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Integrating Mobility Environments in the City

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1 INTRODUCTION

The way we understand the organization of our urban world has changed and the practice of designing it needs to change along with it. Urban places we might once have understood as being defined by their geometries and surfaces and by the objects and people they brought into proximate relations, are today more often defined by their relations and interactions with far-off places and the connections and 'actions-at-a-distance' they enable with other places. The consequence of this change is that 'place' itself becomes a network effect (or product) rather than simply a location in a cartographic surface. This involves a profound conceptual change, one which has been recognized for example in the idea of 'mobility environments'. This idea has been proposed as a means of dealing with *the design of urban places in dynamic and extensive 'spaces of flows'* (Bertolini and Dijst 2003: 27-43) (as opposed to designing on a Cartesian surface defined by cartographic coordinates).

However, dynamism and interconnectivity bring their own network processes which will tend to generate inequalities between places. These processes are complex and are connected to the ways scale is constructed in environments. Our initial criticism of the proposal of mobility environments concerns therefore the way we do not yet understand adequately this process of scale construction or the way flows of people (or material, information or money) affects the environments we are trying to design. We may find ourselves as designers unwittingly contributing to an urbanism of ' (undesirable) uneven development'.

It has already been noted that "uneven global interconnection via advanced […]communications becomes subtly combined with local disconnection in the production of urban space" (Graham 2002). We would argue that it is not only *tele*-communications but *all* communications, including those of movement that are implicated in this effect. Our aim in this paper therefore is [i] to begin to qualify and build on the mobility environments idea by exploring in concepts the ways urban environments may be generated in general out of dynamic spaces, [ii] to begin to inform ourselves better about the ways dynamic spaces may produce both desirable and undesirable effects in our design practice, and [iii] begin to propose strategies for avoiding contributing to unequal effects of flows as we are designing with network spaces of flows.

After introducing the concept of mobility environments and the Network City, we will review briefly our 'default' presuppositions about what urban and network space consist of. We will try to offer a conceptual understanding of the way space affects place, and try to describe how different scales of network space acting alone and together may produce particular effects in public space and in the local functional environment. We will illustrate our statements by looking briefly at Rotterdam South, including some examples of 'mobility environments' in place, to show how effects of local disconnection may be produced. We will try to show how the mechanism of this production is in fact anything but subtle and is in fact a systematic product of the scaling effects of modern infrastructures. In our concluding statements 'Constructing Urbanity' we discuss that we can find in these subtle and not so subtle mechanisms a way of understanding better the way place and non-place (Auge 1995) effects are produced in urban environments and a way of expanding on and developing Bertolini's proposal for producing effects of place (and 'urbanity') in mobility environments.

2 MOBILITY ENVIRONMENTS IN THE NETWORK CITY

Cities today are for a large part understood in *networks* rather than as matrices of *central places*. This understanding has evolved from a gradual overturning of the Central Place concept of Christaller – which we would argue is not by any means complete. This conceptual shift occurred first by way of a recognition of the idea of the city as a *gateway* not only to its region but also from its region to much more distant places. The problem many encountered in dealing with cities by way of the central place idea was that while many cities seemed to work as predicted by the central place model, some cities – particularly at the time ports, national capitals, and industrial centers – seemed not to submit to this model at all. James Bird for example criticized central place thinking in particular because it did not account for port cities. Bird resuscitated

Gradman's notion of the 'gateway city' and this idea also played a hugely influential role in the ideas put forward by R.D. McKenzie and Jean Gottmann (in Bird 1977). The idea of the network as an alternative to the central place was given further shape by cybernetics where it emerged out of information theory, and in particular by the technical examples first of the telegraph and then the Internet[1] (Hayles 1999).

Transportation and communications networks today criss-cross regions, nations, continents and the globe, tying strategic places to others *across* (and to some extent without regard to) distance in global, national and regional networks. The contemporary economy has come to rely on these connections and the fast communications and interactions they effectuate in order to hold together regional, national and global administrations and economies. It is in this context that mobility environments have been proposed, as a way of understanding and making well-located and effective *places* in points of high accessibility (*nodes*) in the networks. Cities are changing from being central places into being nodes in extensive webs of interaction, supported *and in a sense generated* by fast transport and real-time communication networks. Bertolini and Dijst postulate that in a networked world people and the workings of organizations are increasingly independent of urban physical and administrative boundaries and this evolution involves considering flows alongside zones, accessibility alongside proximity and stresses the increasingly interdependent and borderless nature of contemporary cities.

The driving forces behind this evolution are both the increase of spatial reach of people and the increase in diversity of activity and travel patterns (Bertolini and Dijst 2003). On the other hand, the introduction and adoption of high speed, flexible and/or individual transport technologies facilitated this evolution to a large extent (Rooij 2005). All these kinds of processes have lead and still lead to an increasing disentangling between human activity patterns and the Cartesian 'proximate' space of the city. Each individual may increasingly create his own virtual[2] city along the connections of network spaces. This virtual city is rather a specific, changeable combination of activity places, connected by transport networks, within definite socio-economic and behavioural constraints (Bertolini and Dijst 2003). This is what we think of today as the *Network City*, in which the social, economic, and cultural structures are not only determined anymore by the shared use of certain spaces, but also by the connections that an individual actor (person, household, company, institution) has with places, persons, or activities elsewhere. In this (new) spatial constellation, spatial barriers are overcome by new communication and transportation technologies. Network hubs are important places in the Network City, because of their inherent nature of accessibility, connectivity and exchange.

Let us now focus in more detail about a number of thoughts about the Network City. A fundament of the Network City way of thinking is a theory of networks proposed by Dupuy (1991) elaborating on previous investigations (Fishman 1990; Wright 1943). It recognises the existence of three levels of 'operators' of networks (re)organising the urban space. At the first level, there are the suppliers of technical networks, such as streets, highways, cables, wires, sewerage, and so on. They are in charge of providing the physical elements of the networks (infrastructure management) and the services on the networks (exploiting the infrastructure). At the second level there are the suppliers of functional networks. They use the level immediately below to provide services -production, consumption, distribution- to the upper level. At this third level the operators are people in their daily life. They make use of the first two levels to create their personal networks by interpreting possibilities and linking activity places, spaces, services, desires and needs in a single personal (or household) behaviour. In this way, people create their own virtual cities. As the first two levels are still characterised by a certain degree of 'objectivity', the third level is mainly a 'subjective' environment where personal, household, or company choices are made, even if conditioned by the lower two levels.

So, '…throughout the 20th century cities have been planned, and in doing so, networks for the transport, not only of passengers and goods, but also of water, energy and information, have played an ever increasing role. As a kind of conclusion based on network thinkers we can state that the network in its modern meaning is characterised by three principal criteria (Caso 1999):

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1 See for more research on the topic of the relation between the digital and physical world, and its implication for the field of spatial planning also the website of the Delft Network City research group website: www.networkcity.bk.tudelft.nl

2 virtual = being functionally or effectively but not formally of its kind (Webster's)

- **Topological criterion**: topology refers to the geometric or physical configuration of a network, the way in which the nodes of a network are physically connected. Networks are not abstract entities, they are related to the spatial dimension by connecting links via nodes in space. This involves discontinuity and heterogeneity. The topology of a network is open and united, and it is opposed to separations such as city/countryside, centre/periphery and zoning.

- **Kinetic criterion**: kinetics pertains to movement and communication between nodes. It is basically a relationship between space and time: speed. The rapidity of the connections within a network is a measure of the quality of the network itself. So, instantaneousness, homogeneity of speeds, the interest for rapid transfers and transits without losses of time or interruptions makes the network apt to movement and defines the kinetic criterion.

- **Adaptive criterion**: adaptability concerns the capacity for the evolution of networks over time and space. From the one side a network should be able to modify its structure to welcome new systems or to extend the applications of existing ones. On the other side, it should adapt itself to the needs and desires of its users by offering a multiple choice for the reaching of goals. Networks work in combination with other networks.

Mobility environments emphasize the qualities brought to place by the connections places maintain with other places, and especially by the diverse visitors brought to places by connections. The network itself begins to define the objective possibilities of places where the 'disengagement' of people from the 'objectivity' of the local is not just a matter of 'subjectivity' but is a factor of the possibilities of the technical networks themselves, which enables people to put distant places together into everyday itineraries without having to negotiate the 'distance' between. We see that this is a matter of provision and access to the required technologies in the first place and then a matter of the ways that those technologies and their infrastructures give access to certain places (nodes) selectively and just as selectively not to others. "Places are thus infused with complex 'power geometries' based on their highly uneven interconnection with the full range of infrastructural means to overcome time and space barriers" (Graham, 2001).

3 PRODUCING URBANITY IN THE NETWORK CITY

Networks are both spaces and facilitators of use and experience and produce places of 'urbanity' (of vitality at higher and lower intensities) in a territory which develops and becomes different through its use in network space. The space in which people engage with some places more than others is related therefore quite clearly with the space of human network experience we mentioned earlier. We see therefore an essentially dynamic systematicity in which the network relations between places and things are at the same time the means by which those things and places develop and change both physically and as the context for the human use and experience of places. We will argue therefore that engaging with this vision and concern for the territory as human and vital place requires that we understand physical places not as a dimension other than space, but as a *product of* (network) space.

Urban space today is something beyond the flat cartographic surface of the map of the territory. But it is also something more than a straightforward connective matrix laid over this map, simply facilitating the movement of people and things between integral and bounded places. While in a lot of contemporary urbanism places are seen as matrices of relatively integral and bounded nodes in networks, there are those who believe that this view does not understand network urban space in a radical or complete or indeed *creative* enough way. David Harvey for example proposes that we should understand cities and places as *becoming* out of 'relational' network fields rather than as simply *being* objects or nodes which exist 'relative' to one another in networks (Harvey 2006). Harvey talks of a 'relational' space in which the nodes (urban places) are entirely products of the networks. He doesn't see places as being other than networks or other than produced in network spaces.

In fact at the larger scales we often consider urban space to be 'relative', with networks connecting urban entities (regions or cities), while those entities themselves and their principle of change or productivity (or 'creativity') is often seen to be governed in another conception of space – specifically by a principle of 'agglomeration' that arguably belongs to the central place idea. We are often left with a model therefore that sees cities as existing in global networks which enable transfers and movements at larger scales, while local place with its possibilities of productive change and 'creative' working at urban (Storper and Venables

2004), regional (Storper and Manville 2006), and even megacity region (Sassen 2007) scales depends on a principle of 'agglomeration' that is not radically enough understood as a network effect.

Beyond the larger scale integrating and globalizing power of network infrastructures the productive 'creative' factor taken to drive vitality, activity and intensity at the smaller scales in cities is taken to be 'agglomeration' – and this is a factor which may be understood in different terms depending on who we are listening to. On the one hand we hear Sassen describing urban territories in terms of networks which form network clusterings at different scale levels (Sassen, 2007). Similarly, Salet is clear that agglomeration and concentration in cities is about networks all the way down (Musterd and Salet 2003). But often in practice and in theory (and, more importantly perhaps, in our presuppositions about how cities work) agglomeration is understood as involving factors like 'face-to-face', 'creative economy', 'urban amenity' and so on that incorporate assumptions of proximate *density*. At a more empirical level and supporting the opinion above, Ciccone and Hall (1996) found that a "a doubling of population density leads to about a 6% increase in productivity."

So while today the Network Cities idea is used and assimilated, it is nowhere near hegemonic nor near fully operational for design practice (Klaasen et al 2007) and is supplemented by central place ideas in ideas involving for example the 'creativity' of proximity and agglomeration economies. Contemporary urban thinking in fact uses a combination of network and central place ideas (or perhaps we should say: *thinks in* and *presupposes* in different situations network and central place spaces). A very important part of this mental architecture of spatial presuppositions concerns the problematic of scale. And while it is easy to understand the scales of cities in relation to their areal hinterlands in the central place model (this is an explicit part of the construction of the model), networks are very often considered to be capable of working across scales and are therefore difficult to tie down to particular scales in principle. They are sometimes considered, in principle at least, to be 'scale-free' (Barabasi 2002). We find ourselves operating in a default model that has cities (or its parts) as things – as primary objects – which then set up the relations between themselves (an 'access to' spatial model). The alternative is suggested by Harvey's (and Leibnitz's and Whitehead's) notion of 'relational' spaces which switches priority to the *relations* and would have the objects as being constituted in continuous circulations (a 'circulation through' spatial model).

The way Storper and Manville (2006) put it is interesting: "The problem [according to them,] is that it is difficult to accommodate explanation of both resurgence [central urban vitality and productivity] and emergence [vitality and productivity in peripheral areas *between* cities] using the main explanations in the field today. These include: theories of the knowledge or creative economy, urban amenities, diversity and tolerance, and urban beauty. In most of their common specifications, they do well for either resurgent or emergent cities, but not for both at the same time. This suggests that these ideas, interesting as they are, require much greater specification and, in some cases, overhaul, in order to offer satisfactory responses to the diversity of patterns of urban growth." Our conclusions will be different to theirs but this emphasizes our point that conceptions of space and its productivity are often scale-dependent and different depending on the scale we are considering.

The difference between density and network clustering may seem subtle, but when it comes to dealing with space and the design of space and place this difference is absolutely crucial. The space of the one (density) is the more or less filled up areal unit, the space of the other is the connective conduit (network clustering). How we go about designing in these two modes is a matter of working in two entirely different spaces and understanding the processes in different modes of spatial organization.

The first space implies a space of bounded places while the second implies an open and at first sight scale-free network. Scale-free however does not mean that there is no hierarchy in the network. On the contrary. Salingaros (2005: 15-39) argues in his 'theory of the urban web' that the presence of hierarchy is a crucial element for vital networks. And a moment's reflection is all that is needed to see that in fact real technical networks almost always embed, and indeed *construct* in the real world very real scales (the secured cables transmitting information and financial transactions between global centers; the railways as nation-builders of the 19th and early 20th centuries). In network theory as well, what we see is that networks don't so much *have* scales as *construct* them in use. While it may be difficult to see scale as intrinsic in 'scale-free' networks, in the way these networks are constructed and used (in the ways they become parts of human organization and action in other words) we start to see characteristic *levels* of network clustering which we

can associate with scales that are organized in such a way that levels open to one another by way of cross-level links (Granovetter 2003; Buchanan 2002).

Salingaros (2005: 83-114) argues also that urban coherence and vitality is a result of interconnectivity on different levels of scale and the first question for us becomes how we understand scale being constructed and how we conceptualize the relations across scale levels in thinking about physical environments. Bertolini proposes, correctly in our view, that urban qualities are produced in each location largely by what the network brings to place and on the characteristics of the visitors. But he goes on to refer to the 'node quality' and 'place quality' of such mobility oriented environments. We will propose that it may be possible to view these in a relational network logic as simply two sides of the same coin.

The question for design really becomes one of the precise relation of spaces required to produce places. Here we will understand place as being agglomeration, but agglomeration in a very particular way. Place becomes in our view a cipher for the effects of network organization. It is in Harvey's terms the 'thing' as a product inseparable from the connections which construct it. It is relational space become concrete in its point of intensity – and is therefore entirely *network clustering* in the more prosaic viewpoint of the formal model of space we are beginning to construct here. It is sometimes assumed that network space may have a negative and degenerative effect on the concrete place (Tzonis, 2006). Others see places as being produced, but negatively: as chaotic or pathological outcomes of globalizing network spaces (Sassen 2006). We would argue that this view misunderstands the nature of place (certainly in a relational perspective). We would propose that network produces conditions in place which become that place in its entirety. Humans are not well aware of the networks at play around them and their effects (Granovetter 2003) and what we want to do here is propose that there is mileage in pursuing a research agenda which finds a produced place in networks.

4   ROTTERDAM SOUTH

A short example will reveal what we mean:

The technical network of the motorway system which covers the Netherlands converges in radial lines on its major cities. Rotterdam (figure 1) becomes a point around which motorway connections to Amsterdam, Utrecht, Arnhem, South Holland and Belgium converge and turn. To the south of Rotterdam the motorways join in a knot of infrastructure, one of whose off-ramps leads directly into the fabric of Rotterdam South and towards the River Maas. These roads, scarcely less than motorways themselves, cut through some of the poorest urban districts in the Netherlands. But they also connect, along their route, many facilities and functions that are familiar to and used by people from much wider surroundings. There is the Ahoy, the biggest music venue in the Netherlands, the Ikazia Hospital, the Zuidplein shopping mall and the regional bus terminal. Further into the fabric but still highly accessible along fast routes one finds the Maas Silo entertainment complex, the Luxor Theatre and the business district along the south bank of the Maas. A little further is the Kop van Zuid district with its shops and apartments for better-off city dwellers. And all of it within ten minutes of the motorway.

In short, what we find is a mobility environment par excellence, and one the municipality has been pursuing as a development strategy over the last 20 years. What we find also is the set of places that *constitute* Rotterdam South for a large group of people who would in general not live in Rotterdam South but would use it in a certain way. That way is to a large extent defined by the set of places just mentioned and the ways of getting to it.

Contrast this to the Rotterdam South of an inhabitant of regeneration area Afrikaanderwijk (see figure 1). The places that constitute Rotterdam South for this person include the local supermarket, other shops in the neighborhood, the employment and housing office, perhaps a local café and the bus or metro stop, if we map the two everyday worlds we have just mentioned over each other, the first thing that becomes obvious is that these two worlds hardly meet each other. We may very easily begin to trace in and out routes and the 'borders' set up (the limits of their presence and involvement in the place) by different people occupying different perceptions of Rotterdam South with their different ranges of movements, and we may easily demonstrate how some of the places we call 'mobility environments' separate themselves out from the proximate context and play little or no role in the lives of more local people. We see immediately that the fact that a place (Rotterdam South) can be different for different people may be not so much a matter of interpretation or subjectivity as it is an objective matter of the ways that people use space and places. We can

begin to see as well, in a very clear and objective manner, the way that spatial segregation may become established and the way Rotterdam South becomes an area not only of increasing contrasts between the mobile and the less-mobile, the rich and the poor, but also how 'borders' are produced between these different 'classes' and their places even where no clear physical barrier exists.
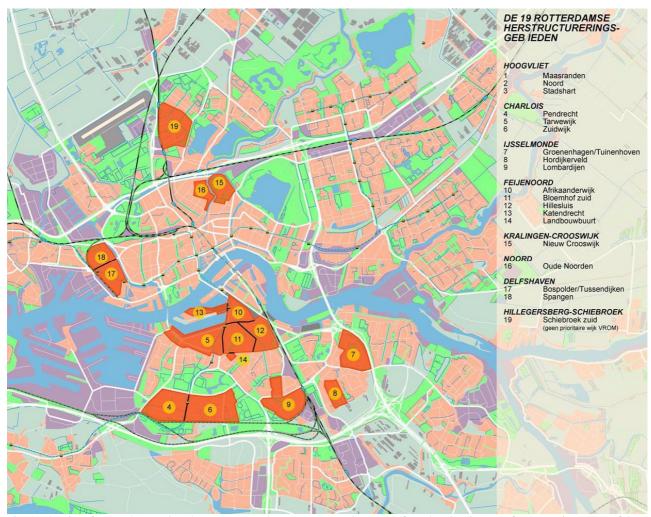

Fig. 1: The city of Rotterdam; main urban structure, River Maas separating North from South, 19 areas of regeneration (most of them located in Rotterdam Zuid)

The problem however that has emerged in Rotterdam South is one of the increasing contrast of two worlds existing side by side (or in 'layers' that pass over each other without meeting each other): the one of relatively mobile people moving over wider areas and using the technologies and the infrastructures of private transportation; the other of less mobile people (tied much more we could say to 'place') living lives which barely engage with the lives lived in the more mobile world. The result is places that on the one hand lack a rich engagement with their surroundings and on the other an isolation of the local from the spaces which connect people to the stimulus and energy of the scales larger than that of the neighborhood. It is one character of the 'urbanity' and the 'benefit of the traditional urban' Bertolini is concerned about that urban space connects people of different cultures and backgrounds in urban places. What we see here on the contrary is a situation in which the 'borders' around the respective life-spaces of people of differing mobilities ensure that these people hardly encounter each other.

5   CONSTRUCTING URBANITY IN MOBILITY ENVIRONMENTS

The Network City is understood as a way of articulating planning and design strategies that try to cope with the reality of an increasingly dynamic and borderless urban system, as presently introduced in the Netherlands (Ministry of Spatial Planning 2006). It is in the context of this strategic dimension that the mobility environments idea is proposed so that planning and urban systems may still fulfill a role, specifically where mobility flows interconnect in airports, railway stations, motorway service areas, urban

squares and parks therefore. Mobility environments are intended as a way of implementing the Network City idea as a matrix of socially and economically viable urban environments and places.
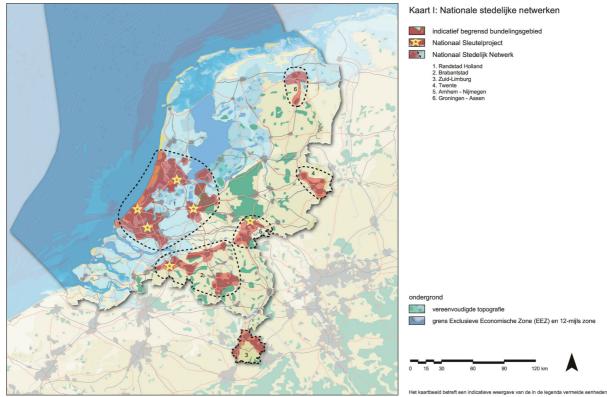

Fig. 2: National Urban Networks (source: Ministry of Spatial Planning 2006)

But the mobility environments perspective has also claimed a concern with the distinctive and traditional qualities of cities, or 'urbanity'. Bertolini has argued that mobility environments will allow us to retrieve some of the 'traditional benefit of the urban' – to be able to design and build places that are supportive of a rich and varied public life in urban space by concentrating on points of high accessibility in the transportation and communications networks the contemporary economy depends on. Engaging with this concern requires that we think about the spaces in which such distinctive qualities might be constituted or *produced*. They require us to think about the spaces in which 'urbanity' *creates* vitality and with it urban places in a generative way.Mobility environments need to emphasize therefore the qualities brought to place by the connections they maintain with other places, and especially with the diverse ways they are used by visitors brought to place by these connections. But they operate also at different scales and in the context therefore of our presuppositions about agglomeration. Visitors are diverse in a number of ways but we will be arguing here that if we want to understand this spatially (and that means more or less formally) the critical difference is the one of scale. This is a question of the local and non-local and the way the people who use places formally engage one another in spaces of networks and agglomeration.

We can begin to see the way we could modify the 'mobility environments' proposal to include a greater emphasis on and attention to the *local* as an important factor alongside the larger scales. We argue here that it is crucial to have the mobility environment linked to and integrated into the local, i.e. the city district, the neighbourhood, the vicinity (Figure 3). Without local integration, spatial fragmentation can and (usually) will grow to an undesirable level *spatiallly* (the so called „connecting" infrastructure become a physical barrier at the local level), *functionally* (the urban programme in (and closely around) mobility environments only meet the needs of the the non-locals, the „visitors", instead of the city dwellers), and *mentally/socially* (locals have the idea and feeling that -because of this spatial and functional disconnection- they do not belong to this piece of „their" city).

National / Regional accessibility	Local integration	Internal organisation

National / Regional accessibility
Mobility environment connected to and
with higher scale networks / nodes

Local integration
Mobility environment connected spatially,
functionally, socially/mentally to urban
environment

Internal organisation
Mobility environment internal walking
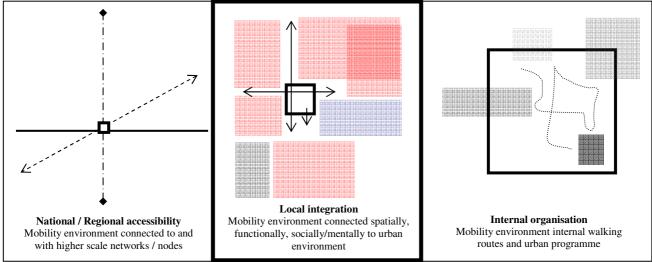routes and urban programme

Fig. 3: Conceptualisation of the integration of Mobility Environments regionally, locallly and internally. The local (urban) integration
will „make sure" that locals will meet non-locals and that spatial fragmentation in the city is avoided, both conditions for creating
vitality and street life.

How this is to be done in more contemporary situations with the involvement of larger scales is a matter for
more research – and for a comprehensive research program. Bertolini's concern with the qualities of the
'urban' are best addressed by first understanding the way the principles of traditional urbanity already
involve network logics and relationality and a productive relation between flows working at both larger and
local scales a the same time. We believe it should be possible to extend this knowledge to a deeper
understanding of the ways we can make public space in 'faster' and higher scaled spaces.

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