not taken into account, it is inevitable that urban planners create unrealistic, inhuman, utopias. The increased need in the last decades to approach urban problems *in an integral way*, can be considered as a need to approach them as *organised-complexity problems.* Thus, only when we understand and analyse the complicated social, economic and cultural interrelations within urban regions, we can soundly tackle urban problems and develop urban plans.

Cities present "situations in which a half-dozen or even several dozen quantities are all varying simultaneously *and in subtly interconnected ways.*" Cities do not exhibit *one* problem in organised complexity, which if understood explains all. They can be analysed into many such problems or segments which, as in the case of behavioural sciences, are also related with one another. The variables are many, but they are not helter-skelter; they are "interrelated into an organic whole" (Jacobs, 1961, p.433).

Hall (1988, p.386) stated that there are large changes of (ideas about) the role of city planner in this century. The discipline of physical planning changed more in the ten years from 1960 to 1970, than in the previous 100, possible 1000 years (Batty, 1979, p.18). Hall gives a caricature of this change: in 1955 the planner was at the drawing board, producing a diagram of desired land-uses; in 1965 s/he was analysing computer output of traffic patterns; and in 1975, the same person was talking late into the night with community groups, in the attempt to organise against hostile forces in the world outside. Hall, thus, distinguished also the "simplicity" and the "disorganised complexity" approach. The third approach he mentioned can be considered the Marxist' approach of problems in organised complexity: to organise the influence of social forces on the planning processes of cities: cultivate community networks, listen carefully to the people, involve the less-organised people, educate the citizens in how to join in, supply information and make sure people know how to get it, develop skills in working with groups in conflict situations, emphasise the need to participate, compensate for external pressures.

Christopher Alexander (1965) also considers urban areas as organisational entities with all kind of intricate interrelations between their elements. He fights too simplified ideas concerning the way cities are functioning. In his article "A City is not a Tree", he argues that cities can not be understood by tree structures, though this has been done many times by city planners and other urban experts. *A city should not be designed with a neatly branching treelike organisation dividing functions from each other. Alexander condemns tidy city plans, which lay out discretely bounded neighbourhoods, zone one area for housing and another for business, or establish areas just for universities or cultural facilities. He sees human activity as much more complex and overlapping than that (*Alexander, 1965).

Therefore, Alexander pleads to analyse urban structures as being semi-lattices, structures that make clear that a relatively large number of variables directly influence each other. Alexander makes a distinction between natural (Siena, Liverpool, Manhattan, Kyoto) and artificial cities (Levittown, Chandigarh, and the British New Towns). Alexander believes that a natural city has the organisation of a semi-lattice; *but then when we organise a city artificially, we organise it as a tree. It is the process of thought itself, which works in a treelike way, so that whenever a city is "thought out" instead of "grown", it is bound to get a treelike structure.*

Whenever we have a tree structure, it means that within this structure no piece of any unit is ever connected to other units, except through the medium of that unit as a whole (Alexander, 1965). It can be stated that Alexander fought urban analyses via the simplicity and disorganised-complexity approach and that he promoted an organised-complexity approach. Alexander shares architectural critic Jane Jacobs's love of apparently chaotic, jumbled urban neighbourhoods. Like Jacobs he sees a complex order and rationality behind an apparently disorderly facade. Jacobs and Alexander thus sharply opposed the ideas of Le Corbusier.

Jacobs shares with Howard, Le Corbusier, and Wright a mistrust in the abilities of governments, especially higher government levels. In Jacobs' view, only local governments could be able to undertake adequate policy steps, because they are better involved in the actual urban problems. Richard Sennett (1970) accepts almost all of Jacobs's premises and carries them even further. He believes the planners' search for harmony is not only bad urban policy but even worse psychology. For him, this goal stems not from altruism but from a "fear of the sources of human diversity" (Ibid, p.8). It is a refusal to accept the unpleasant truth that conflict and disorder are inevitable in any society (Fishman, 1982, p.272).

5. Elaboration of organised complexity method

According to Jacobs (1961, p.440) *to understand cities, the most important habits of thought are to think about processes; to work inductively, reasoning from particulars to the general, rather than the reverse; and to seek for "unaverage" clues involving very small quantities, which reveal the way larger and more "average" quantities are operating.*

Process thinking

To understand elements, actors, organisations and activities, of cities, it is necessary to study them in their proper circumstances and context. Then and only then, theses analyses will make sense. For instance, the reason of being and success of an urban-development organisation *Metropoli 30* in Bilbao, Spain (during the nineties of the 20th century), in which nearly all relevant regional public and private actors co-operate, becomes clear when the regional context is considered. Relevant backgrounds were relatively bad regional-economic circumstances with large unemployment, but also the strive for regional autonomy, which generate a large solidarity feeling (Berg, van den, et al. 1996). These were important incentives for setting up this public-private partnership, and are therefore necessary to understand to study the urban economic development of the region.

City processes constitute of interactions among unique combinations of particulars, and there is no substitute for knowing the particulars. For cities, processes are of the essence. Furthermore, once one thinks about city processes, it follows that one *must* think of catalysts of these processes, and this too is of the essence (Jacobs, 1961, p.440-441). The advent of the HST, for instance, is considered to be an important catalyst for urban economic development. It forms a kind of breakthrough, which enables all kind of private and public investments that would have not been generated without the advent of the HST (Pol, 2002). To understand this particular

catalysing force is important to understand which processes take place around HST-stations and which actions an urban region has to undertake to benefit from the advent of the HST.

Inductive analysis

The only useful analysis of economic development of urban regions seems to be studies of concrete, individual situations. It is hardly possible to find out general principles of the economic functioning of urban areas in a deductive way. For, cities differ too much from each other. Only by analysing case-studies, relevant ideas of how spatial entities function can be developed. By comparative urban research certain statements about urban economic development can be made, that *possibly* are true for other cities. But, these generalisations based on inductive analysis have to made very carefully, exactly because of large differences between urban regions.

In this respect, a good instance is the meaning of rail infrastructure as barrier in the urban spatial configuration for its socio-economic functioning. One might say that such an barrier is *always* hindering a sound functioning of interurban relations, and therefore will *always* hinder a sound urban-economic development. We find out that this was considered to be true in Turin, Italy, and that urban actors, therefore, decided, to put all main rail infrastructure underground within the inner city[5]. As a consequence, urban districts that were separated by this infrastructure could integrate, and develop in a positive way, because all kind of interurban relations have been stimulated. In Rotterdam, however, the barrier function of the rail was considered to be desirable to preserve the existing urban structure, clearly separating certain urban areas with different "characters". The urban centre with a "metropolitan character" is at the northern side separated from a mainly residential area by rail infrastructure. Elimination of this rail barrier might imply a proliferation of metropolitan functions over a larger area. This was considered to be conflicting with the desired intensification of the metropolitan centre and with the desired preservation of the residential character of the northern urban area.

The above examples illustrate that though dealing with similar problems, specific analyses are often necessary. Specific circumstances in urban environments makes it impossible to make general rules about for instance the ideal way of laying out transport infrastructure in cities.

"Unaverage" clues

Relatively small "unaverage" clues can play a major role in city development. They can determine how large urban processes develop. To analyse these "unaverage" clues is, therefore, of essence to understand urban economic processes. *To learn how things are working, we need pinpoint clues. The "unaverage" can be physical, as in the case of eye-catchers which are small elements in much larger, more "average" visual scenes. They can be economic, as in the case of one-of-a-kind stores, or cultural, as in the case of an unusual school or out-of-the-ordinary theatre. They can be social, as in the case of public characters, loitering places, or residents or users who are financially, vocationally, racially or culturally unaverage (*Jacobs, 1961, p.442-443).

An example of how an unaverage clue can influence urban economic development is the politician who decide to construct a new transport system, only for keeping a certain promise to his electorate, but without a profound study of the consequences. This decision can have a large influence on the spatial distribution of activities in an urban area. Another instance is the nomination of a city as Cultural Capital of Europe. This unaverage clue may imply that a substantial larger amount of infrastructure investments can be realised than without this nomination. These investments can also have substantial consequences on the spatial distribution of activities.

In statistical analyses, these unaverage clues are normally not studied, because they are statistically not significant. These clues can, however, be essential for understanding specific urban developments. According to Jacobs (1961, p.443), in the past city planners often have regarded "unaverage" quantities as relatively inconsequential, because these are *statistically* inconsequential. Therefore, in her vision, often, they did not consider essential information to understand urban development.

To study urban regions as organised complexity systems, it thus seems to be essential to start with individual case-studies. It is important to analyse real situations to be able to understand how urban elements are influencing each other. Often, the best way to do this is by speaking with people directly involved in the problems to be analysed. These people can often tell more about the mutual relationships between urban elements than is written down in books and reports on these matters.

In comparative urban studies, we try to deduce general patterns of urban development, which can be noticed in a multitude of cities. These general principles can be used to explain or even predict developments in other urban regions. It is, however, necessary to be very careful in applying such principles to other situations, because cities can differ so much from each other. Thus, though, there is and always will be a need for such rules, in principle, every generalised rule of urban development has to be applied in a very careful way.

That cities ideally have to be studied as an organised complexity problem does not say that two-variable and disorganised complexity methods never has to be used for analysing urban development. For, these methods can play a secondary role besides methods of organised complexity. Comprehensive statistical studies, to be sure, can *sometimes* be useful abstracted measurements of the sizes, ranges, averages and medians of this and that. Gathered from time to

time, statistics can tell too what has been happening to these figures. However, they tell almost nothing about how the quantities are working in systems of organised complexity *(*Ibid, p.442*)*

6. The diversified city

In this section the theoretical urban concept, the *"diversified city",* is described. It can be considered an organised-complexity approach, because it is based on intricate relationships between urban variables. To Jacobs (1961) the diversified city is *the* key to a socio-economic successful *and* attractive metropolitan area. Only the urban areas that are sufficiently diversified will continually attract inhabitants, companies and visitors. Jacobs analyses at micro-level which requirements vital city districts must fulfil. She distinguished four basic preconditions for city diversity: need for primary mixed uses, small blocks, mix of buildings and concentration of people. They are not just personal preferences. She legitimises these preconditions by clear economic arguments.

Need for primary mixed uses

The first condition deals with the desirability of mixing main functions in city areas. A main concern of Jacobs is to create a lively urban district. *A city district, and indeed many of its internal parts as possible, must serve more than one primary function; preferably more than two. They must insure the presence of people who go outdoors on different schedules and are in the place for different purposes, but who are able to use many facilities in common* (Jacobs, 1961, p.152).

Primary uses are those which, in themselves, bring people to a specific place because they are anchorages. Offices and factories are primary uses. So are dwellings. Certain places of entertainment, education and recreation are primary uses. To a degree (that is, for an appreciable proportion of their users), so are many museums, libraries and galleries, but not all (Ibid, p.161*).* The distinction between primary and secondary uses is diffuse. It depends on the way how people make use of it. Some activities are for some a primary use, but for others they are secondary. For instance, shops in the city centres. Some people go to the urban centre, especially to visit these shops. But others go to these shops, while they primary were attracted by another urban function, such as a museum. Currently, activities are more and more combined, like shops in universities, entertainment in shops, merchandising in restaurants. This makes it more difficult to distinguish spatially primary and secondary uses. This does, however, not change anything about the basic idea of the need to mix primary functions in an urban district.

In principal, the more primary uses in an urban area, the larger the economic support for secondary uses, such as shops, restaurants and hotels. In a monofunctional area, such as a Central Business District, the economic support for secondary facilities is often low, because there are only potential consumers in limited time periods.

It is possible that the success of one primary function threatens the liveability and economic viability of an urban district on the long term. When for instance offices are in high demand, this function may crowd out other primary functions, like residences and entertainment.

Then the district will become more and more monofunctional and might lose is liveliness and its attractiveness. In the wake of these leaving primary functions more and more secondary functions will also disappear, because they lose their economic base, which was formed by consumers visiting different primary functions and, therefore, were distributed through time. In the end, the district might also lose its attractiveness for offices, because of a lack of desired secondary activities. Then, the area might face serious decline. In the sixties, there was a strong downward socio-economic pattern for this reason in downtown Manhattan in New York. *In time, a place that was once so successful and once the object of such ardent competition, wanes and becomes marginal* (Ibid, p.243). Jacobs speaks about the *self-destruction of diversity*, mainly caused by the success of such a district. She considered it an inherent process of city development and often difficult to notice, because it happens not overnight and it occurs in seemingly successful areas. *The process occurs only in small areas at a time, because it is a sequel only to outstanding success. Nevertheless, the destructive power of this process is larger and more serious than its geographical scope at any one time suggests* (Ibid, p.249). Therefore, it is an important task for city governments to notice the risks of such developments and to take adequate measures to prevent the actual occurring of such negative patterns.

Jacobs stresses the fact that there are clearly economic motives for diversified cities. *With primary mixtures, it is everyday, ordinary performance in mixing people, as pools of economic mutual support, that counts. This is the point, and it is a tangible, concrete economic matter, not a vaguely "atmospheric" effect"* (Ibid, p.164). Diversified urban districts are, according to her, indispensable to realise a long-term economic development in the whole metropolitan area. Successful diversity in city district can have important and substantial spread effects, noticeable in other city parts. *The more successfully a city generates diversity and vitality in any of its parts, of course, the better becomes its chances for building success, ultimately, in still other parts - including, eventually, those most discouraging to begin with* (Ibid, p.177).

Function-mixing will stimulate face-to-face contacts in urban districts. The need for this might increase in a world in which new technology applications increasingly seem to substitute such contacts. New information technology partly replaces physical transport. Fax, e-mail and internet are to some degree alternatives for physical transport, and teleconference meetings could in part be a substitute for face-to-face meetings. However, as Hall (1996) reminds us, ever since the invention of the telephone in 1876, but above all in the last half-century, the growth of telecommunication has marched in unison with the growth of personal business travel, including both in-business trips and business tourism in the form of conferences, fairs and conventions. Likewise, the growth of electronic data interchange can be expected to generate new flows of physical transport. Contrary to the beliefs of -amongst others- Wells and Wright (see section 3), the expectation is that there will always be an urgent great demand for face-to-face contacts, in spite of -or even thanks to- the development of new transport technology. Therefore, with the advent of new technologies, also urban-concentration processes might be strengthened.

Need for small blocks

Most blocks must be short; that is, streets and opportunities to turn corners must be frequent (Jacobs 1961, p.179). The size of city blocks directly influences the vitality of city districts and,

therefore, has direct economic consequences, considering the impact on the functioning of primary and secondary uses. This pleads for the construction of urban districts where the user is central. Thus, the *human size* is determining. Too large urban blocks function like spatial barriers; they hinder intra-urban interaction, while the presence of many intra-urban interactions is one of the main *assets* and catalyst of successful metropolitan areas. In successful city centres something greater, socially, culturally and economically, than the sum of its separated parts, is generated, thanks to the high extent of intra-urban interactions.

Long blocks, in their nature, thwart the potential advantages that cities offer to incubation, experimentation, and many small or special enterprises, insofar as these depend upon drawing their customers or clients from among much larger cross-sections of passing public. Long blocks also thwart the principle that if city mixtures of use are to be more than a fiction on maps, they must result in different people, bent on different purposes, appearing at different times, but using the same *streets* (Ibid, p.183).

Need for mix of buildings

The district must mingle buildings that vary in age and condition, including a good proportion of old ones (Jacobs 1961, p.187). *We are dealing here again, as we were in the case of mixed primary uses, with the economic effects of time. But in this case we are dealing with the economics of time not hour by hour through the day, but with the economics of time by decades and generations* (Ibid, p.189).

Only urban districts that already did develop during many decades (more than five to six) have a certain self-supporting vitality. In these districts an intricate mix of buildings can have come into being, attractive to a variety of users, varying from starting to "established" companies and from yuppies to complete families. Such a mix is normally not realisable in new, "drawing board" developed, areas. These new areas often lack sufficient diversity, and, therefore, attract a limited number of target groups. *Time makes the high building costs of one generation the bargains of a following generation. Time pays off original capital costs, and this depreciation can be reflected in the yields required from a building. Time makes certain structures obsolete for some enterprises, and they become available to others. Time can make the space efficiencies of one generation the space luxuries of another generation. One century's building commonplace is another century's useful aberration (*Ibid, p.190).

An entire new urban district like the Potsdamer Platz in Berlin lacks vitality and liveliness. At this moment, it is a clean and sterile district. It attracts lots of people because of its newness, not because of its "nice metropolitan atmosphere". Only after some decades, the district will probably obtain such an atmosphere when all the blind empty spots have been filled, and a mixture of categories of users will have been sprang up.

Need for concentration of people.

The district must have a sufficiently dense concentration of people, for whatever purpose they may be there. This includes people there because of residence (Jacobs 1961, p.200). A concentration of people in an urban centre serves a multitude of aims. One of the most important reasons is that it creates supporting capacity for all kind of facilities. High-grade cultural

facilities, like theatres and cinemas, can only be realised if there is a sufficient amount of people who potentially will use it.

Another important reason is all -in principle unlimited - possibilities of people meeting each other exchanging ideas, creating music, new products, etc., etc. *People gathered in concentrations of city size and density can be considered a positive good, in the faith that they are desirable because they are the source of immense vitality, and because they do represent, in small geographic compass, a great exuberant richness of differences and possibilities, many of these differences unique and unpredictable, and all the more valuable because they are (*Ibid, p.221).

Currently, in the perspective to achieve a more sustainable society, the striving for relatively high population densities is more and more considered to be desirable. By building compact cities scarce natural areas can be saved, and demand for transport can be reduced. For, in compact cities, the transport need in number of traveller kilometres is, ceteris paribus, lower than in wide-spread urban areas. Moreover, the principally unlimited possibilities that cities offer regarding cultural, social and economic activities are increasingly looked upon as a desired environment to live and work in.

The construction of compact towns has, however, not always been considered advisable. The idea of the *Garden City,* for instance, was to realise exactly the contrary: to build small –to a certain extent- self-supporting cities. Ebenezer Howard's garden-city concept (1898) was based on a protest against overcrowding in cities, the one issue upon which, he writes, "men of all parties" are "wellnigh universally agreed" (LeGates et al. 1996, p.345). Howard, of who is said to have laid the groundwork for the entire tradition of modern city planning, considered overcrowding an inherent problem of large cities. His ideas were strongly influenced by the time era in which he lived: in that time overcrowding was a large problem that seemed to be insoluble. Friedrich Engels (1845) and many other contemporary observers characterised the cities of the new industrialism as being horrendous overcrowded and facing ubiquitous misery and despair. There were daily threats to the public health and safety, not just for the impoverished working class but for the capitalist middle class as well (Le Gates et al. 1996, p.334). In those days, these negative perceptions of people concentration in cities were catalysing the creation of new urban concepts, like Howard's *Garden City.*

Now, *grosso modo* the quality of life in the metropolitan areas of the Western Hemisphere has been much improved compared with the situations of one century ago. Of course, with respect to the built environment in urban areas still much can and have to be improved. But this can be expected to be a never-ending process. If we do want to attract and retain people in cities, we have to fulfil some preconditions concerning the quality of live. Traffic nuisance has to be minimised, there have to be sufficient recreational areas and parks, people must perceive urban areas as relatively safe, the housing stock must be of sufficient quality, etc. In principle, people must have the feeling that they have sufficient space to live in metropolitan areas. Otherwise, they will alienate and, consequently, will intend to leave the city.

Discussions about the desirability of concentration of people in urban areas are sometimes troubled because of confusing high density with overcrowding. *One reason why low densities conventionally have a good name, unjustified by the facts, and why high city densities have a bad name, equally unjustified, is that high densities of dwellings and overcrowding of*

*dwellings are often confused (*Jacobs 1961, p.205). In the current society, however, both issues, high densities and overcrowding are different. Overcrowding means that facilities and infrastructure of an urban area are insufficient to accommodate the people living and working in that area. Then, as a consequence, the quality of the built environment will be harmed. However, by realising good and sufficient facilities and infrastructure in urban centres, relatively high population densities can be realised. Then, also in dense urban areas a relatively high quality of the built environment can be striven for. Moreover, a catalysing effect is the fact that high densities with (partly) relatively affluent citizens create a (financial and organising) supporting capacity for attractive metropolitan facilities. This can create an upward socio-economic pattern. More and better facilities attract more (affluent) people, that creates a larger base for new facilities, etc..

7. Conclusions

In this paper is dealt with three *general* methods of thought, that influenced different visions on city development. The *simplicity* method dealt with two-variable problems. It has founded many theories in physical sciences, which has led to many technological inventions in the 18th till the 20th century. The method also influenced the way cities were analysed and planned. The urban *Idealtype Garden City* can be considered to be influenced by this method of thought.

Broadacre City is one of the *Idealtypes* that is influenced by the disorganised-complexity method. It is a plan for an urban region in which the activities are proliferated over large surfaces. With help of statistical methods insight could be obtained in a relatively large number of variables. However, the relationships between these variables were and could not be analysed. The advent of the individual car helped to make *Broadacre Cities* to become reality. These wide-spread spatial developments are called *Technoburbs* or *Edge Cities.* They have arisen especially in the United States, where major cities are threatened by strong disurbanisation-developments. In these spatial configurations there is a strong separation of functions and the individual car is the dominant transport mode. People hope to find a better quality of life in the countryside, where they can find free space and attractive environments on the short term. On the long term, however, they threaten, by the ever-increasing need for space and mobility, this attractiveness and the quality of their built environment.

The third described method is the organised-complexity approach. This approach is especially applied in behavioural sciences The point of this analysis is to study the intricate mutual relationships between a considerable and manageable number of variables. Two things are important in this method: the number of the variables and the mutual relationships between these variables. Both elements make this method of thought quite appropriate to analyse urban areas. In this paper is also dealt with *methodology* of the organised complexity method. Jacobs distinguished three important aspects: inductive analysis, process thinking, and including "unaverage" clues.

Nowadays, there is a wide awareness that central urban planning is not possible and desirable. The very concept of the ideal city appears to belong to the past. The ideal cities of

Howard, Wright, and Le Corbusier have not been pushed aside by more up-to-date solutions. They have been superseded by the belief that no such "solution" exists (Fishman, 1982, p.267). Jacobs (1961, p.141) concludes in her study, "most city diversity is the creation of incredible numbers of different people and different private organisations, with vastly differing ideas and purposes, planning and contriving outside the formal framework of public action". In other words, cities are constituted by many actors in the course of many years. It is an illusion to think that "normal functioning" cities can be developed at the drawing table. This is also the conviction of Jacobs. She believes in a "bottom-up" approach with her urban 'Idealtype', the *diversified city*.

However, a certain degree of urban planning appears to be necessary to avoid chaotic developments. Therefore, ideas have to be generated about what kind of city developments is desirable to achieve sustainable urban economic growth. In other words, although we know that such an *Idealtype* will never be achieved, the development of a target configuration will still be necessary. It will help to judge individual urban developments according to their contribution to achieve the urban *Idealtype*. However, to realise advisable urban developments there always have to be sufficient flexibility in urban plans to be able to adapt to changing circumstances, like changing needs of urban actors.

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Notes:

[1] Jacobs (1961, p.429): A summary and interpretation of the history of scientific thought is included in an essay on science and complexity in the 1958 *Annual Report of the Rockefeller Foundation*, written by Warren Weaver.

[2] See Jacobs, 1961, p.16-25, 432-439, Howard, 1898, Geddes, 1915, and Le Corbusier, 1929 (In: Le Gates et al., 1996)

[3] Other well-known distributors of the Garden City ideas were Patrick Geddes and Lewis Mumford. Geddes tried to apply the idea at a larger, regional scale level.

[4] See Le Gates et al., 1996, p.334. Both Garden Cities are located north to London (UK), and were constructed before the death of Howard in 1924.

[5] See: Pol, 2002.