Measuring the residential environment

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Paper for the conference Doing, thinking, feeling home: the mental geography of residential environments
Delft, 14-15 October 2005

Abstract
Housing satisfaction is more and more being determined by the quality of the surrounding area, and its appreciation by the inhabitants. Housing is more than the care for just a roof for everybody: the residential environment matters.
Otherwise, there are processes of individualization, globalization and information which make people more footloose, building their own networks independent from the location their home is coincidentally situated. The neighbourhood is a space and a place at the same time, with a meaning for the residents. Everyone lives somewhere, in a house, a surrounding residential environment, located in a neighbourhood as a part of the town. Scientists, planners and politicians all pay attention to the quality of the residential environment. However, in most studies and reports there is not much attention for the concept of both the residential environment and the neighbourhood. Some just consider the other side of the street or the surrounding block, a couple of houses. Others are analyzing data or making plans for areas of thousands of dwellings. Both are planning for or doing research on what they call the neighbourhood.
This paper focuses on the concept itself of neighbourhood and residential environment. The paper goes into the next questions:
- What do people consider as their own residential environment and as their neighbourhood? What are differences? We have measured this in a pilot study in two Dutch cities, using a mental mapping method.
- How are neighbourhoods analysed and classified by both administrations as scientists. We have combined all types of classifications and distinguished into six typologies, six ways of looking to neighbourhoods and residential environments. These typologies are dependent on the aim and the viewpoint of the classifier, so the researcher, the planner or the politician.
- Do these top down classifications and bottom up considerations match. And what are consequences if they do not? We will show that the residential environment as perceived by the inhabitants, and as used by the administration often do not match.
At last, we go into conclusions for scientists, planners and politicians when they are working with data or plans concerning neighbourhoods or residential environments.

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Measuring the residential environment

1. Introduction

Housing satisfaction is more and more being determined by the quality of the surrounding area, and its appreciation by the inhabitants. Housing is more than the care for just a roof for everybody: the residential environment matters.
The recent attention for the neighbourhood can be explained by changes on the housing market. During the last decades the focus moved from the quantitative supply of dwellings towards a qualitative improvement of dwellings and the surroundings. This move is caused by developments in society, such as emancipation, growth of prosperity, education and mobility. Households have been changed and social structures have grown more complicated. These kinds of developments are visible in housing and living preferences. The recent focus on the neighbourhood can be understood as a renewed attention for the local importance of spatial identity (Mommaas, 2001).
Otherwise, there are processes of individualization, globalization and information which make people more footloose, building their own networks independent from the location their home is coincidentally situated. As a counterweight the need for a safe and quiet haven grows. This haven is the individual home and immediate surroundings.
The neighbourhood is a space and a place at the same time, with a meaning for the residents. Everyone lives somewhere, in a house, a surrounding residential environment, located in a neighbourhood as a part of the town. Scientists, planners and politicians all pay attention to the quality of the residential environment, the neighbourhood.

These notions have become important in housing policy and housing practice. Recently, the Dutch Ministry of Housing, Spatial Planning & The Environment (VROM) raised the question how to deal with the 'neighbourhood' in its new design of the National Housing Need Survey (WoON and formerly known as WBO). The WBO started in the late seventies as a substitute for the National Population and Housing Census. Since 1977, every four years between the 50.000 and 70.000 persons answer questions of their past, present and intended housing situation. The subsequent WBO's give vital information to understand the dynamics of migration patterns, the dynamics of housing market regions and neighbourhood types and residential choices. Since 1998 more attention is paid to the neighbourhood.
This article is based on a study for the Dutch Ministry that contributed to the new set up of the WoON-research project. OTB carried out this research project in order of the ministry with the aim to come to a typology of neighbourhoods that meet three aims:
- inhabitants should recognize the classification
- policymakers should be able to use it in practise
- make use of existing data on neighbourhood level.

The study had an explorative character; it was not the aim the find the ultimate typology.

This paper focuses on the first goal, and the relation between the first and the third goal. Three questions are considered:
1 How are neighbourhoods analysed and classified by both administrations as scientists. We have combined all types of classifications and distinguished into six typologies, six ways of looking to neighbourhoods and residential environments. These typologies are dependent on the aim and the viewpoint of the classifier, so the researcher, the planner or the politician.
2 What do people consider as their own residential environment and as their neighbourhood? What are differences? We have measured this in a pilot study in two Dutch cities, using a mental mapping method.

3 Do these top down classifications and bottom up considerations match. And what are consequences if they do not? We will show that the residential environment as perceived by the inhabitants, and as used by the administration often do not match.

At last, we go into conclusions for scientists, planners and politicians when they are working with data or plans concerning neighbourhoods or residential environments.

The paper is organized as follows. In section 2 we order the range of neighbourhood typologies into six points of view. In section 3 we go into the geography of space and of place and state that these do not always match. There is a difference between administrative neighbourhoods and people's perception, which we surveyed in a pilot project, described in section 4, and present results in section 5. In the last section we combine the three research questions and formulate conclusions and recommendations for science, policy and practice.

2. Neighbourhood typologies

There are a lot of definitions about the concept of neighbourhood, daily environments, living environments or notions that go into the direct environment of inhabitants. For an overview we refer to the mentioned study (Wassenberg et al, 2005). Making typologies of people's daily environments is not a new activity. Since the 1970s a range of neighbourhood typologies is set up, on base of different criteria, with different aims and by, and for, different actors. This has led to equal amounts of neighbourhood typologies.

Typologies divide neighbourhoods on the base of particular criteria. These can be singular (based on one criterion, such as building period or selling prices), monothematic (based on one theme, such as physical or social) and multi thematic (for example a combination of physical, geographical and behaviour criteria). Each classification (or typology) has advantages and disadvantages. A multi thematic typology looks more nuanced and sophisticated, but at the same time can be overcomplicated and arbitrary.

Neighbourhood typologies can be distinguished into the degree of firmness of the used criteria. Hard typologies make use of objective, measurable data on for example dwellings, surroundings, the location or the population. Soft typologies make more use of perception, appreciation, image and life styles.

The Neighbourhood hexagon

In the research project over twenty typologies are selected and evaluated. These are summarized in the "Neighbourhood hexagon" (see Figure 1). In this figure six kinds of typologies are distinguished, based on six points of view, six ways to look to a neighbourhood. All typologies from our study fit into these six points of view. These six are:

- physical: the way an area looks like, types of houses, architecture, building period, functions, urban design
- geographical: the location in the city and in the wider region
- economical: tenureship, housing prices, position on the housing market
- social: criteria concerning the population, such as incomes, households, level of education, age and ethnic structure.
- Use and behaviour: these indicators refer to the way people use their surroundings. Lifestyle typologies belong to this.
- Mental criteria: these have to do with subjective notions and the perception and appreciation of the neighbourhood such as sphere, identity, reputation, social status and aesthetics.

Each user of typologies looks according to his or her own point of view. In Figure 2 two different areas are classified according to all six points of view, which results in different names for the same two areas. There is no best point of view. This belongs to the aim of the typology and the way someone wants to use it.

Figure 1 Six types of classifications according to the 'Neighbourhood hexagon'

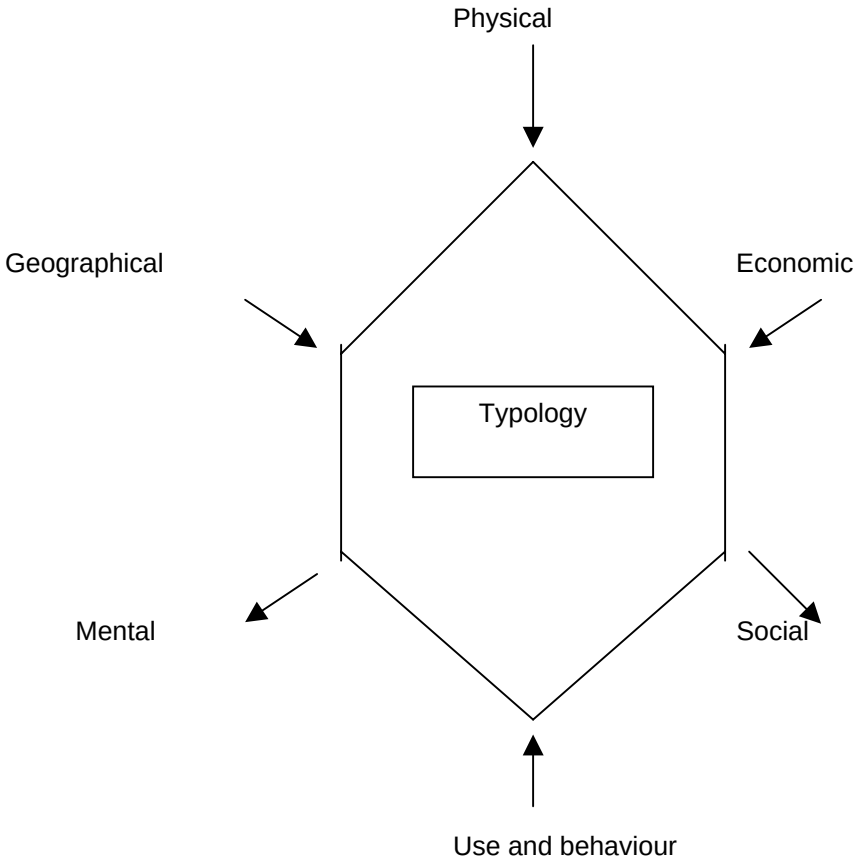
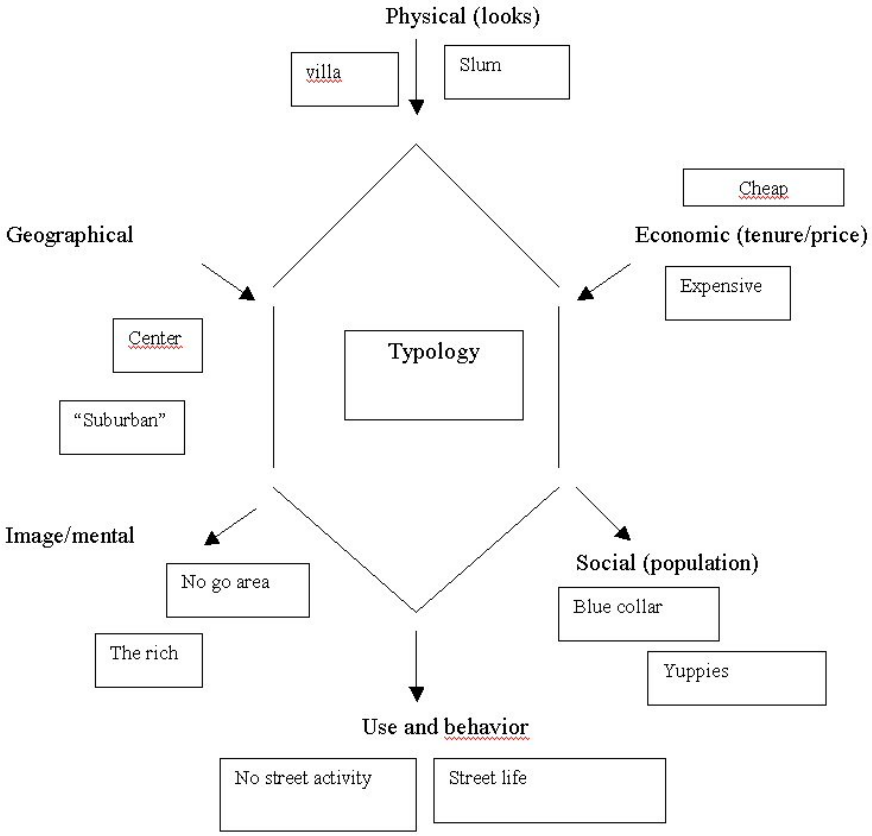


Figure 2 Two areas according to the six types of neighbourhood classifications



Source: Wassenberg et al., 2005

3. Geography of space and geography of place

In many studies we can discern a further orientation towards the relationship between residential satisfaction and choices, and housing policies in connection with the dynamics of neighbourhoods and cities. However, a remarkable ambiguity can be distinguished with the concept of neighbourhoods. On the one side, housing satisfaction is more and more being determined with the quality of the surrounding area: the neighbourhood as a place. It is a trivial statement: location matters in the valuation of the past, the present and the future housing situation of housing consumers. Processes of individualization, information and globalization make people more footloose, building their own networks independent from the location their home is coincidentally situated: the neighbourhood as a space (Goetgeluk 2004). But space is more than an activity area (Dijst 1995). Space has also a meaning, what we call place. Place and space are related to each other. Goetgeluk and Wassenberg (2005) elaborate on the concept of the geography of space and the geography of place in relation to this research project.

In housing studies the notion of the geography of place is reflected in the concept neighbourhood. The neighbourhood seems to be a compound of geographical, sociological and physical/design origins and is therefore a reflection how different sciences look at the concept of neighbourhood. In a geographical sense it refers to the absolute and relative distance and size of an area within a broader spatial area, like a city, conurbation and of course the housing market area. The neighbourhood is valued by 'hard' attributes like the composition of the housing stock, the households, the square meters retail, the composition of the labour market and jobs and so on, like choice models show. By means of for instance potential models, which are derived for gravity models and entropy models, neighbourhoods are ranked by attraction. Statements like 'problem, redlined, dynamics, stable, declining' reveal the underlying reasoning of thinking of the valuation.
In a sociological sense the neighbourhood refers to the social distance between individuals and the groups they belong to or want to belong to (see Van der Horst et al, 2001). The word 'community' is a keyword in urban sociology. Wirth (1938), a member of the Chicago School, argued that social ties deteriorated in the rapidly growing migrant cities of the United States of America. The community changed into society. However, other researchers at that time found also strong communities in which bonding and bridging capital (Putnam 2000) was high. In a sociological sense the complexity of the geography of space and place is a bit more complex.

Administrating the neighbourhood
In many studies the neighbourhood is conceived as a spatial administrative unit. Scientific and policy inferences are drawn upon statistical significant differences between neighbourhoods. Neighbourhoods are top down classified and valued as problematic or not, as favourable or not, and so on. Is this justified? What are neighbourhoods, is it possible that many presentations in charts and maps are not valid since we have not tested for the heterogeneity of important variables in neighbourhoods?
In both macro and micro perspectives the choice of the area chosen in the research design is often triggered by the growing availability of spatial data (Goetgeluk & Musterd 2005). This has especially become true after the introduction of Geographical Information Systems (GIS) and (government) programs to collect data and link these in a similar way by means of an area code. In the Netherlands for instance collecting data by zip code 4 is very popular. The zip code is actually a strange spatial unit for housing research. It reflects the addresses a postman can visit on a day without ringing twice. In the country as a whole there are 4.000 zip codes (4-position codes). In an average middle sized city such as Delft, Alkmaar or Amersfoort (with about 100.000 inhabitants) there will be seven to ten 4-position zip code living areas. As a general rule can be postulated that the smaller the town, the more mixed a

zip code area will be. Each zip code area also has two letters, which makes it a 6-position zip code. An average urban 6-position zip code area counts about 20 dwellings.
So, two factors need to be discerned if we apply the administrative data. Is the spatial scale, i.e. the administrative area, valid? In the case of residential mobility studies and neighbourhood appraisals, we must be careful that the size and shape of the administrative map matches with the mental map of the household involved. But if a mental map is important, than we must agree that this has a relationship with the meaning of space for housing or the geography of place.

4. A pilot project

This article concentrates on the relation between top down, administrative based neighbourhoods and neighbourhoods as these are experienced by inhabitants. The perception of residents is tested with a survey, which is set up as a pilot project. This pilot was part of the mentioned research for the Dutch ministry of Housing.
The pilot was done in two cities in the Netherlands: Utrecht and Alkmaar. In each of these cities a number of administrative neighbourhoods were selected based on the standard criteria applied in various typologies. We chose for neighbourhoods that were likely to be heterogeneous regarding to the housing stock, household composition and so on. In the pilot 50 persons were interviewed in the two cities, in each city five inhabitants in five streets with the same six-position zip code. As an average urban (6-position) zip code contains about 20 addresses, it is important to mention that the respondents live close to each other; they are almost neighbours.

Digital mental mapping
All 50 respondents started to make a mental map of their direct their 'direct living environment'. This was defined as the area that they use on a daily basis per week. We also asked them to show the activity centres like shops, parks and so on. This happened digitally, on a laptop. On the screen was a potential 'awareness space' of a square kilometre, divided in 400 cells of 50 x 50 meter. The grid map was overlaid with a topographical map. The interviewer had to test in advance if the respondent was able to recognize this map at all. The drawing itself was done directly on a laptop. The respondent could appoint each cell, starting with his own house in the middle, to belong or not to his or her direct living environment. Later on in the survey – in time about half an hour later – we asked the respondents to do the same for what they consider to be their 'neighbourhood', after asking them some specific questions about their neighbourhood.
We have to state the limits of this pilot study: the amount of interviews was small, conclusions give an indication, the respondents were picked who were at home, as representativity was not the aim of the pilot, and the elaboration of some of the typologies into questions was not always good. These shortcomings easily can be overcome in professional follow up, as the pilot as a whole has been successful. Mental mapping on the laptop was a success and there has become more insight in the relation between mental and administrative neighbourhoods.

5. What are the direct living environment and the neighbourhood?

Policymakers, professionals, but also researchers like to work with administrative neighbourhoods. In the Netherlands these often are the 4-position zip code areas as mentioned before. Data about zip codes can easily be used and exchanged, and furthermore it is nice to show it graphically in attractive maps.
However, the neighbourhood as a resident experiences it, usually is different. In the pilot we have differentiated between the direct living environment and the neighbourhood, that could

be larger. An important question therefore was what people consider as their daily environment and what as their neighbourhood.

Aggregating individual maps into heat maps

In the analysis of space we made several steps. The first step was to sum up the individual mental maps. The aggregate map per street has values ranging from 0 to 5, since per street 5 people were interviewed. This numerical variable allowed us to make a choropleth. This resulted in a 'heat map': the highest score 5 is very red. Such a heat map shows the grid cells that are shared, in other words, the shared direct living environment. The darker the colour of the cell, the more often it is mentioned, and the more shared this grid cell is experienced.

Figure 3 shows ten heat maps, only for the ten streets in the city of Utrecht. Per 6-position zip code (street) each time two heat maps are presented. All residents made two mental maps, one of their direct living environment in the beginning of the survey, and one of their whole neighbourhood as they perceive it at the end, which was about half an hour later. The left column in figure 3 shows how people consider their direct living environment, while the right column gives their perception of their whole neighbourhood.

Some conclusions can be drawn from figure 3. First, the daily living environment and the neighbourhood look rather similar. This means that inhabitants consider their neighbourhood equal to their daily use area. Secondly, most people orient themselves on streets on which they pass with their daily activities.

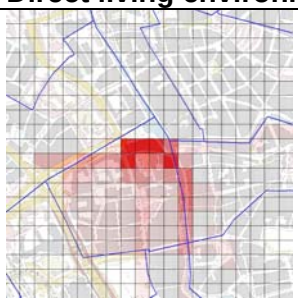
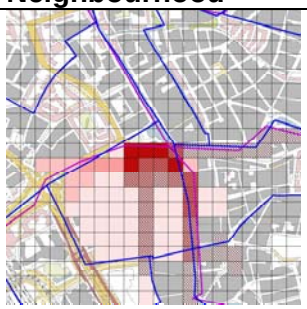
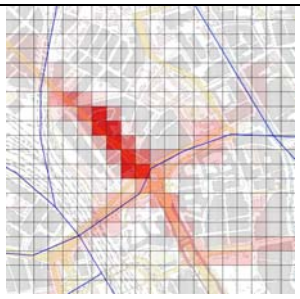
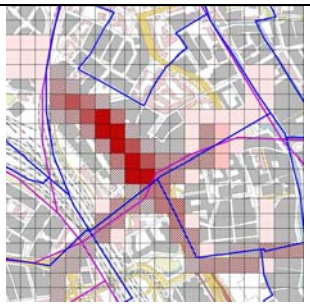
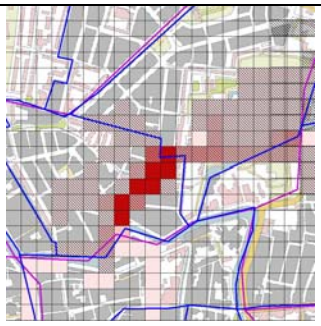
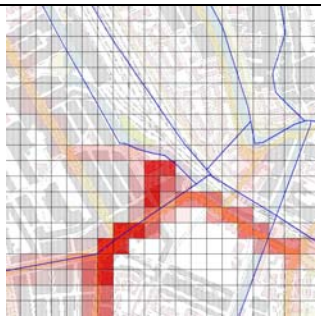
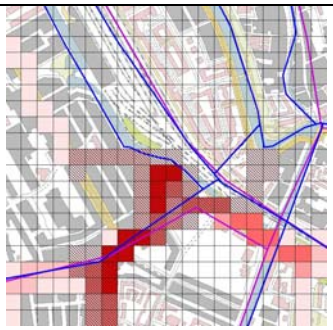
Both conclusions we work out below.

The size of the neighbourhood

The heat maps show that the size of the shared daily living environment is rather small. In Figure 4 this is worked out. There are 400 cells in the square kilometre; all of these 400 could have been mentioned by at least 1 respondent. However, we observe that the number of mentioned cells is circa 100 (25%). This equals an area of 25 hectare, which is 50 football fields. However, these 50 fields are hardly shared by the inhabitants. If we only count the cells that are shared by at least two of five respondents, the shared area halves to 25 football fields. The surface area that all five respondents mention on average, is not more than 2.5 football fields. If we assume a neighbourhood in a Christallerian isomorphic area, we get a circle with a radius of 63 meters.

When we put the limit of common area with four of the five inhabitants – because they are almost each others neighbours – the shared daily living environment is only 2.5 hectares, or five football fields, or an area as large as a circle with a radius of almost 90 meters. When we state that someone's perception of the neighbourhood starts with the fence of his garden, we can round it up to a radius of 100 meters from the middle of someone's house. The table shows the results. We have to keep in mind the restrictions of the survey, but the conclusion is clear: the shared daily living environment is limited. The neighbourhood might be larger than the daily living environment, but most residents consider hardly any differences, as shown by figure 3. The neighbourhood, used in many reports and documents, is hardly larger than the daily living environment.

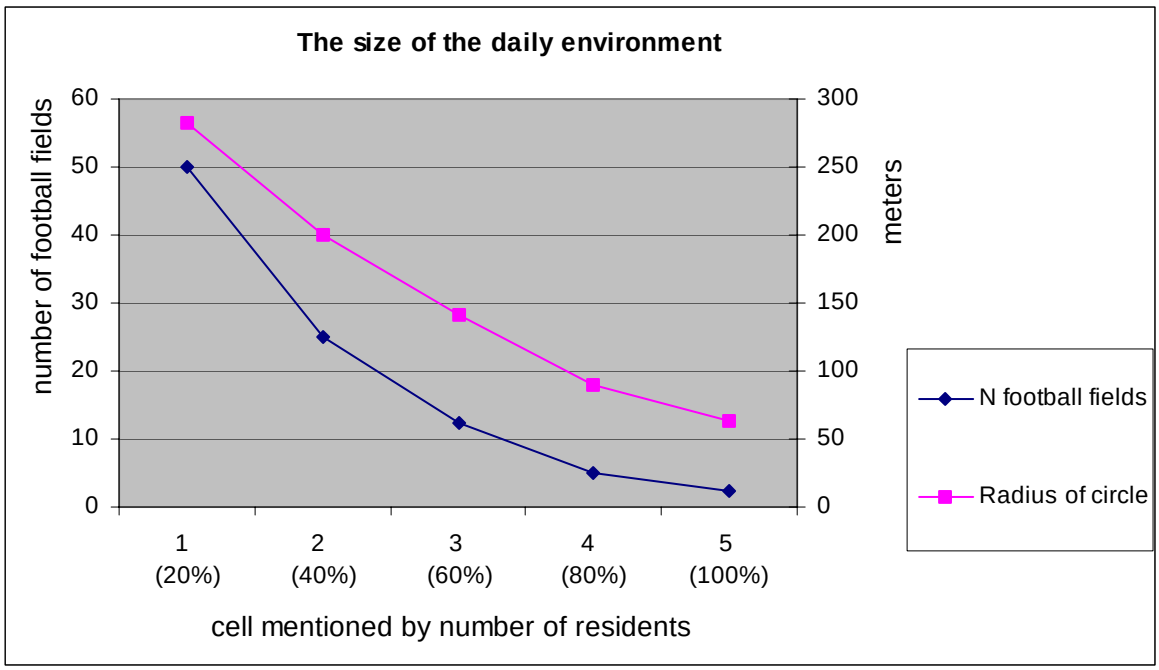
Figure 3 Heat maps for the direct living environment (left) and the neighbourhood (right) in Utrecht overplayed by the zip code 4.

Direct living environment	Neighbourhood
 **3511**	
 **3513**	
 **3514**	
 **3521**	
 **3572**	

Source: Wassenberg et al., 2005

Figure 4 The size of the daily living environment

Cel mentioned	Number of cells mentioned		Size of shared area		
	Abs.	In %	In ha.	In football fields	In a circle with a radius of:
potential	400	100%	100	200	564 m.
1	100	25%	25	50	282 m.
2	50	12,5%	12,5	25	200 m.
3	25	6,25%	6,25	12,5	141 m.
4	10	2,5%	2,5	5	89 m.
5	5	1,25%	1,25	2,5	63 m.



The shape of the neighbourhood

The heat maps show a street orientation and not a block orientation due to the built environment. The built environment is not isomorphic, but mostly structured by transportation infrastructure, this implies that people must be street oriented. Not mapped here, we concluded that this street orientation was related to activity centers. In Utrecht's zip code 3572, we observed that our respondents visit a park and a large local retail center. The same is true for zip code 3513. The map shows that these respondents do not care about the administrative neighbourhood.

We concluded that the direct living environment has on average the size of five football fields, or the circle with the radius of 100 meters, but hardly anyone will perceive this shape. Definitely not in a city. People perceive their neighbourhood fragmented, with their home as the core and streets going all sides, like the fingers on a hand. A person whose address is located at the crossing of streets will have the largest neighbourhood. In all directions and on

both sides of the road we can go 65 to 80 meters in all wind directions. In areas with many streets the neighbourhood will have another shape than in areas with flat blocks amidst greens. The smallest neighbourhood is found in a cul-de sac.

The typologies according to the residents
Earlier in the research project, we clustered all kinds of neighbourhood typologies that came out of the literature into six major types. We asked all respondents to assign their just made mental neighbourhood according to each of these six types, to test their perception. They might be workable for professionals, scientists or politicians, but do people on the street recognize themselves in these classifications, and which kinds of typologies do appeal to them the most? We stress that the pilot's aim was to test these typologies and not to define new ones. The Physical typology was revealed as pictures of streets. They were selected by the Ministry of VROM (2002), which was based on an earlier research (RIGO 2002). The categories of the other typologies were described in words. The typology 'Image/Mental' is a relative new one and is related to the analysis of life-styles based on unravelling values and norms. Values can be seen as steering principles, while norms can be seen as instruments defined by (commonly) shared meanings, dominance and legislative power. The practical question is what matters in housing choice and evaluation of people: the norm or the value (see Coolen and Hoekstra, 2001). Each of these typologies has also its distinctive users in policymaking and practice. Urban designers or supervisors of corporation use the 'Physical' perspective. The social perspective is often found in use by retailers (shopping behaviour) and social services. Use and behaviour seems important for the police and for corporations. The image perspective has become popular in marketing based on branding (Wassenberg et al. 2005).

In the pilot study the respondents could answer questions according to these six points of view. We used a boxplot to analyze how heterogeneous the answers were. Moreover, we had to test if the categories of the typologies were perceived as vital and to what extent the different typologies measured the same or were linked (interacted) in some way or another. We applied a Chi square automatic interaction detection analysis (CHAID, Kass 1983) to test both. In this paper we don't go further into these analyses, but we refer to the main study, and Goetgeluk and Wassenberg (2005).
The test of the six kinds of typologies showed that most respondents could rather easily fill out the questions, at least for the first five. The 'mental' one was the hardest. Some questions in this pilot study did not work out too well, something that should be improved in a next round.

The typologies are not always very well categorized from the perspective of the respondent. It is remarkable that residents give different names to apparently comparable classifications, such as the type of houses, the location or the kind of inhabitants (for example for age or ethnicity). This implies that mismatches between typologies that policymakers and scientist use and their 'clients' are likely to occur. The CHAID-analysis has confirmed that the Physical, Geographical, Economic and Social typologies are indeed important, but can be derived from spatial data sources at the street level, although the Social Typology is a bit tricky due to the data we now have. Not all data is available or accessible, but there is more than we use at this moment. These data refer mainly to 'facts'. The key typologies for the national WoON research project are the 'Use & Behaviour and the Image/Mental.

6. Conclusions

The research questions in this paper were:
- How are neighbourhoods analysed and classified by both administrations as scientists. And is one classification possible that is recognizable by residents, useable by professionals and can be filled with existing data?
- What do people consider as their own residential environment and as their neighbourhood? What are differences?
- Do the top down classifications and bottom up considerations match. And what are consequences if they do not?

The first question deals with the classification of neighbourhoods. We have combined all types of classifications and developed the figure of the “neighbourhood hexagon”, six ways of looking to neighbourhoods and residential environments. These typologies are dependent on the aim and the viewpoint of the classifier, so the researcher, the planner or the politician. Unfortunately, there is no such thing as the ultimate typology for everyone, nor there is a best one. The reason is simple: the right classification depends on the aim and of the user. A real estate broker looks different the same area as a social worker, and a policeman different as a developer, a school teacher or a tourist. And the one resident is not the other. All of them look from their own point of view. It is worth to realize that each typology serves it’s own goal.

The second question is about people’s perceptions. This is answered by the pilot study in two Dutch cities, using a mental mapping method. The conclusion is that people consider their direct living environment and neighbourhood as more or less equal. The shared daily environment shows to be rather small, so is the shared neighbourhood. It is not more than 2.5 hectare, or five football fields, or a circle with a radius of 90 meters, which can be up rounded to a 100 meters from the middle of somebody’s house.
Moreover, people do not think in circles or rectangular areas, but in streets and destinations for their daily activities. Altogether, the whole neighbourhood is only five minutes by foot.

The last question deals with the relation between the top down classifications and the perceptions of neighbourhoods.
Policymakers, professionals, but also researchers like to work with administrative neighbourhoods. However, the neighbourhood as people perceive it, is different. The heat maps show that perceived and administrative areas are mixed up. This not surprising, as people define their neighbourhood according to their daily use of streets, destinations and activities, and not because of administrative boundaries.
The administrative neighbourhoods generally are much larger than the perceived neighbourhoods. This implicates a warning for professionals that their administrative classification is not the same as what residents call their neighbourhood. The size of the neighbourhoods is different in discussions about neighbourhood plans, a neighbourhood warden scheme, a neighbourhood centre, a neighbourhood cleaning action, a neighbourhood barbecue or a neighbourhood approach.
Policy documents, but also research reports often are presented to be true for the larger (administrative) area, without looking to the internal homogeneity of this area. A neighbourhood might have a negative image, while only a single street is bad. Otherwise, a problematic area can be neglected, because some more remote expensive parts moderate the poor figures.

Information about the neighbourhood
The immediate cause of the research project was the new set up of the Dutch national housing survey (WoON). The recommendation is not to ask residents all kinds of questions

that can be obtained from other sources as well, besides some control questions. There is enough information available on a low scale level (6-position zip code), and moreover people do not always give reliable answers to apparently obvious features like housing types, location and populations.
Of the six points of view from the neighbourhood hexagon, there are plenty statistics from sources on the physical, the geographical, the economical and the social points of view, although the latter are not always reliable. Data about use and behaviour are oriented on marketing purposes. For the mental point of view there are no other sources. This means that available information about the dwelling, the location, the area and the inhabitants can be used and that the survey can concentrate on aspects of perception, use, behaviour, wishes and satisfaction.

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