

Fusion Point Gothenburg

Draft of Position Paper for Seminars 21-22 January 2019

PRELIMINARIES

The following is a draft of a paper prepared for seminars within the Fusion Point Gothenburg project 21-22 January, 2019. It is divided into three major sections. First a short section aiming to position the theme of the paper and seminar, spatial form, within the broader field of urban development. Second, a section presenting a set of principles concerning the workings of spatial form in relation to urban processes and as central material in the practice of urban design. Finally, a major section consisting of three parts, first, a comparison of the spatial form of Gothenburg with other cities, second an interpretation of the current spatial form of Gothenburg against the background of this comparison as well as the earlier presented principles, and, third, some conclusion about the implications of this for the future planning process of Gothenburg.

Importantly, the methodological approach of the Fusion Point-project is design methodological, meaning in this context, that we aim to generate applicable and usable knowledge based on current status of research in the field, by presenting hypotheses based on this research about concrete and real urban development cases to both academics and practitioners in the aim to test the validity of these hypotheses. This naturally leads to positive and negative feed-back, which forces us to go back and rework our hypotheses, which then can be tested again. Hence, in the following we deliberately try to express our conclusions, that actually are hypotheses, as distinct as possible to also get as precise responses as possible, but should not be mistaken for self-assuredness.

1. POSITIONING SPATIAL FORM IN THE FIELD OF URBAN DEVELOPMENT

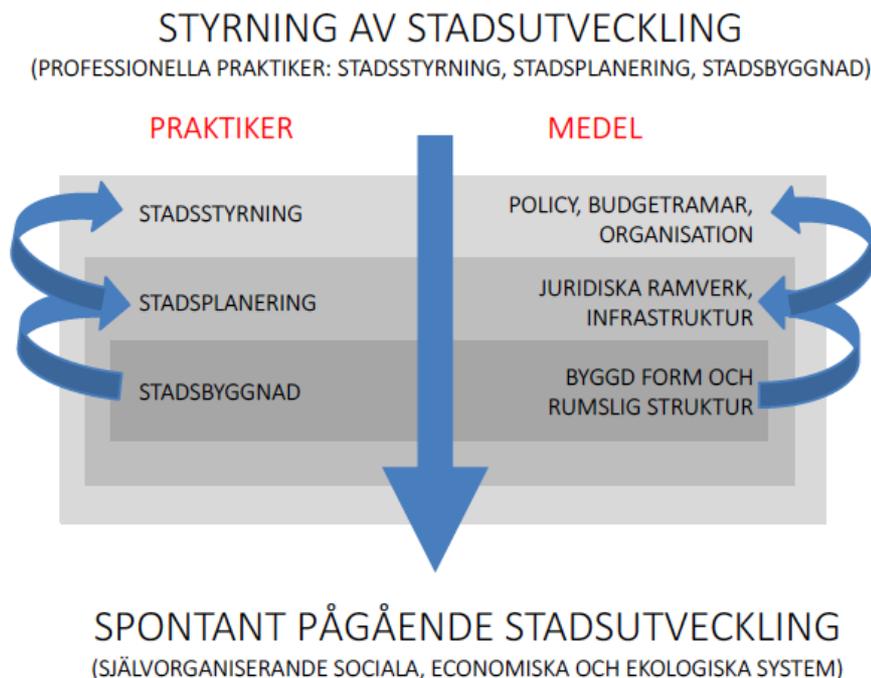
1.1 The field of urban development

There has in recent years developed a vague terminology by which the field of urban development (stadsutveckling) is defined. On the one hand, there is confusion between the terms urban development (stadsutveckling), urban planning (stadsplanering) and urban design (stadsbyggnad), (more about that below) and on the other hand between urban development (stadsutveckling) and societal development more generally (samhällsutveckling/-planering) and also between urban development and the development of the built environment more generally (samhällsbyggnad). Starting with the latter it is quite clear that urban development only is a sub-area of the broader field of societal development, where the latter takes in more or less everything that fits into politically driven public efforts, such as education, health care and transport. It is clear that all of these by necessity have dimensions that need physical support through the planning and design of the physical environment, but the planning efforts specifically concerned with education etc., are not dominated by this physical aspect but by other dimensions relating more directly to issues of education, health and transport. These planning efforts are therefore also embodied in practices with quite a different expertise than what we generally find in the urban development practices. Urban development instead concerns exactly the planning and design of the built environment, or more fundamentally yet, it concerns land development, that is, the obligation for all Swedish municipalities to develop and maintain the land within their jurisdiction, for instance by allocating land-use and identifying major infrastructural investments as well as through continuously structure and shape the built fabric within its boundaries. Obviously there needs to be exchange between these fields but they are not the same thing.

1.2 The practices of urban development

While the institutional framework of the urban development process is absolutely central, both when it comes to the rule system it needs to follow according to Swedish law, and the organisational structure of agents, this will be an empty vessel if we do not identify the agency in such a governance framework and moreover, in turn identify the agency framework of these actors themselves, both given their particular role in this process but also when it comes to the kind of skill and expertise they bring or should bring to the urban development process whereby they embody that role.

To illustrate the idea and also further position the theme of the current seminar, we have in the image below, without any attempt to be complete, identified three such practices: urban governance, urban planning and urban design, which moreover are set in boxes within boxes, where urban design is a sub-area demanding particular skill and expertise within urban planning and urban planning a sub-area demanding particular skill and expertise within urban governance, which in itself is a practice demanding particular skill and expertise. We have also chosen to identify at least part of the particular means specific to each practice demanding particular skill and expertise, since all these practices by necessity need to use particular means to structure and shape self-organising urban process into politically sanctioned directions; this being the core task of these practices.



Hence, we suggest urban governance to primarily use discourse and discourse formalised into policy as its means, not least setting the framework for urban planning that rather use land-use regulations and the design of property rights as their means, which again create the framework for the practice of urban design, which primarily use built form and the spatial structure that it generates as its mean to implement policy in urban development projects. The issue of the means is here central because it defines the kind of skill and expertise that is demanded of the different roles, which in turn generate agency in the institutional structure that is supposed to efficiently drive the urban development processes. The image also gives us the opportunity to position the theme of the current seminar to specifically concern the practice of urban design and its particular means (or technology) spatial form, within the larger framework of urban development, which also means that we do see how this theme only is a part of a larger machinery.

1.3 Analysis vs Design in urban design practice

In the following there will be several images and discussions that may be interpreted as analyses of spatial form. However, it is important to keep in mind that such analyses cannot add anything to artefacts of spatial form that not is already there. What these analyses do is to reveal dimensions of spatial form that otherwise is hidden or not directly accessible to the eye. For instance, several of the analyses concerns revealing the relation between different spatial elements, such as the relation between a particular street space and all other street spaces, which is something not easily captured and certainly not visible in the individual street space. The measure of centrality (see below) does exactly this however, and by colouring each street space according to its degree of centrality we get a new pattern that we will see, not is immediately intuitive. This pattern, however, is not something added to the two areas of spatial form but is something already inherent to them but not revealed.

Given the relation that we will demonstrate below, which has repeatedly been supported by empirical studies, that this revealed pattern, relating to the relation between individual street spaces, tends to correlate quite distinctively with pedestrian movement, we rather should understand this pattern as a particular dimension of spatial form of great importance for urban design, since it connects spatial form – the built city – with the lived city. Moreover, we realise that this pattern, or this dimension of spatial form, is a product of urban design – perhaps one of its most important products – and something that can be consciously designed. Importantly, it is a dimension of spatial form that will be an inherent part of spatial form whether we acknowledge it or not – including its influence on pedestrian movement – why we as urban designers rather than ignoring it, should be obliged to take responsibility for it, and when being successful in designing it, take pride in it.



2. PRINCIPLES OF SPATIAL FORM

2.1 Ontology of cities

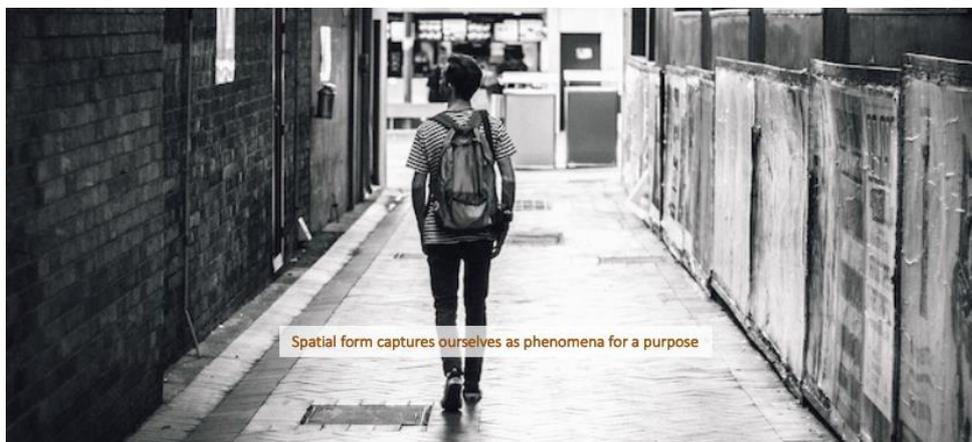
The physical city and the lived city - The focus for this seminar is the practice of urban design and the primary medium used in this practice, built form and the spatial structure it generates – where we at times will speak about spatial form as interchangeable with built form since we cannot have the one without the other. The focus on spatial form means that we imply an ontological division of cities into, on the one hand, a physical city of built form and spatial structure and, on the other, a lived city of social and economic processes as well as everyday urban life. We moreover imply, in accordance with the argument above, that the first is a means to structure and shape the latter. We do realise that there are many feed-back loops here, where not least urban processes lead to changes of the built

city, but from the point of view stressed here, that is, the perspective of the urban designer, the primary relation is to try to design spatial form in support of different dimensions of urban life.

This is important, not least since we in planning documents often find different spatial forms listed as goals for urban development. In the Gothenburg example for instance, we often see the ideal of densification listed as a goal rather than a means, which is problematic, both since it hides the real goals implied in these means – a vibrant street life for instance – but also complicates an affective application of these means – if density is what it is asked for it is pretty easily solved, but if it is a vibrant street life, we may need to look deeper into the tool-box and also apply density in a particular manner. Even though we also realise that it is not always so easy to make a strict distinction between means and ends here, a lot of the following discussions do rely on fundamental distinction between the physical city and the lived city as well as an understating where the first to a great degree is a means for the latter.

The city as complexity –

The city as technology –



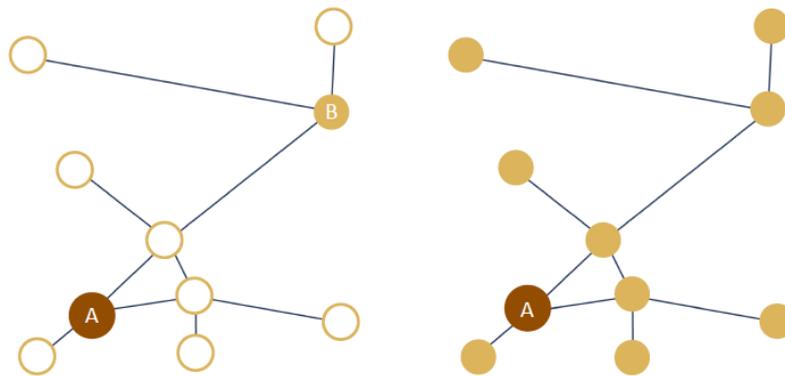
The path dependency of cities – First, the material we work with in urban development (and not least in urban design as one of the practices realizing urban development) is already there to the greater extent in the sense that the city is already there and this is not something we in any simple manner can add whatever we want to. It is already limiting and pointing out which directions are possible and which are not, in other words, we are path dependent and ignorance of this fact will lead to failure.

Cities as parts-whole problems – Second, this material does not concern the local entity of the particular site, but is set by the spatial structure of the city as a whole, since the whole thing about urban development (and again urban design) is a parts-whole problem, where what happens in one place is both limited by what happens in other places as well as it rebounds back to what happens in these places. Hence, if we do not have a description of the city as a whole (or as large parts as possible), we will fail to understand both what is necessary to do and the effects of what we are doing.

The evolutions of cities as necessary for understanding – Third, the material we are working with is not only already there and concerns the city more or less as a whole, it also concerns the history of the city, since only by viewing how the city has evolved and understanding how this has generated certain processes over time, do we understand the limitations set by our path dependency and can intervene in an informed and professional manner, not least as urban designers structuring and shaping the spatial form of the city. In short, without and understating about how things have evolved we run the risk of misinterpreting the current state and draw the wrong conclusions about how to intervene.

2.2 Principles of spatial form

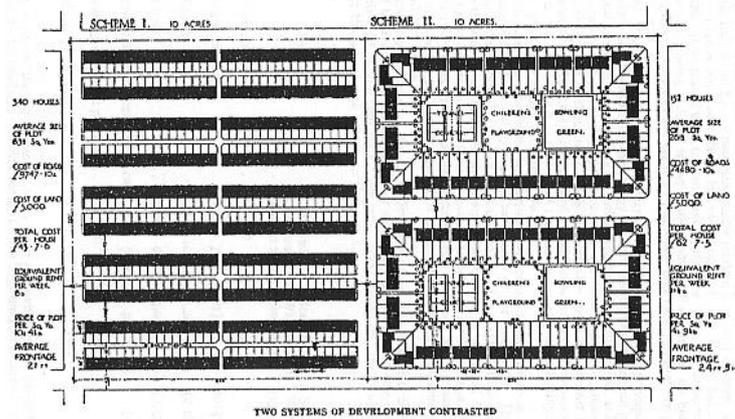
Principle 1: Distance to everything reveals architectural structure – The most central concept when it comes to space is distance; distance is simply what creates space. We are also we accustomed to measuring space both in everyday life and more particularly in the practice of architecture and urban design. We then primarily measure distance in physical terms but it is important to realise that for many practices closely related to urban design, such as traffic planning, distance is more often measured in time and when joint to economic calculations also as economic cost. Even when sticking to physical measures, we can also here measure distance in many ways, for instance metrically or topologically. More important for the following discussion is that we may measure distance from one location to one other location but also from one location to all other locations or even from all locations to all locations. The latter measures are different variations of centrality measures, which as we shall see are very powerful in bringing forth architectural dimensions both in building and cities. Such centrality measures can be measured both for the system as whole but also for a set radius from each location measured from. There are also different forms of centrality that can be measured, where the ones used here are, on the one hand, closeness centrality that measures how close a location is from all other locations (or within a set radius), and on the other hand, betweenness centrality, that measures how many paths between all locations within the system (or within a set radius) that passes the measured location.



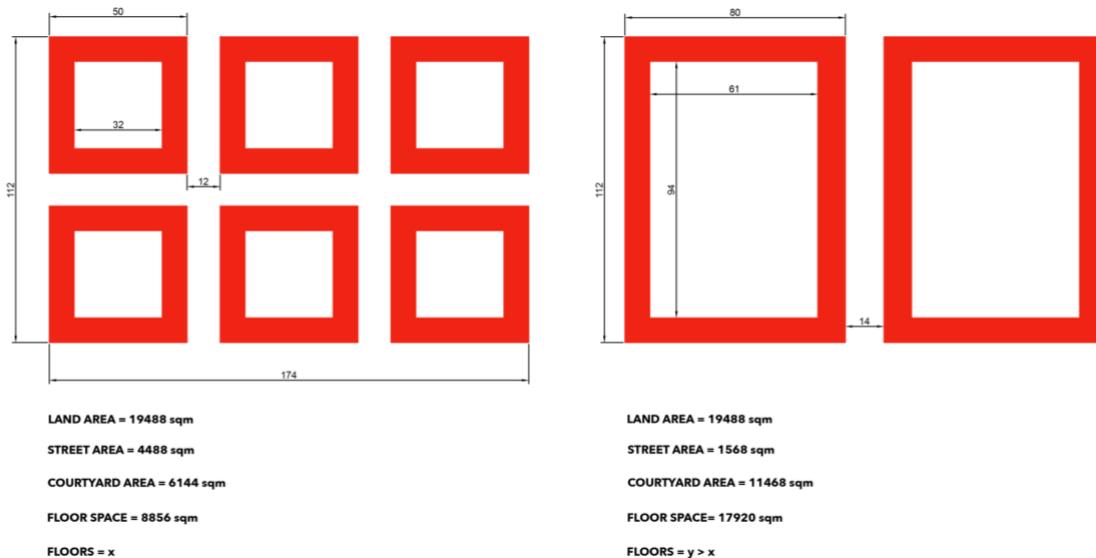
Principle 2: Still nothing gained by overcrowding – While distance often is taken for granted and not much discussed, the mostly discussed variable of spatial form is density, which also may be measured in many ways. On the one hand as area-based density and on the other as location-based density. The first concerns how much built space you find within a particular urban area, as for instance a district, a block of a plot. The second, concerns how much built space you can access within a radius of a particular location, in our case measured following the street grid and not as the bird flies. Both are useful but we here often use the latter since it can be said to better capture the impact of density as experienced at the street level.

Importantly, density is in urban design not just a number characterising urban areas but something that may be distributed in very many ways through the design of built form. We may here identify certain principles important to understand for efficient and successful design. Some of these were powerfully described a hundred years ago by Raymond Unwin in his article: “Nothing gained by overcrowding”. The fact he identified is that building around the perimeter of a site rather than in its centre, generates surprisingly higher amount of built floor space. This is due to the geometric fact that the area of a space increases by the square of an increase of its radius. Hence, he could show how the practice of terraced housing of the time was extremely inefficient both economically but also when it came to creating housing qualities, since terraces led to an unnecessary amount of street space that better could be used for courtyards that also improved daylight in the buildings.

Diagram I.



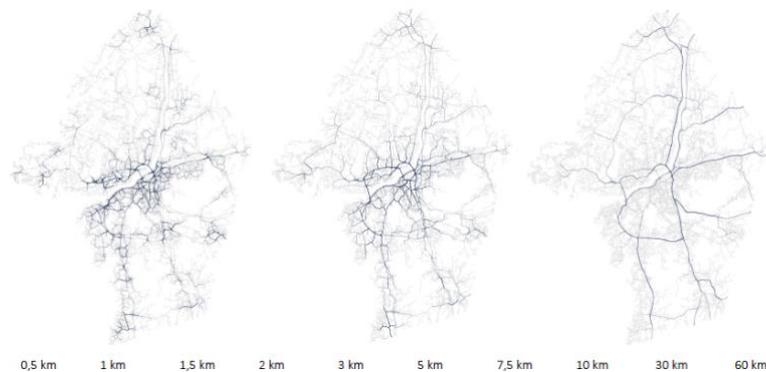
Despite this being an old fact, we today often see the mistake repeated, however, now often in the form of too small city blocks, again, generating an unnecessary amount of street space and dark courtyard without increasing the amount of floor space. The fact is that if you increase the size of the blocks, you need less street space, which instead can be used for larger courtyards that in turn increase daylight, but also allows for taller buildings. Thereby, the amount of floor space can be increased, both by the taller buildings, but also due to the fact that locating building along the periphery is so efficient in this respect and this opportunity increases with larger blocks.



Principle 3: Interscalarity as a short-cut to place – Scale is a much-used term in urban development, but even so it often remains vague. Scale can either refer to the size of things in the real world, as in one city being larger than another, or the resolution of representations of things, such as in city maps of different scales. The latter naturally hangs together with the size we choose to represent things in, where this also allows for different resolutions of the representation. Hence, when we speak of real-world urban spaces, such as a square or a street, this refers to the size of these.

The centrality measures introduced above, however, open for a different way of speaking about the scale of urban spaces. An urban space with high centrality measures is located close to all other spaces, which could be turned around and be spoken of as the reach of a space, since centrally located spaces can also be said to reach very far, while spaces not centrally located do not. As we shall

see below, this has proven to have a strong influence on the flow of people in different urban spaces, where centrally located spaces attract larger flows and less central spaces smaller flows. Hence, we can say that centrally located spaces is of concern for larger parts of the city than less centrally located.



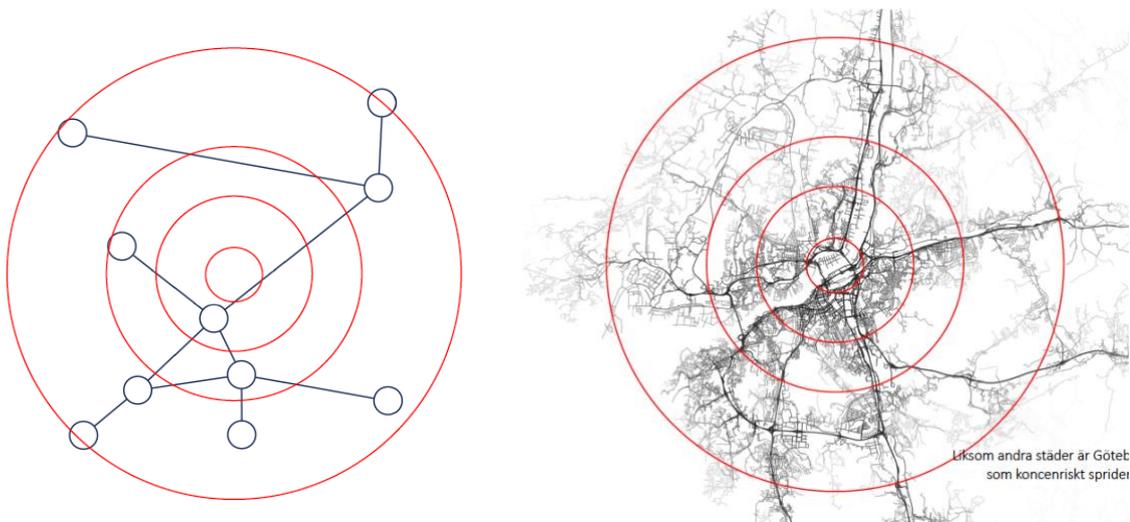
Importantly, when we measure centrality for the same space but within different radii, the centrality may vary at different radii. A space may be centrally located at larger radii but not at lower while others work the other way around. Others yet, may be centrally located on all radii. These variations often prove very distinctive for different urban spaces and carries a lot of their particular character - it seems to be something of a short-cut to place. Hence, we have developed a measure that we call inter-scalarity for this that we sense to be very strategic and useful and below we shall see how we have used this measure to identify street types.



Principle 4: Cities are geometrically far more complex than we tend to think – There is a great amount of geometric simplification when we talk about cities. The general conception is that cities are concentric for instance, that accessibility, density and general character shifts radiantly as you move out from the centre of a city, forming distinct rings in these respects along the way. While this may be true at some very aggregated level, it runs the risk of hiding more than it discloses. It origins in what we here in a simplified manner would call a geographic approach to spatial description by which we mean that the descriptions concern distributions in space, with emphasis on the “in”. Architecture represents another approach to spatial description, where descriptions rather concern distributions of space, with emphasis on the “of”. Architecture, and in extension urban design, simply concerns the

shaping and structuring of space by the means of built form, which can be understood as a concern for the distribution of space.

In the case of urban design, this is naturally done in the aim to accommodate and support urban life in different ways, but it thereby also means that it structures and directs urban life. For instance, we can only move according to the distribution of space as structured and shaped through urban design, which means that cities are geometrically far more complex and structured than our usually used geometric descriptions, such as cities as concentric. This also means that we do not in a simple manner find one centre in the middle of cities, but often many centres but of different size and importance, which are connected to each other in often rather complicated manners. In turn this means that cities are far more different than we tend to think, where some typically are more hierarchical or tree-like and others are far more distributed or grid-like.



Principle 5: Urban development concerns a landscape where location is relative not absolute – That the geometry of cities as used by people is given by its spatial form as designed in urban design, what we above called the distribution of space also means that we in urban development operate in a landscape where location is relative rather than absolute; what matters is the relation between spaces, their internal accessibility for people, rather than their absolute location in relation to some neutral descriptive grid. This is exactly what is fore-fronted when we describe the centrality of cities, since it directly concerns how each location or space is located to other locations or spaces. Still, this is unusual and we tend to describe also the distribution of space as absolute as in the case of most plans and drawings.



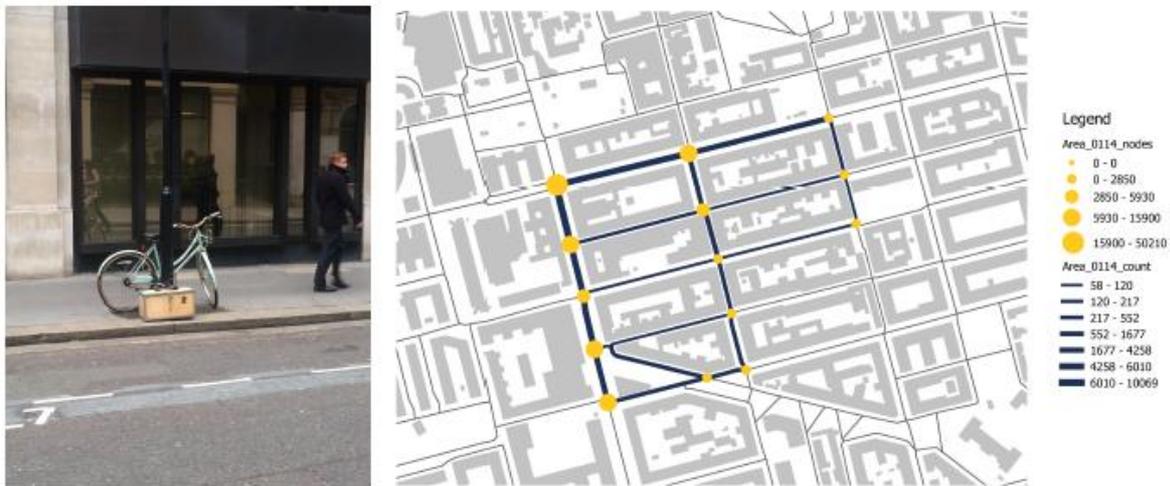
Principle 6: Relative locations move over time – Given the concept of relative location, which as we saw, does not concern the absolute location of a particular urban space related to a neutral grid, but the location of a particular urban space related to all other urban spaces in a city, or all urban spaces within a certain radius from the particular space, we need to draw the rather surprising conclusion that all relative locations within a city changes as we add new parts to the city. In summary, as cities grow locations continuously move! This typically means that locations tend to become more centrally located as cities grow so that what used to be peripheral locations over time tend to become more central locations. Since centrality has proven to be a rather revealing measure of relative location, we may through a time-series witness how location move and reconfigure over time. In the images below the colours correspond to the same degree of centrality, so that we can see how the centre of Gothenburg over time has grown and come to include what originally were far more peripheral locations, but also how certain locations, such as Guldheden, due to their segregated spatial form, to a great degree have withstood this tendency.



This is highly useful for understanding and explaining urban processes, such as gentrification, where areas earlier located in the periphery over time become far more centrally located and then come under pressure for development or become attractive for new residential groups. In the images above we see how this has been the case both for Majorna and Östra Kvillebäcken, where the first increasingly has been overtaken by new residential groups and the latter extensively redeveloped after new development pressures due to rising land values created by increased centrality. We may also observe a difference between two large-scale housing estates from the 1960s, where Biskopsgården has become decisively more central, and potentially is becoming part of a gentrification

process that here may be interpreted as something positive, while Bergsjön remains largely uninfluenced due to its very segregated location.

Principle 7: Spatial configuration ties the built city to the lived city – An essential finding in spatial morphology is that centrality analyses tend to capture movement patterns in urban space. Even if this may vary from area to area due to the distribution of built density and other attractions such as retail centres or public transport, it is a fundamental finding in that it ties the built city to the lived city and does so through a medium we can structure and shape, that is, spatial form. Importantly, one needs to understand movement patterns here not as the end of such analysis, which may lead one to think that there are so many other processes in cities of concern, but rather as an intermediary process of great importance for a long series of urban processes and qualities. First, movement leads to repeated sizes of co-presence in different space in the city, which forms an entity of great importance both for urban meeting places in social terms or local markets in economic terms. Hence, such co-presence in turn tend to influence retail distribution, which in turn tend to influence rent.



In this manner, it is possible to interpret movement patterns as an essential contribution to a long series of urban processes and qualities and in turn the centrality of spatial form as a way to support or direct such processes or create certain urban qualities. To further validate this central relation, SMOG has conducted a very large observation set using sensing of mobile phones in Stockholm, Amsterdam and London. In these the centrality measure can be extended also by measures of density and differentiation, thus creating a broader and richer model of spatial form whereby movement may be captured. The analyses of this large data set are still under way, but preliminary results indicate that the model explains movement patterns to around 50%, with local variation. Moreover, by adding also density measures to the analysis, these results also indicate that local density level seems to be what sets the level of movement, that is the number of people moving, while the centrality measure captures the distribution between spaces.

Principle 8: The possibility of analytical typologies – Both in professional practice and everyday life we use typologies, such as grid cities, garden cities, high-rise cities, to describe cities. Such typologies are often simply based on broad geometric differences in built form or the date when urban areas were constructed. By identifying central variables of spatial form such as distance, density and differentiation, we in contrast open for analytical typologies of the spatial form of cities, which furthermore can be related to certain performativities. We may moreover create typologies of streets of density and of plot systems, as well as combinations of them.



The important point here is that we may retrieve fundamental properties in the built environment that generate urban qualities that we value and would like to emulate, which then can be recreated. Importantly, this is different from what happens today, when we simply imitate what meets the eye of urban form, but most often are not able to recreate the urban life we were attracted by. Through these analytical typologies we go deeper into the urban form and capture variables that we know connect to certain performativities, such as movement pattern and in extension sizes of co-presences, which when recreated may generate also this performativity. Also, we avoid sheer imitation and are freer in the design of the appearance of built form.

3. GOTHENBURG COMPARED (Gothenburg, Stockholm, Amsterdam, London)

3.1 Comparison of spatial form (distributions of space)

Size – Sheer size is naturally decisive in itself, but also how this size is spatially distributed. Not least important is what we mean by size: size in population or size of spatial extension, again relating to the fundamental distinction between the physical city and the lived city. Our comparisons show how Gothenburg is clearly smaller than the other cities when it comes to population but actually larger than Amsterdam and almost as large as Stockholm when it comes to spatial extension (UMZ). For the physical city this is even more true where Gothenburg turns out to be twice as big as Amsterdam. This means that Gothenburg on this comprehensive level demonstrates a very low population density in comparison to the other cities, where Gothenburg is a third as dense as Stockholm and only a fourth as dense as the other two cities. Naturally, on a more detailed level the population density may vary greatly, but this gives an overarching image of Gothenburg as a city of unusual spatial dispersion also in comparison to cities that in other regards are quite similar, like Stockholm and Amsterdam.

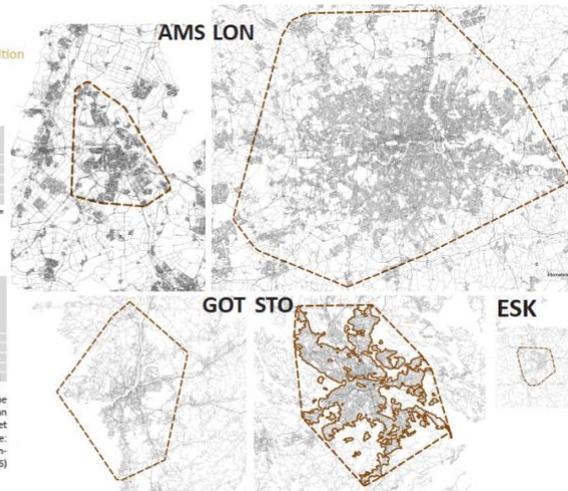
COMPARATIVE MODELS
Implications, Challenges, Size, Boundary definition

	Area, UIMZ (sqkm)	Area, City (sqkm)	Population Density City (people/sqkm)
ESK	71,5	28,75	108
GOT	733	142,96	1360
STO	1084	105,00	4500
AMS	416,5	139,32	1115
Greater LON	3411	1571,00	5437

source: wikipedia.com, worldpopulationreview.com

UIMZ (Urban Morphological Zone)	Area (sqkm)	Street length, Motorised Network (km)	Street length, Non-Motorised Network (km)	No of Addresses	No of Buildings	No of Plots
ESK	71,5	459	558	14746	10546	11568
GOT	733	3390	5238	142127	20259	118114
STO	1084	6565	8118	289127	21879	104275
AMS	416,5	3914	4330	45408	36992	23506
Greater LON	3411	14451	3659	829200	472997	279129

Urban morphological zones (UIMZ) are defined by Corine land cover classes considered to contribute to the urban tissue and function. A UIMZ can be defined as "a set of urban areas laying less than 200m apart" (source: <http://www.eea.europa.eu/data-and-maps/data/urban-morphological-zones-2006>, date of download 13-7-2016)



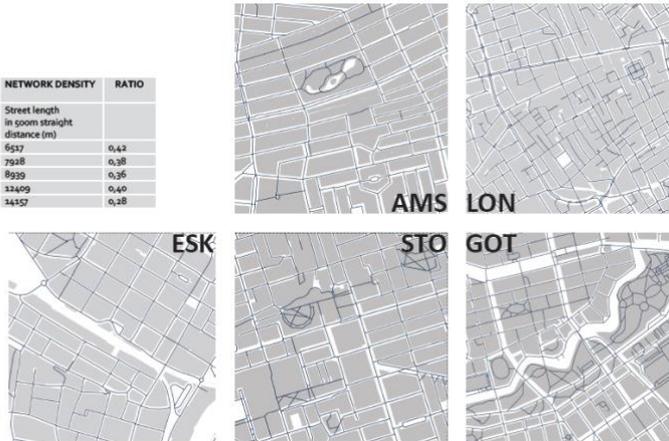
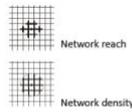
When it comes to population, Gothenburg (582 000) is about half the size of both Stockholm (902 000) and Amsterdam (1 126 000), where these two are comparable as far as population goes but only are an eighth of the population size of London (8 547 000), which makes Gothenburg a fifteenth the population size of London. That London at the same time is only 3,5 times as large when it comes to spatial extension and Amsterdam actually only half the size of Gothenburg, makes Gothenburg an extremely dispersed city in comparison. This is true also in relation to Stockholm, which is 3,7 times as dense as Gothenburg, but even in comparison to the small Swedish city Eskilstuna, which is 1,6 times as dense.

The interpretation here is that on this aggregated level (on a local level things may naturally vary a lot), Gothenburg is a city with very large distances between its inhabitants. Generally speaking this dispersion is not evenly spread but lumpy, there are places locally that are quite dense and create a great degree of proximity between people, but given the over-all dispersion, in many cases there are long distances between these dense spots, why neighbourhoods and districts often are likely to function as quite isolated entities. This gives some support to the idea of Gothenburg as: the city of many small cities. However, the unusual dispersion may indicate that the true saying should be: the city of long distances(?). What seems crucial is the distance between the lumps and how they hang together.

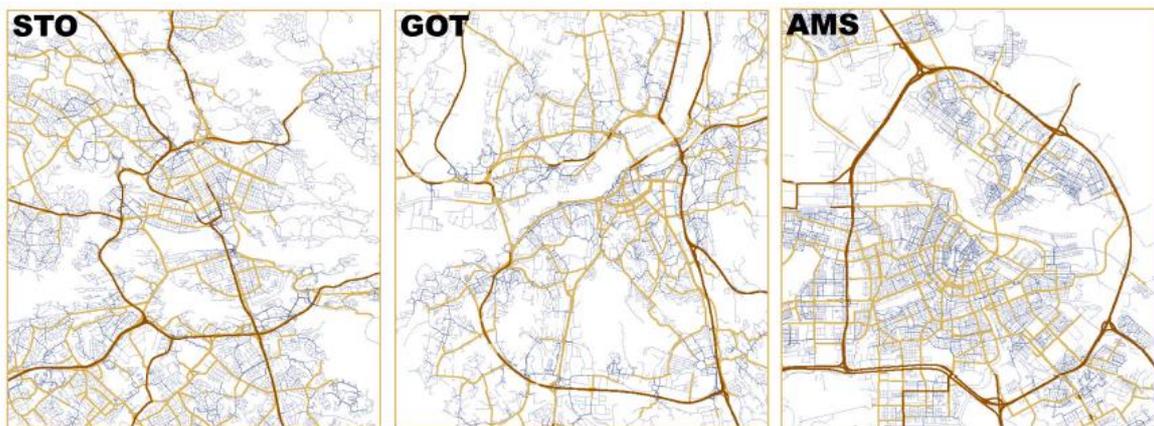
Centrality – Centrality is, as we have seen, a simple way of capturing what we may call the architectural structure of the city in that it depends on the relation between the parts and the whole. This form of distance measure is here measured through the street network, which in itself is interesting to compare. For the motorized network we see that Gothenburg and Stockholm are rather similar in comparison to the other cities both when it comes to the amount of street length you can reach within a radius of 500m and the density of the street network. Gothenburg having 75% of the reach and 56% of the density of London and 66% of the reach as well as density of Amsterdam.

CITY COMPARISON
Streets, Buildings, Plots

MOTORISED NETWORK	NETWORK REACH/ ACCESSIBILITY	NETWORK DENSITY	RATIO
	Street length in 500m walking distance (m)	Street length in 500m straight distance (m)	
ESK	2766	6617	0,42
GOT	3023	7928	0,38
STO	3226	8939	0,36
AMS	4976	13409	0,40
Greater LON	4969	14457	0,38

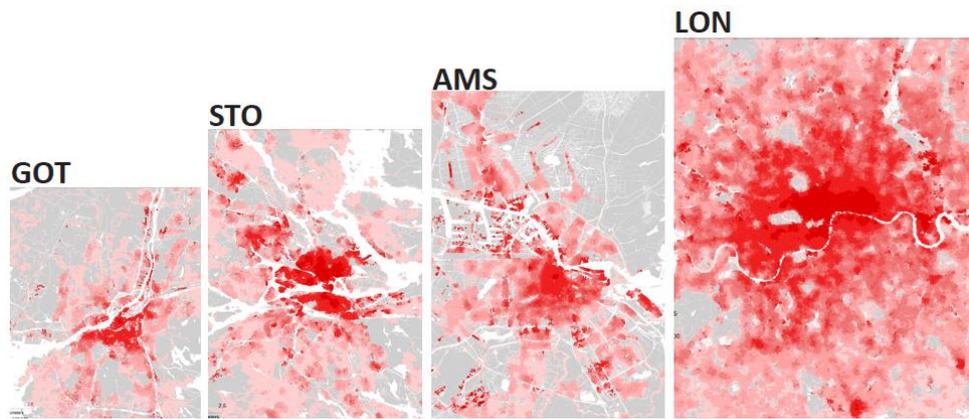


Gothenburg has low local reach to the street network, whether measured as reach through the network itself or as density per area unit. This due to the fact that the street network, similar to other Swedish cities, has a decisively more hierarchical street structure, that is, it is more often tree-like than net-like in comparison to both Amsterdam and London, but also to the fact that when the street network is net-like, the loops in the net are larger.

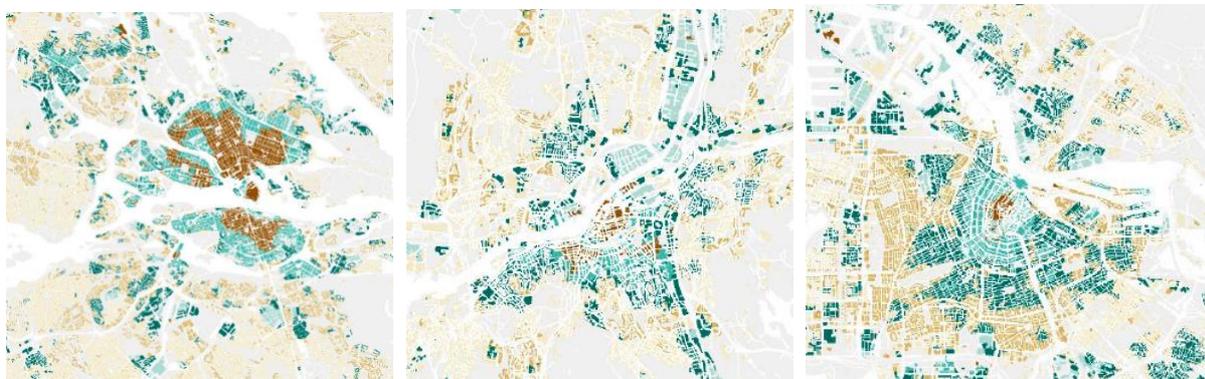


The interpretation of this is that Gothenburg's street network is, compared to the street networks in Amsterdam and London, a distance generator rather than distance minimizer, and thereby a reason for the great dispersion we saw above. Importantly, the tree-like structure does not only generate distance but distance of a particular kind, a hierarchical distance which means that you are less likely to pass by parts of the city located far out in the branches if you do not directly intend to visit them. It also means a more vulnerable structure and less resilient in that you may cut off large parts of the city by breaking connections at one or a few points.

Density – Density is perhaps the most used variable to measure cities, but also one of the most misunderstood. We have seen that one fundamental difference of measuring density is area-based density and location-based density, where both may be useful but the latter perhaps better captures the experience of the city. If we use the latter we see large differences between Gothenburg and other cities. Where Gothenburg demonstrates a built density of about half the density of both London and Amsterdam but also only 80% of the built density of Stockholm. We may also try to compare the spatial distribution between the cities and in that case we find that Gothenburg has a core of similar size and density as Amsterdam but outside this drop in density rather quickly and in more peripheral areas demonstrate a rather fragmented pattern of rather low density, while Amsterdam has a more continuous pattern of quite high density. London in comparison demonstrates a very high and continuous density pattern with locations also quite far from the centre with very high density.



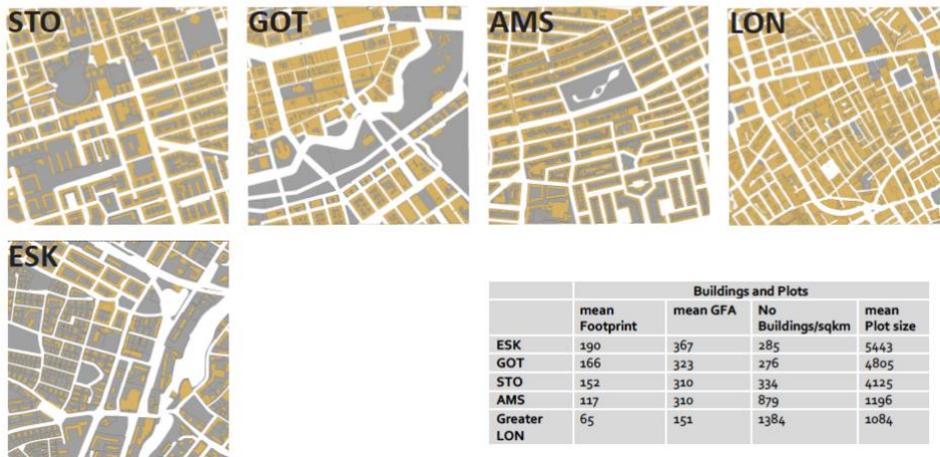
The low population density is mirrored, not surprisingly, by a low building density that is about half the density of Amsterdam and London and about 80% of that of Stockholm. Again, this contributes to the general dispersion already identified.



Differentiation – As we have argued, the number of plots urban space is divided into is a measure of the degree of differentiation urban space is divided into, which may be interpreted as the degree urban space has the potential to be distributed among actors able in a direct sense to influence the development of the city, hence also a measure of the potential diversity of the city. Here we find quite a dramatic difference in that the plot sizes in Gothenburg are almost four times as large as in Amsterdam and London. This is further reflected in the number of buildings we find in the cities where we in London find five times as many buildings per km² and in Amsterdam three times as many.

An interesting and perhaps less expected fact is that the division of land into plots is far lower generally for the Swedish cities in comparison to Amsterdam and London, but especially true for Gothenburg.

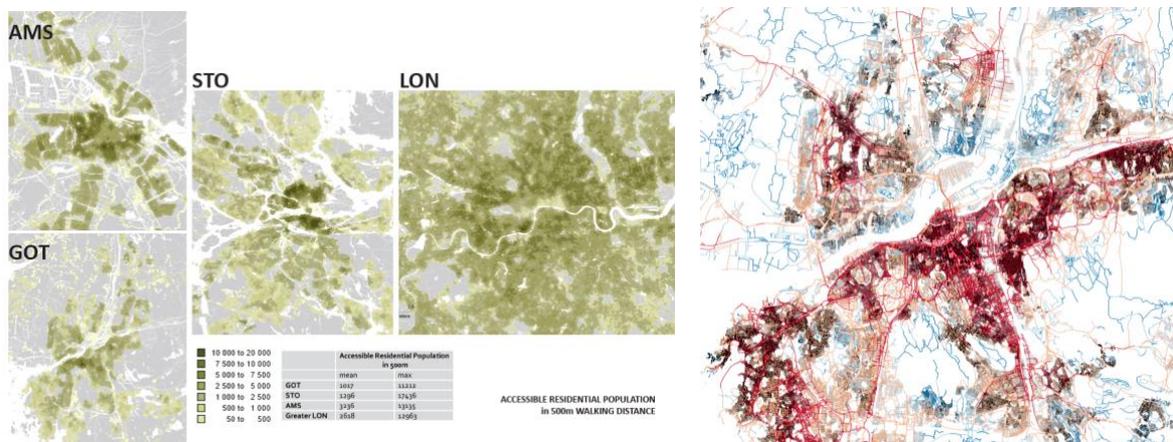
CITY COMPARISON
Streets, Buildings, Plots



The interpretation here is that this means that the number of potential actors with a direct influence on the city's development by owning land in the city is far smaller in Swedish cities than in the other two cities and that this is especially true for Gothenburg. One think about it as the initiative to take concrete action in the city's development is less distributed in Gothenburg than in other cities. This seems to correlate and further support the earlier identified hierarchical structure of the street network in Gothenburg.

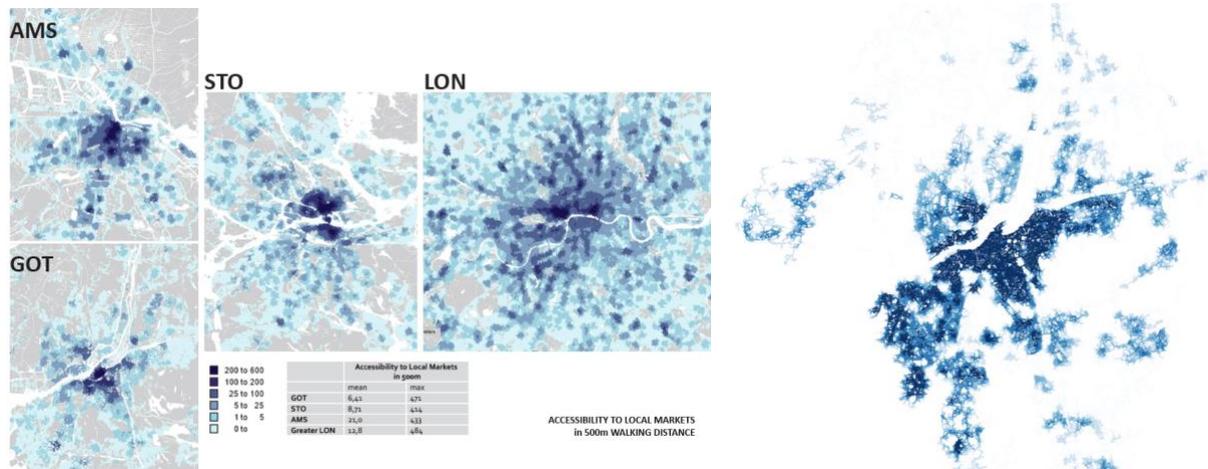
3.2 Comparison of social form (distributions in space)

Population and income – We may also measure the accessibility to population and not only building density, making a shift from measuring the distributions of space to the distributions in space. Here we see that the accessible population in London is 2,6 times as high as in Gothenburg and 3,2 times as high in Amsterdam. Stockholm has an accessibility to population that is 1,3 times as high. This seems to indicate quite different conditions for life in public space between the Swedish cities and in particular Gothenburg in comparison to the other European cities. When we look at the spatial distribution of this we see that we actually have more high peaks in both Stockholm and Amsterdam but where the continuity is far stronger in Amsterdam. London does not have as many peaks but demonstrates an extraordinary continuity and extension of very high accessibility to population. Gothenburg we find, both on a far lower level and with a far less continuous pattern of accessibility to population.



Economic activity and land value – In a similar manner we may measure the accessibility to economic activity, where we see how Gothenburg only access a third of the economic activity we find in

Amsterdam or half or what we find in London. As for the spatial distribution, we find both a core with lower accessibility but also a quicker drop outside the centre where the periphery is quite fragmented and on a low level, while we both in Amsterdam and London find quite distinct centres of economic activity also far out in the periphery.

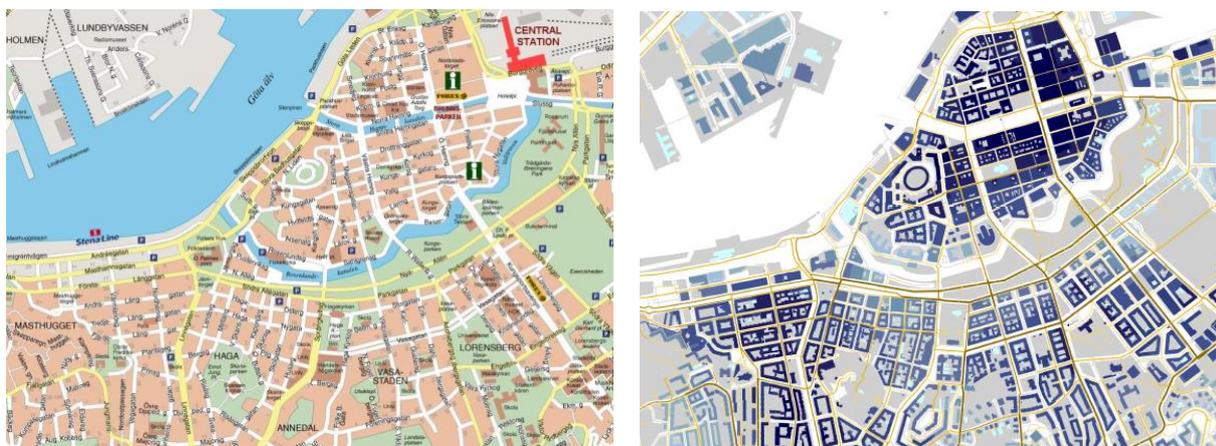


Summary – Together we may say that the spatial form of Gothenburg combines a hierarchical and dispersed structure with a very low distribution of spaces of agency. Even though the spatial structure of the city clearly can be interpreted in this way, an immediate translation into similar social terms should be treated with caution.

4. GOTHENBURG INTERPRETED

4.1 Interpretation of the spatial form of Gothenburg

The principles and comparisons above give a rich ground for extensive interpretations of the spatial form of Gothenburg. We here choose to focus this on two strands based on two sets of principles introduced above. The two strands are in turn tied to each other so that we can see them as an overarching argument about how to connect aggregated spatial analysis to the creation of spatial conditions for place of different character.

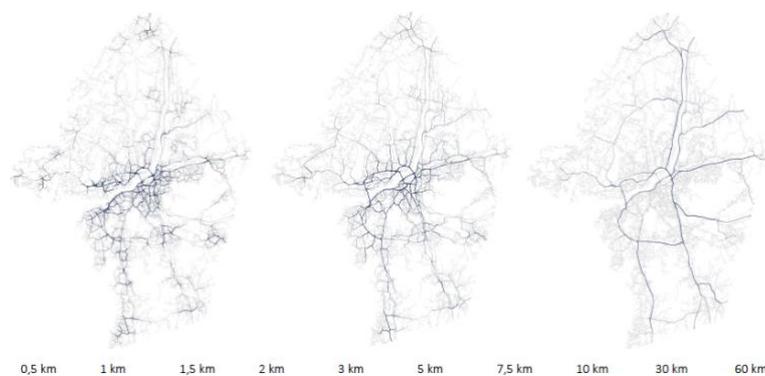


Location can be described as absolute or relative. Absolute locations are what we typically find described in maps and plans of cities (left), while relative locations can be described by measuring centrality or accessibility (right).

What we see to the right is the centrality of the street network within a radius of 2000m (yellow) and the accessibility to density within 500m (blue).

The first strand, start with the important observation that what we deal with in urban planning and design is not absolute space as much as relative space, the fact that essential qualities in local places are conditioned by their relation to other or even all other spaces in the city. This makes distance measured as centrality, which captures exactly this, a most useful measure of relative space. This can be done for the street network in itself, which is the spatial system relating all spaces to each other, or by conducting such an analysis in relation to particular attractions in space, which can be anything from population over public transport to retail.

Importantly, relative location means that individual location move in relation to other locations as cities grows and changes due to spatial interventions. Hence, we importantly need to understand that any new plan has extensive implications for areas and locations outside the plan itself and especially that planning efforts over time add up to powerful effects on both the overall structure of the city and the particular relations between its locations. An understanding of this and the ability to model it before implementation of planning interventions, offers a powerful tool to direct future development of the city.



Centrality can be measured within different radii for each location, where one often sees changes in centrality for the individual location at different radii. For instance, there may be locations with high centrality on all radii or on only high or low. This indicates the relevance of the location on what we may call different scales of the city.

Some locations more important for long-distance movement over the city as whole and others for local movement within the neighbourhood, while others yet mix both. This seems a very important indicator for each location of its potential use and quality.

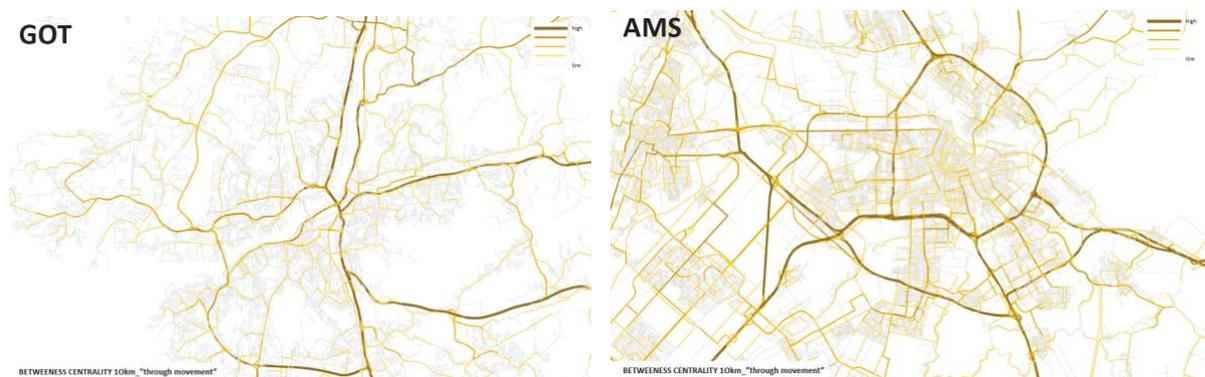
The second strand, builds on this by observing the fact that the centrality of a particular location may vary on what we have called the reach or scale we measure centrality on. We may measure the centrality to all other spaces in the city or only within particular radii, like 500m or 2000m. We then see that certain locations are centrally located only on high radii, which means that they primarily are of interest for long-distance movement within the city, and others only on low, which means that they primarily are of local interest. Others yet, may be centrally located on all radii and therefore in principle mix long-distance and short-distance movements, which in all cases are essential for the quality of these locations.

Based on this observation we may divide streets into typologies based on their centrality on different scales, for instance; metropolitan, urban, neighbourhood and background streets due to their relevance on different scales. If we map these typologies over the city as whole we get a very rich description of fundamental conditions of each and every space in itself in relation to its potential quality, but also how each individual space relates to all others. Together this creates very good indication of the spatial conditions of these spaces that directly relates to both their use and how we experience them. Naturally, this is important information that can guide and support local land use regulations and design interventions. Importantly, in large urban projects, this whole structure will be affected and these fundamental conditions will be redistributed, which seems inherently important to

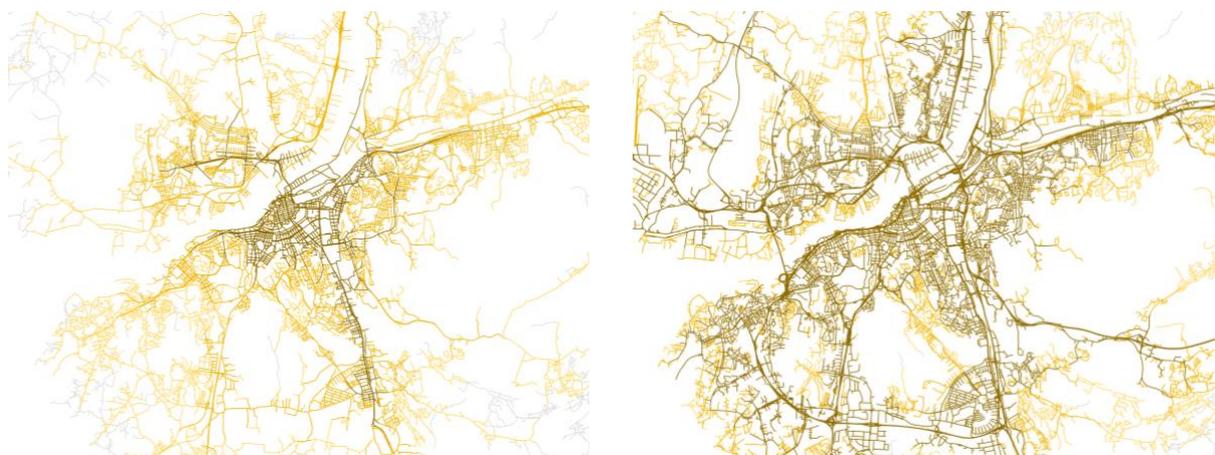
be able to control, both to control that things move in desired directions and to avoid the destruction of vital local values.

4.2 Relative location-centrality-growth

As we have seen, on an aggregated level Gothenburg displays a very dispersed and hierarchical structure of relative locations, meaning that they both are far in between each other and structured in a tree-like way rather than a net-like way, which in turn means that from the point of view of movement within the city, certain locations are favoured before others, which creates an unusually distinct city centre with local centres repeating the same thing but on another scale as we move towards the periphery. It also means that these centres have a certain control over movement, since there are few alternative routes.



This may not immediately be interpreted as negative. From a planning point of view it may form a good structure for locating central public and commercial services at these centres, at the same time creating both easy access and large market support for them. A weakness however, may be that it creates a sensitive structure for change, where, as the city grows, these centres may become increasingly central creating pressure for extensive change at the same time as they may hinder other local centres to develop. We may say that the first may be the case with both Majorna and Östra Kvillebäcken, albeit with different connotations, whereas the latter may be the case for both Guldheden and Bergsjön, again, with different connotations.



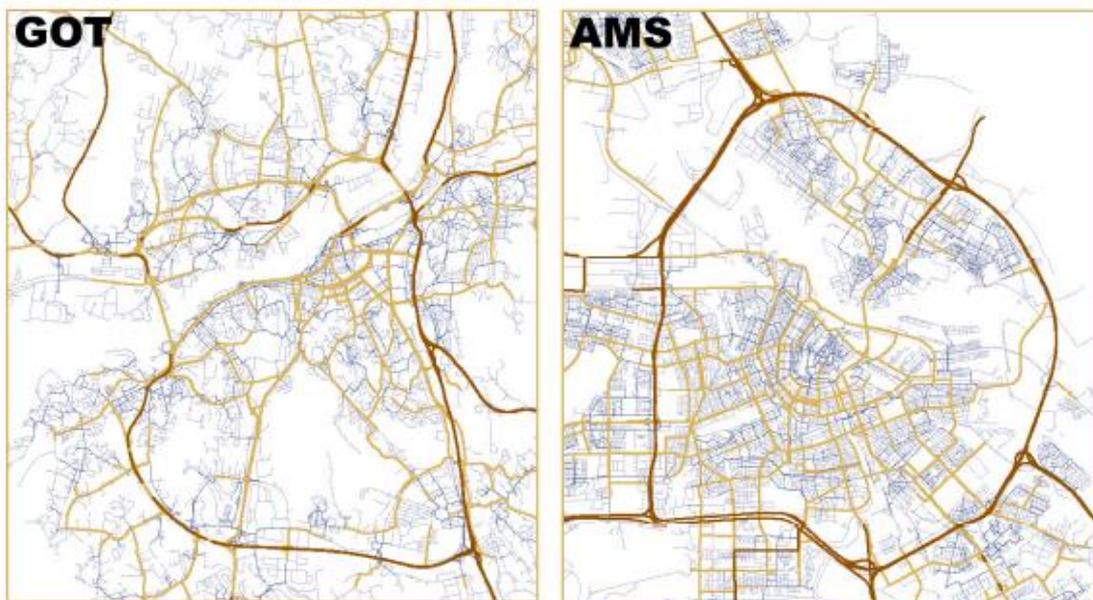
Comparing a centrality analysis of Gothenburg in 1960 and 2020, we see how much larger areas have the same central location in 2010 than in 1960, but also how the relation between spaces have changed. His must be interpreted as locations change over time and that many over time for instance has moved towards the centre. Importantly, other have not.

Majorna has seen a slow and subtle gentrification where a lot of earlier qualities have been retained, while Östra Kvillebäcken has seen drastic change, exchanging old qualities with new. However, they share the fact that both locations over time has become increasingly central and thereby attractive for investment. Both Guldheden and Bergsjön has restrained immediate change and have neither become much more central than before. This seems to create a sort of conservative force that again, not immediately needs to be interpreted in negative terms. Guldheden seems to have been able to keep its identity in a manner appreciated by its inhabitants and potentially exemplifies an urban area a bit aloof in a positive sense. Bergsjön on the other hand, may be interpreted, acknowledging that this is a bit simplistic, as an area that may have benefitted in increasing in centrality over time, thereby creating new attraction and investment interest, where this today in contrast is very low and may be interpreted as problematic.

A simple planning strategy of general implication in Gothenburg would here be to try to move its structure towards a more resilient net-like structure, given its current rather extreme tree-like structure, which may prove wise in the face of unknown future challenges. This does not mean moving towards an equally extreme netlike structure, since we see how segregated locations may prove essential for urban qualities in general as well as for creating resilience, but rather to work towards a new balance in the over-all structure of the city and its parts.

4.3 Interscalarity-typology-place

As explained above, centrality can be measured within different radii for each individual space, through which we can create a typology based on the centrality of streets at different radii. Mapped together they display a structure that must be interpreted as very powerful in understanding both the general structure of the city as well as the potential of individual spaces. For the motorized network we typically see different large-scale infrastructures highlighted, typically highly accessible on large radii. The important difference here is that Gothenburg let these also pass the central parts of the city in a manner that Amsterdam does not.

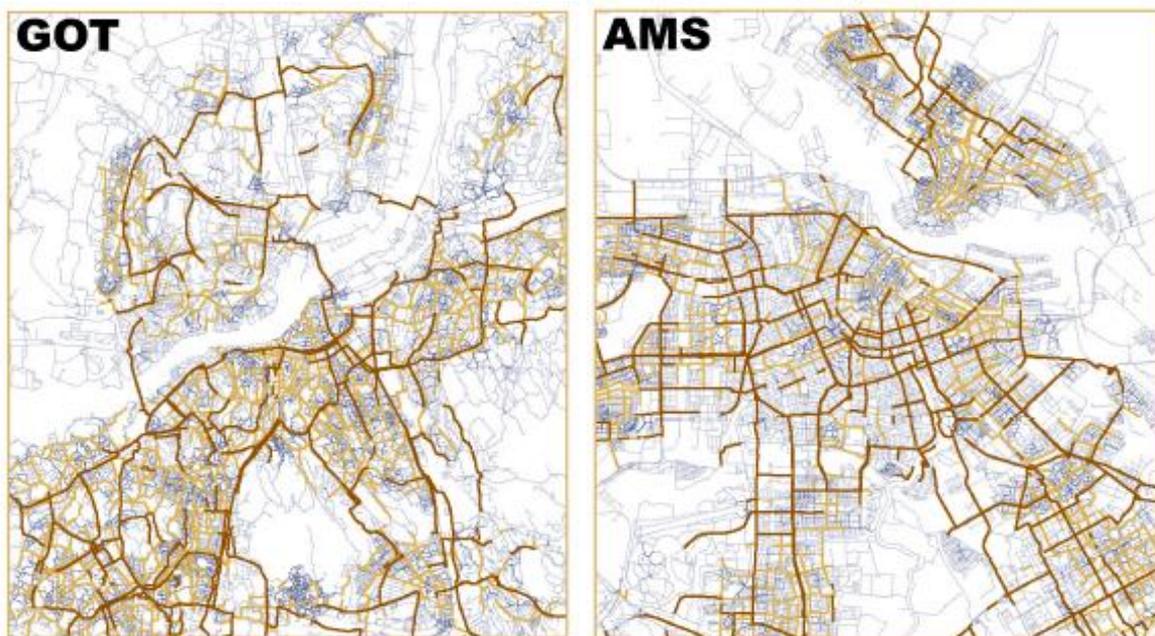


In the motorised network, the metropolitan street type with high centrality at high radii runs through the city centre in Gothenburg but circumvents the centre of Amsterdam. More importantly, the urban street type that combines high centrality at high and low radii runs around neighbourhoods in Gothenburg but through neighbourhoods in Amsterdam. This can be interpreted as that they work as integrators in Amsterdam but as separators in Gothenburg.

More importantly perhaps, we see the next street typology called urban, which combines both high and low radii, in Gothenburg forms loops around neighbourhoods, except for in the most central parts, while they in Amsterdam form part of the grid and run through neighbourhoods. This is a distinctive feature and leave neighbourhoods internally served with neighbourhood streets and even background streets. These must be interpreted as that they thereby lack spaces that integrate between neighbourhoods and in extension create connections of the city more generally. In other words, Gothenburg really is a city of small cities adding up to a large city, but it is not a city like Amsterdam where these neighbourhoods also add together into districts, which in turn ties the city together as whole. Rather there is an abrupt jump from the very local to the very urban in Gothenburg.

One should avoid simple interpretations, but this naturally raises question in relation to the fact that Gothenburg often is pointed out as Sweden's most socially segregated city, where we know that Sweden has a lot of socially segregated cities, despite their small size. It also raises questions in relation to its general sustainability and adaptability to change.

Looking at the non-motorised network, we may use this to point out the highly different spatial conditions different locations in the city have. We see how Järntorget is a location with high centrality on many radii, combining several movement scales and therefore performing, we may suggest, an important work in integrating people in Gothenburg and hence creating a place where people from very different parts of the city for a while share the same place (which could be interpreted as low-key integration). While this is rather well-known, it is interesting to see how that can be captured in an analysis of its spatial form. More surprisingly, we can see how another location like Mariaplan, have similar spatial conditions, again combining movement on different scales, albeit this time on a lower level than Järntorget. We seem to be able to capture spatial conditions for places vital for meeting.



The street types may be used as very rich descriptions of spatial conditions creating different potentials for different locations. We may for instance compare Järntorget, Mariaplan and Komettorget.

In contrast, we do not at all find this to be true for Komettorget in Bergsjön, which is an extremely localised space. This should not immediately be interpreted as problematic. However, the fact that almost all locations in Bergsjön has similar spatial conditions, one could argue that even though localised places may be a vital quality to cities, it is often considered so when found in proximity of more urban spaces, why one could conclude that Bergsjön rather is deprived of such urban spaces

that has the potential to integrate movement on different scales and thereby decreasing the quality of the localised character of Komettorget.

The lesson here seems to be to try mix spaces of both short and long reach within a certain proximity of each other, thereby enhancing the quality of both while also creating a greater degree of adaptability to future unknown demands.



Järntorget, Mariaplan and Komettorget

5. IMPLICATIONS FOR URBAN DEVELOPMENT IN GOTHENBURG

5.1 Comprehensive level (Gothenburg)

There is need to define a comprehensive system of space that structures public access to the city's major locations on the generic level of public space in the comprehensive plan. This may over time be enhanced by different forms of mobility technologies as well as be extended in further detail in subsequent planning documents.

Spatial form today plays a very small role in comprehensive planning, apart from general guide-lines demanding a certain level of design quality or in principle stressing the need to spatially connect the city. Such remarks are however, never represented with any spatial specificity in the actual maps of the plan, which instead are dominated by major land-use zones, infrastructure locations and areas that due to national interest are protected from development.

We may tentatively identify two major reasons for this. First, it seems like space in itself, in this case public space, not is visible if not filled with something like either land-use or infrastructure and therefore does not need to be structured and shaped concretely in the comprehensive plan, in the meaning, not only being mentioned in a general manner in the text but represented with some specificity in its maps. This leads to paradoxes, such as new tram-ways being represented in such maps, but not the streets (public spaces) the trams need to run on, where the primary urban element in need of careful planning not so much is the tram-way but the street. All street where trams run on today in Gothenburg were planned and laid out decades and even centuries before the trams were introduced and will most likely be there decades and centuries after tram way technology has become outdated.

Similarly, land-uses are fundamentally dependent on accessibility created by spatial form, where the degree of accessibility to different locations greatly decides what land-uses may prove adequate in these locations, since high accessibility generally also means larger flows of people and low accessibility smaller flows. This creates perhaps the most decisive property of location; its size when it comes to flow and co-presence of people. We may usefully understand these co-presences as markets in the general meaning of the word as places of exchange, where cities to a large extent are exactly this, places of exchange (or rather large sets of places of exchange), not only of commodities but of information more generally, and not only in the purpose of economic gain but for building social ties. Depending on the structure of accessibility we find in particular cities, for instance Gothenburg, this generates a wide set of locations characterised by their size of co-present people. In turn, this is decisive for what land-use is appropriate in what locations, not only broadly as in housing, offices and

commercial uses, but also specifically, what kind of housing, offices and commercial uses. For instance, locations with high flows are generally speaking less suitable for family housing and better perhaps for young professionals. Even so, comprehensive plans of today specify land-uses without specifying the spatial system that create accessibility to these land-uses, that is, without seeking support in one of its most powerful determinants.

A second reason is that public space often is interpreted as “place” and thereby a local thing. But place is far from a local thing; places are defined by the overarching spatial structure of the city, due to the same logic as outlined in the paragraph above. Places are not primarily defined by local design interventions, such interventions may enhance place, but primarily place is generated by the flow and co-presence of people at these locations. Current comprehensive plans miss this point and postpone dealing with the broader structure of public space to latter planning phases, where the direction of flows is more or less impossible due to the limited reach of such plans. Instead one is left with local interventions with comparatively small effect on place. Hence, in current planning we typically see very ambitiously designed public places but low level of co-present people.

Naturally, the system of public space should not be decided in detail in the comprehensive plan, but a general skeleton describing the accessibility pattern between the city’s major locations is necessary to decide on this level, simply since it cannot be decided on a more detailed planning level, as we have seen. It is essential both to reserve space for future mobility technologies and to define a general distribution of land-use, that neither can be decided on a more detailed level. Since the comprehensive plan expressively aim to decide location of infrastructure and broad distribution of land-use, it is quite incomprehensible why it does not lay down a generic accessibility system. This skeleton may be extended in further detail in subsequent planning documents dealing with different districts in the city.

What seems to be lacking here is an understanding of the system of public space as a vital urban infrastructure, that furthermore is designated for one of the fundamental land-uses in cities; mobility, and moreover, mobility understood on a generic level that may be enhanced by different mobility technologies. The other generic land-use in cities, apart from moving in space, is occupying space. Hence the typical and primary division of urban space into blocks and streets, where streets are for moving in space and block for occupying space, where this division is unnegotiable since the two uses are in immediate conflict with each other and cannot share the same space.

5.2 District level (Älvstaden)

There is need for an intermediate level of planning that concerns what we may call the district level of the city, where the skeleton of public access to the city is continued and extend within the district, which in turn also can be extended in regulations for the level of density through buildings and differentiation through land division into plots.

As already stated, the comprehensive plan needs to be comprehensive and should therefore not decide things in detail but concentrate on overarching structures of high relevance to the city as a whole, including strategic parts of the system of public space and its importance in distributing land-use. Hence there is need for a planning level that we may call the district level that connects the overarching planning intentions with the immediate building projects dealt with in development plans. This has been an issue debated for a long time in Sweden, where this argument has been lifted again and again. There are openings for such intermediate planning documents in Swedish planning law, most often called *Fördjupad Översiktsplan* (Developed Comprehensive Plan), however often interpreted in many different ways.

On this level the overarching structure of public space may be extended in relation to intentions for the particular district, without any need of deciding every street or public space in it. Importantly, this is also the level where other dimension of spatial form may be introduced, not least the issue of building density. We then see how there is a natural relation between degrees of accessibility and

degrees of density. Since also density is a generator of flows, it is logical that locations of high accessibility also are designated for higher densities. High density in locations with low accessibility will still generate flows but, where these locations are less prepared for accommodating them, which runs the risk of building conflicts into the plan. Densities should here be interpreted as a means of enhancing land-uses designated to different locations. Higher density allows for more intense housing, office or commercial use. Buildings are not a use in themselves but a means for other uses. This is quite obvious, but at times this fact is lost sight of.

In a similar manner, differentiation by land division into plots, can be interpreted as means of differentiating land uses into the hands of a larger or lower number of actors, which in extension may form the basis for a greater diversity in or between land-uses. Here the relation between accessibility and differentiation is less straightforward than when it comes to density. Highly accessible locations are often not the best to differentiate into many plots, since these are locations of large-scale movement and therefore often locations of high property prices. For both reasons, smaller actors are not logical in these locations. However, this is only if we specifically look at the plot system as the decisive property rights system. What often happens in locations of high accessibility, is that they are divided into very large plots, but also that within these plots a new property rights system evolves., often in the form of a division into many small retail spaces possible to let by different retail actors, This property rights system is generally managed by the owner or proprietor of the large original plot. What we talk about are typically shopping malls, either in highly accessible locations in the periphery or in central downtown locations. A typical example in Gothenburg is Nordstan, where this central location over time has transformed into one large property but where the diversity of the city, so to speak, is reborn within its boundaries. Naturally, this gives a particular flavour to this urban diversity.

Hence, we draw the conclusion that this intermediate or district level of planning can, as far as spatial form goes, first extend the skeleton of the street network developed in the comprehensive plan in further detail, creating as it were, a kind of new street network skeleton on the level of the district that in a similar manner as the comprehensive plan create a system of public access that can support more local mobility technologies as well as support the local distribution of land-uses. In addition, this is also the planning level where the distribution of building density and differentiation through the plot system may be decided in support of local land-uses, on the one hand setting the level of intensity (building density) and on the other the level of differentiation (the plot system).

5.3 Project level (Lindholmen)

There is need to reconnect the today most decisive planning level, steering concrete development projects, the development plan (detaljplan), both to the comprehensive and intermediate planning level so that qualities and values set by these planning documents are maintained and extended on the detailed level, but also so that the specificities set in the development plan are integrated and updated in the other two planning levels, something possible through the fast development of digital tools in recent years.

This is the planning level where concrete development projects are defined and also negotiated between developers and the public planning administrations, why there is need for quite detailed and extensive descriptions that fully includes the system of public access as well as detailed descriptions of the spatial distribution of density and differentiation. On top of this, this is also the level where particular design qualities need to be put down, both concerning individual buildings as well as public spaces.

However, based on our earlier arguments, we see how many of these local qualities are dependent on planning decisions taken on superior levels, where the particular location of buildings and local public spaces are defined. The development and design of these plans therefore need to be immediately connected to superior plans in the planning hierarchy to make these qualities apparent and supported. The other way around, decisions taken in development plans will have strong influence on qualities beyond the boundaries of these plans, why it is equally important to acknowledge the effect

of development plans in a larger spatial context, so that decisions on this planning level not only support local qualities but also qualities beyond the boundaries of the plan.

This can fairly easily be accomplished using new digital tools that can move seamlessly between scales and visualise how different planning levels affect and support each other and avoid that different planning scales work against each other. The notion of inter-scalar, giving rise to our street typology, is here an essential dimension of this, where we realise that to create such inter-scalar qualities, which we argue are essential in supporting urban qualities, we need to let different planning levels influence each other.

5.4 A worked through example through the scales