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Digital Cities in the making: exploring perceptions of space, agency of actors and heterotopia

Cidades Digitais em formação: explorando a percepção do espaço, o agenciamento dos atores e heterotopia

Asne Kvale Handlykken[1]

ABSTRACT This paper is an attempt to explore how we imagine, sense and experience spaces in digital cities by a study of the hybrid relations between digital media, users' bodies, architecture and the city. Digital and physical spaces of the city are intertwined, the city and urban places and things become sentient, embedded with sensors and digital infrastructure, challenging traditional notions of space, and how we perceive and experience urban space. Crucial issues to explore are: how interactions and agency operate amongst actors in these spaces; between sentient non-human actors, places and people? How are spaces of interaction embedded in the city, what characterizes these spaces, can they be explored as heterotopias (Foucault)? These processes are a mutual shaping of society and technology, where the role of the imaginary, of mental representations and creation are being transformed. .

KEYWORDS Urban space; architecture; sentient cities; biopolitics; connectivity; heterotopia

RESUMO Este artigo é uma tentativa de investigar como imaginamos, sentimos e experimentamos espaços nas cidades digitais através do estudo das relações híbridas entre mídia digital, os corpos dos usuários, a arquitetura e a cidade. Os espaços físicos e digitais da cidade estão intercruzados. A cidade, os espaços urbanos e os objetos tornam-se conscientes, incrustados com sensores e infraestrutura digital, questionando as noções tradicionais de espaço, e de como percebemos e experimentamos o espaço urbano. As questões cruciais a explorar são: como as interações e o meio operam entre os atores nesses espaços; entre atores conscientes não-humanos, lugares e pessoas? Como são incrustados os espaços de interação na cidade? O que carateriza esses espaços? Podem ser explorados como heterotopias (Foucault)? Estes processos são uma configuração recíproca da sociedade e da tecnologia, onde o papel do imaginário, das representações mentais e da criação estão sendo transformados..

PALAVRAS-CHAVE Espaço urbano; arquitetura; cidades sencientes; biopolítica; conectividade; heterotopia

1 Doutoranda no programa internacional Erasmus Mundus Joint Doctorate, Estudos Culturais em Interzones Literárias, alocada na Universidade Federal Fluminense, orientada pela professora Dra. Paula Sibilia. Possui mestrado em Estudos sobre Ciência, Sociedade e Tecnologia, no "Governança e Culturas de Inovação, Cultures Tecnológico no Global Norte Sul", da Universidade de Maastricht, Holanda.

Current conceptions and imaginations of the city are challenged by the emergence of "digital cities". In our daily life we experience and navigate the city in intertwined digital/virtual worlds and physical space. The city and things become sentient, mobile devices, non-human actors and places are embedded with sensors, tracking and location based applications such as geo-tags. These experiences of digital cities emerge with our daily experience of the Internet; from navigating the city in augmented reality, Google Maps, digital infrastructure, concepts such as Intelligent Cities[2] (ICs), to urban installations and art projects such as *New City*[3] (Greg Lynn, 2008), *WikiCity Rome* (Senseable City Laboratory, MIT, 2007[4]), challenging how we imagine, perceive and represent the world, creating new spatial models and experiences. New spatial experiences of digital cities can be found in the interrelated experience of the various ways we interact with the city through digital media such as Internet or location based technology, "digital cities"/"virtual worlds", and our quotidian experience of physical space. These new ways of experiencing, imagining and mapping the city can furthermore be explored as mental representations and heterotopias (Foucault). This research seeks to explore the making of digital cities; particularly how we imagine and experience fluid spaces beyond physical frontiers and territories of the city. Bodies are connected through technology in intertwined physical and digital spaces. These relational spaces will be explored with the concept of heterotopia in order to reveal the complex existence and relationships of these *counter-sites*, or *outsides* (Blanchot). Relations of power and control, creation and resistance are discussed in the context of *Empire* and the *multitude* (Hardt and Negri); revealing possibilities for agency, empowerment and resistance.

Constituted of multiple "intelligent" layers, based on "real-time" interaction, communication and location based content, the digital city is beyond the physical buildings and urban environment. We interact in an intertwined digital and physical space. Content and information are created, co-created, shared and re-negotiated in "real-time", between both sentient places, non-human actors and human actors, transforming traditional urban space and the city. While we sense, navigate and experience digital cities our perception of space and of the city changes. In order to understand how new spatial experience of the city and sense of space emerge, and how the city and things become sentient, we need to investigate what characterizes spaces in digital cities, how the intertwined physical and digital city shape our experience of the city, as well as the potential for agency of users, who no longer are only users, but are also creating the digital city. In an attempt to explore how the digital city is shaping us, and how we also create the city, it is necessary to investigate interactions between both human and non-human actors, recognizing that things also have agency (Latour), and that this is a mutually shaping process. Crucial questions are: what characterizes spaces and heterotopias in digital cities? How do our perception and sense of space changes, as simultaneously the city becomes sentient? How do new spatial experiences and perceptions emerge?

2 Digital or virtual cities are also referred to as smart cites, e-cities, and intelligent cities or ICs, emphasizing in this case the "intelligent infrastructure" based on the concept of open innovation and sharing of knowledge. *Singapore Live* is an example of an IC http://senseable.mit.edu/livesingapore/

3 *New City* is a virtual world created by Greg Lynn (2008), and constructed as a topology, where the earth is mapped onto a folded virtual manifold, and all the information is based on life feeding data on the Internet.

4 In the project of *WikiCity Rome* users can navigate the city in "augmented reality", so the navigation of the city is experienced simultaneously in a physical and a virtual environment, both real and intertwined. For information about the *WikiCity Rome* projects see http://senseable.mit.edu/wikicity/rome/

How do mechanisms of control and relations of power and politics emerge in digital cities? What characterizes space, the experience of space, interactions and possibilities for agency in digital cities?

Places of interaction in digital cities can be explored by a study of users, focusing on their social interactions, creations, and interactions with content in the city and digital networks. In the project of *WikiCity Rome* (Senseable City Laboratory, MIT, 2007)[5], for example, users are navigating the city in "augmented reality", based on an open source network where they can interact, create and share knowledge. The physical and virtual environment of the city is intertwined. The potential for creation and agency of users in this hybrid urban environment and fluid space opens for new ways of sharing, co-creation and remixing both art both as knowledge and meaning making tool.

First of all, however, it is important to present an adequate definition of all those notions, which are far from being evident. The concept of digital/cyber/virtual/liquid cities or architectures builds on dreams, utopias and the imagination about the future of the city, where the human body, connected to technology, taking the shape of cyborgs integrated to computers and cyberspace; it is a space of flux, open for all possibilities. But this is not quite recent: in the 1960th, the ideas of "plug-in city" and "electronic nomads" were developed.[6] The term "cyberspace" was coined by William Gibson in 1984, in his cyberpunk novel *Neuromancier*. The 1980th was influenced by ideas from cyberpunk and virtual reality, where the "cyberworld" was seen as a parallel world[7]. In the 1990th, the idea of a parallel virtual world was challenged by the notions of a hybrid space, although mainly by the influence of Donna Haraways's Cyborg Manifesto[8], and by Manuel Castells[9] theories on the "network society" and the "space of flows", among others, recognizing that we are not only shaped by technology, but also shaping the technology. In architecture and urban studies, particularly the dream of a liquid architecture adapting to our bodies was emphasized in Novak's Manifesto "Liquid Architectures in Cyberspace": "Thus while we reassert the body, we grant it freedom to change at whim, to become liquid" (Novak, 1991, p. 227).

I will use the expression "digital cities" including our experience of the intertwined digital and physical space in the city; covering the following. Firstly, the numerous ways we experience the city through the Internet and mobile devices, from Google maps to augmented reality, moreover digital networks such as: social networks (e.g. Foursquare, Twitter), games and virtual worlds (e.g. Second Life, World of Warcraft), open source (e.g. Wikipedia), augmented reality (e.g. navigating the city with a smart phone with as such as Layar[10] and Wikitude[11]). Secondly, digital cities refers particularly to architecture based on topologies and creation of virtual environments (e.g. Novak's architecture, Lynn's architecture such

5 *WikiCity Rome* (2007) is an art project by the MIT Senseable City Lab, it proposes to explore the city as an open source system. Users can navigate the city in augmented reality and upload content. For information about the Wiki City projects see http://senseable.mit.edu/wikicity/rome/

6 For more information on "Plug-In City" projects of 1962-64, and electronic nomads, see McQuire, S, (2008), *The Media City: Media, Architecture and Urban Space*, London, Sage Publications, 95.

7 The development of "the post-urban fantasy" and the cyberspace is described in Graham, S. (2004), The Cybercities Reader, London, Routledge, 5-9.

8 Haraway, D. (1991), Simians, Cyborgs, and Women: The Reinvention of Nature. New York: Routledge.

9 Castells, M. (1996), The rise of the Network Society, Cambridge, Blackwell Publishers.

10 Layar augmented reality browser, Accessed 20.02.2010 from http://www.layar.com/

11 Wikitude Open Source Augmented reality browser, Accessed 20.02.2010 from http://www.wikitude.org

as *New City*). Thirdly, digital cities also include wireless infrastructure in urban spaces such as in projects based on the concepts of "Smart Cities", "Intelligent Cities" and the "Internet of Things"[12] (RFID technology). Thus, I will focus on particular case studies of digital cities from the interrelated domains of our daily experience of the city through the Internet and mobile devices, architecture, new media art, augmented reality and open source.

It is necessary to have in mind that the term "digital cities" also contains symbolic meaning, and can be seen as a metaphor, where digital networks, architectures and cities re-present hybrid, fluid and relational space. Self-organized networks, such as open source platforms, exist and are hold together without a central node of power. The relations, and all the places of interactions, are the ones making the network sustainable. That is why, digital architecture is "not only a series of representation of an ideated physical space; it also serves as a metaphor in the creation of places in cyberspace", according to the definition provided by Bertol and Foell. "Here the use of architecture is meant for the creation of places for human interaction, which does not necessarily resemble traditional physical architectural places" (1997, p.57). These places of interactions, and not only of human interaction, but also of things, non-human actors and places, are shaping spatial experience and how we perceive and sense the city. The changing conception of space based on experience and the senses, not necessarily visual representation and physical space as basis for the "real" needs to be explored further.

Our epoch is, according to Foucault, one of space, and particularly the relations among sites. In digital cities one can imagine the relations among multiple layers in digital networks, intertwined with physical spaces, thus the spaces that relate those sites, and the nodes of interactions creating them can be explored as heterotopias. Digital cities exist of flows of self-organized networks, layers and nodes of connections, emerging "other spaces", and heterotopia of the sixths principle:

> "the boat is a floating piece of space, a place without a place, that exists by itself, that is closed in on itself and at the same time is given over to the infinity of the sea and that, from port to port, from tack to tack, from brothel to brothel, it goes as far as the colonies in search of the most precious treasures they conceal in their gardens, you will understand why the boat has not only been for our civilization, from the sixteenth century until the present, the great instrument of economic development (I have not been speaking of that today), but has been simultaneously the greatest reserve of the imagination. The ship is the heterotopia par excellence. In civilizations without boats, dreams dry up, espionage takes the place of adventure, and the police take the place of pirates".

Imaginary and making of digital cities; intertwined physical and virtual spaces, our bodies are connected; in self-organized network beyond physical borders. Bodies connected through nodes in self-organized networks, or archipelagos in the infinite ocean. We are inhabiting the relations of these fluid spaces and heterotopia, in the ocean or the net as an infinite space where complex

12 Constitutes the network of objects connected with RFID (Radio Frequency Identification) tags. This "ambient technology" promises to create a near invisible global network of physical objects. For more information about "The Internet of Things" see Kranenburg, R. The Internet of things, A critique of ambient technology and the all-seeing network of RFID, Network Notebooks 02, Institute of Network Cultures, accessed 15.02.10 from http://www.networkcultures.org/_uploads/notebook2_theinternetofthings.pdf The Senseable City Lab has developed a project tracking trash connected with RFID tags http://senseable.mit.edu/trashtrack/ These nearly invisible networks are also a part of the digital cities.

relationships of power, control and potential for creation and resistance, co-exist and nourish each other.

Sensing and experiencing space in digital cities

The cyberspace, as well as virtual worlds in games, contains multiple layers of reality. According to Margaret Wertheim in *A history of space from Dante to the internet*: "new digital domain function as a space for complex mental experience and game (...) a new realm of the self, and of imagination" (1999, p. 232-233). This is also the case for digital cities, and while we interact simultaneously in a physical and digital space, this might have implications on how we imagine and experience the physical city and construct spaces, also mentally. "The fact that we are in process of creating a new immaterial space of being is of profound psychosocial significance" (1999, p. 232-233). While we are more and more often interacting in intertwined physical and digital cities, this is also changing our conception of space and even of the self. Moreover, Wertheim points to the representation of space that can be fund in *The Divine Comedy*: "organized as a multileveled hierarchy: the nine circles of Hell, the nine cornices of Purgatory, and the nine spheres of heaven" (1999, p. 246). A similar organization of space can be found in the first computer-based virtual worlds, such as the game *Adventure* (1999, p. 246). Cracking the codes of Dante compromise according to Wertheim "a kind of medievalist hacker intelligentsia" (1999, p. 246). Wertheim emphasizes that *multileveled reality* is not new; "with the virtual world of the television for instance, this created another plane of reality, and paved the way for the new dualism of the cyberspace" (1999, p. 245). She states that as in the Middle ages, our children "will increasingly inhabit a two-phase reality" (1999, p. 245). I argue that nowadays perception and experience of hybrid urban space are challenging these ideas that used to separate the virtual from the physical world, which was the characteristic of the emergence of early cyberspace. In digital cities we experience and inhabit intertwined physical and digital layers of space and realities; spaces are changing in "real-time", fluid, relational, sites of interaction; emerging as heterotopias.

The way we read and write the city is being transformed, as pointed out by Varnelis and Meisterlin:

> "As we have grown accustomed to navigating the city with our smart-phones and our printouts from Google maps, we have come to know it from above, as a two-dimensional, planimetric experience. Instead of seeing ourselves as a part of the city fabric, inhabiting a three-dimensional urban condition, we dwell in a permanent out -of-body experience, displaced from our own locations, seeing ourselves as moving dots or pins on a map (Varnelis and Meisterlin, in Shepard, p. 25, 2011).

We experience, read and navigate the city through "intelligent maps" or in "augmented reality" through numerous "intelligent layers" of real time communication, information and content[13]. This space where we can interact with content, upload, share, co-create, in a kind of fluid space or heterotopia, is characterized by a real-time dynamic multi-layered experience of the city and space (e.g. navigating the city with Google Maps, or augmented reality with Layar or Wikitude, *WkiCity Rome*, navigating interactive and subjective maps

13 It is possible to navigate the city in augmented reality with a smart-phone using applications such as Layar or Wikitude. Through these applications one can navigate the city through multiple layers of geo-tagged content: e.g. twitter-streams, videos, pictures, information from Wikipedia or publicity appears in "real-time"

such as *Real Time Singapore*[14], or Bangalore: Subjective Cartography[15]). So it seems that our mental experience and perception of the city, as well as the self and space, changes. Although we might follow the paths of Google Maps and commercial information, there is as well a potential for agency of each user. In the case of Google Maps we paradoxically get a 2D effect of the 3D, this has implication also on how we experience and imagine the city. In what we call "augmented reality", it is possible to upload and geo-tag content: anything from words, information, pictures, virtual graffiti, videos and sounds are added as new layers of space in the city. Experiencing the city through multiple layers might also have implication for how we navigate, perceive and imagine the city and space.

In the project of *WikiCity Rome*, for example, users navigate the city in "augmented reality", based on an open source network where they can interact, create and share knowledge. *WikiCity Rome* is an art project created by the Senseable City Laboratory at MIT in 2007, searching to explore the following question: "how can a city perform as an open-source real-time system?" (Senseable City Laboratories, 2007). *WikiCity Rome* was based on semantic data structures, open source, and it is constructed with a bottom-up approach, hence the users are developers interacting in real-time, uploading and navigating the digital city. "The map is drawn on the basis of dynamic elements of which the map itself is an active part" (Calabrese, F. Kloeckl, K. & Ratti, C., 2007). The actors interact with real-time content and information, furthermore interrelated with decision making and movement in the network. In the case of augmented reality, it is interesting to look at social interactions and the potential for creation in this hybrid urban environment and fluid space, which opens for new ways of sharing, co-creation and remixing content, knowledge and art (Content from video, music, pictures, text etc). Currently, however, augmented reality is dominated by commercial actors, therefore it is necessary to explore the potential for agency of users, and how politics is embedded in digital cities. The Internet, in the case of augmented reality based on open source, a self-organized virtual network and a hybrid space, represents as such a "digital city", where the physical and virtual environment of the city are intertwined. Nevertheless, great part of the research on the Internet and the information society has been dominated by studies based on a technological deterministic view. This has resulted in numerous studies on technology and the "impact" of the Internet. I argue that this view is largely ignoring the mutual shaping process of technology and society, and especially the potential for agency of users, interactions and creation of content by users in digital networks.

Beyond the physical urban space, digital cities open the horizon for new ways of sensing and interacting. Applications for smart-phones such as *Serendipitor*, by artist Mark Shepard[16], illustrates that although we mostly explore the city passively following Google Maps direction, there is a potential for new ways of random and hazardous exploration of the city and space also in a digital space.

When "users" from any geographical location can upload and tag artworks in the digital space

14 Singapore Live is an example of an IC http://senseable.mit.edu/livesingapore/

15 For more information see: http://bangalore.metamap.fr/ and http://semaphore.blogs.com/semaphore/2010/09/bangalore-subjective-cartography-at-european-month-of-photography-2010-2011.html

16 "Serendipitor is an alternative navigation app for the iPhone that helps you find something by looking for something else. The app combines directions generated by a routing service (in this case, the Google Maps API) with instructions for action and movement inspired by Fluxus, Vito Acconci, and Yoko Ono, among others". http://serendipitor.net/site/

of the *Uninvited DIY exhibition*[17], at The Museum of Modern Art (MoMA) (2010) in New York, this also illustrates new ways of interaction and exploration of space, where people can interact and create in intertwined physical and digital spaces, adding multiple layers of space. For example, *Bangalore: Subjective Cartography* also invites people to upload content to an interactive map of the city accessible on the Internet. The agency of users can challenge traditional conception and organization of space and the city.

Another challenge is to explore further how we can represent these layers of "real-time" content, interaction and communication in new ways. Why do we create maps and models so similar to physical space? The example of Google maps also illustrates how the affect on our experience of the city offers a 2D experience of 3D, shaping our imagination and perception of the city. New direction could emerge if we look ate the project of *New City*, which proposes a dynamic topological representation of cities and the world, in constant transformation, challenging the traditional representation of the world based on maps and the model of a globe. If we explore the city in augmented reality or digital networks based on similar models to that of *New City*, and applications such as *Serendipitor*, which proposes new ways of exploring the city, this could open for new imaginary and experience of the city and space. In order to explore further these spaces of interaction and collaboration, in the case of *WikiCity Rome*, also as a self-organized and open source network.

Actors and inter-action spaces in digital cities

> "What happens in the next phase to the spaces as defined by interactions between people, between people and things, and, not least, between things and things remains open for discussion. As media networks are embedded in and distributed throughout the city, who or what has control over the environment is the very essence of what is still at stake" (Steiner, 2011, p.45).

The experience of the "user" in conceiving space is essential. Steiner points to how a "comprehension of space through interaction rather than delineation" (2011, p.39) was explored by the Archigram movement in the 1960s, as well as the conception of space as social constructed (Lefebvre). The changing role of the "user" in relation to conceiving space is emphasized by Baudrillard, no longer a "user", but, as an "active engineer of atmosphere" (...) "Space is at his disposal like a kind of distributed system, and by controlling this space he holds way over all possible reciprocal relations between the object therein, and hence over all the roles that they are capable of assuming" (Baudrillard, qtd. in Steiner, 2011, p.40)

The study of places of interactions poses questions regarding the role of users, who no longer are merely "users", their agency, and interaction with sentient things and non-human actors that also have agency. Possible new forms of organization emerge, such as self-organized collaborative network, for example the movement of Free/Libre/Open/Source software and Wikipedia. Sassen points out how cities work as frontier zones, and digital networks "enables a new type of cross-border political activism, one centered in multiple locations yet

17 "The experimental unofficial exhibition is part of the Conflux Festival, the annual New York festival dedicated to the psychogeography practice. With the exhibition, the organizers of the event aim to address a contemporary issue, caused by the rapid rise of Augmented Reality usage. What is the impact of AR on our public and private spaces? Is the distinction between the two fading, or are we approaching a situation with an increasing fragmentation of space and realities to be perceived individually? "For more information about this exhibitions see: http://site.layar.com/company/blog/uninvited-diy-exhibition-at-moma-nyc/

intensely connected digitally" (Sassen, 2011, p. 188). Furthermore she says that: "What presents itself as segregated or excluded from the mainstream core of the city can actually be a part of increasingly complex interactions with other similarly segregated sectors in cities of other countries (…) partly inhabit a cross-border space that connects particular cities" (2011 p. 188). An example of such places of interaction can be found in social networks. This was manifested in recent activism and social movements in Egypt, Tunisia and Libya. In these cases, Twitters streams, U-tube and Facebook, are also a part of the networks and relations which constitutes digital cities. These could be also places of resistance, creation and transformation. According to Sassen "global cities become a sort of new frontier zone where an enormous mix of people converge and new forms of politics are possible" (2011, p. 189). However, it is necessary to be aware of how our traces and information are collected, tracked through sensors, RFID (Radio Frequency Identification Tags), connected to information from for e.g. Facebook, and this poses questions also regarding control, privacy, and what should be made publicly available. There is a potential for action and collaboration, as conception of space is also a collaborative process, new forms of collaborative organization of space, politics and activism should be further studied.

Spaces of interaction and collaboration where we interact and share information in a digital space blurs the boundaries between public and private space, and thus questions of privacy, what should be available in the public domain become crucial. Alternative licenses such as Creative Commons[18] emerge also as a result of these changes. "The conception of the liquid city, which directly maps the fluidity of data space onto experiences of the cityscape, raises fundamental questions concerning the public culture of cities " (McQuire, 2008 p. 101). Although these changes seem to transform public life and social interactions, it appears that social movements and interaction, resistance and creativity are embedded in digital cities and network. Social and political movements, being a part of the "multitude"[19], use social networks and digital media, empowering citizens in order to make societal and political changes. Digital cities (including social networks and new media) are transgressing and transforming the physical and geographical mapped city space. "They become critical and strategic sites at which the very political organization of space and society becomes continually remade" (Graham, 2004 p. 155).

If we understand space in digital cities merely as a process of interactions between both human and non-human actors and places, all sentient and with agency, it appears that the implications are impossible to know, but more important is to study the process: these spaces as relational, in constant negotiation and mutually shaping our experiences and perceptions of space and the city. Particularly interesting are the transformations and actions emerging in these places. This has been illustrated with the project of *WikiCity Rome*. Another example is the project Natural Fuse[20]. The network connecting "Natural Fuse" units implies actively participation and collaboration. Thus, it highlights the potential for going beyond the mapping, and tracking which is the case of most representations of digital infrastructures, that propose a visualization and raise awareness, but not necessarily imply action

18 http://creativecommons.org/

19 The postmodern multitude is according to Negri "an ensemble of singularities whose life-tool is the brain and whose productive force consists in co-operation" (Negri 2004, p.225).

20 For more information see http://www.naturalfuse.org/

of citizens (e.g. Trash Tracking[21], and Subjective mapping). The potential for action, creation and transformation are challenging the view of the Internet and digital media as an information society where the user is seen as a "user" and not an active creator of content and meaning making, sheltering simultaneously multiple subjectivities of the actors. This raises an important issue of agency of citizens who actively can participate and create heterotopique spaces of creation and transformation. Hence, challenging the view of people as users and passive consumers of the Internet and digital media as a tool for simply raising awareness or access to knowledge. Agency of people and the potentiality of creation and resistance of the multitude of the poor also through digital media are crucial to explore further.

The forms of resistance, power and control are related to the organization of space.

Deleuze refers to how Foucault describes the *disciplinary societies* in the eighteenth, nineteenth centuries, until the outset of the twentieth century: "They initiate the organization of vast spaces of enclosure. The individual never ceases passing from one closed environment to another" (Deleuze, 1992, p.3). According to Deleuze we are "in a general crisis in relation to all the environments of enclosure –prison, hospital, factory, school, family" (1992, p.4). The societies of control are in the "process of replacing disciplinary societies", and there are "forms of free-floating control that replaces the old disciplines operating in the time frame of a closed system" (1992, p.3). Deleuze says that the corporation has replaced the factory. In the present society we can see how *Empire and multitude* operate:

> "New figures of struggle and new subjectivities are produced in the conjecture of events, in the universal nomadism […] They are not posed merely against the imperial system—they are no simply negative forces. They also express, nourish, and develop positively their own constituent projects. […] This constituent aspect of the movement of the multitude, in its myriad faces, is really the positive terrain of the historical construction of Empire, […] an antagonistic and creative positivity. The deterritorializing power of the multitude is the productive force that sustains Empire and at the same time the force that calls for and makes necessary its destruction." (Empire, 61)

In fluid spaces such as the intertwined physical and digital space, or in the relations which *multitude* and *Empire* (Hardt and Negri) exists; relations of power, and control in empty spaces and networks that also can be related to Latour's metaphor of the net, or the infinite ocean in Foucault's sixth principle of heterotopia. It is, though, important to locate the movements, experience and agency of the connected bodies in these self-organized vast spaces where frontiers no longer exist. The sixth principle of Foucault's heterotopia opens for an exploration of these counter sites or other spaces, that also can be connected with Blanchot's and Foucalt's "*The Thought from Outside*". These mental spaces or imaginary sites "dehors", where we are inside a set of relations, that simultaneously are in connection with all other sites. According to Foucault this outside is immanent in the process of

21 The Senseable City Lab at MIT has developed a project tracking trash connected with RFID tags http://senseable.mit.edu/trashtrack/ These nearly invisible networks are also a part of the digital cities. Constitutes the network of objects connected with RFID (Radio Frequency Identification) tags. This "ambient technology" promises to create a near invisible global network of physical objects. For more information about "The Internet of Things" see Kranenburg, R. The Internet of things, A critique of ambient technology and the all-seeing network of RFID, Network Notebooks 02, Institute of Network Cultures accessed 15.02.10 from http://www.networkcultures.org/_uploads/notebook2_theinternetofthings.pdf

subjectification (Pelbart, 2000, p. 208).

Spaces of heterotopia, resistance and creation in Digital Cities (intertwined digital and physical spaces of the city as well as imaginary and virtual worlds), new political activism and resistance can emerge. However it is a challenge to transfer and empower also the excluded, and poor that constitutes the potentiality of the multitude. "The poverty of the multitude, then, seen from this perspective, does not refer to its misery or deprivation or even its lack, but instead names a production of social subjectivity that results in a radically plural and open body politic, opposed to both the individualism and the exclusive, unified social body of property" (Commonwealth, p.39-40).

Foucault describes how the society of discipline is in crisis, and if we want to change the power of the state it is necessary to look at the micro powers that permit the existence of the power of the state. These powers consist of the numerous relations of power that exist in the society, and are even more complex and diverse today (Foucault, 1978, p. 268). These relations can be illustrated by how Hardt and Negri describe the power and relations of the Empire and the multitude, and how these concepts operate together.

> "The ultimate core of biopolitical production, we can see stepping back to a higher level of abstraction, is not the production of objects for subjects, as commodity production is often understood, but the production of subjectivity itself. This is the terrain from which our ethical and political project must set out. But how can an ethical production be established on the shifting ground of the production of subjectivity, which constantly transforms fixed values and subjects?" (Hardt and Negri, 2009, p. x).

How can our bodies and subjectivities navigating and creating new fluid spaces in the city challenge what Sennet points as the "The fall of the public man"? Sennet announces the death of politics in the public spaces of the city, and the passive spirit of man in public life. The individual focuses on self-realization and the public and intimate life is in confusion. Sennet describes how "Each person's self has become his principal burden; to know oneself has become an end, instead of a means through which one knows the world. And precisely because we are so self-absorbed, it is extremely difficult for us to arrive at a private principle, to give any clear account to ourselves or to others of what our personalities are. The reason is that, the more privatized the psyche, the less it is stimulated, and the more difficult it is for us to feel or to express feeling" (Sennet p.4).

As Deleuze states referring to the young people: "It's up to them to discover what they're being made to serve, just as their elders discovered, not without difficulty, the telos of the disciplines. The coils of a serpent are even more complex that the burrows of a molehill" (Deleuze, 1992, p. 7). How can subjectivities composed of the multitude produce creation and resistance? "If we are to act within them, however, the ethical horizon has to be reoriented from identity to becoming. A t issue "is not what we are but rather what we are in the process of becoming—that is the Other, our becoming-other." (…) The multitude makes itself by composing in the common the singular subjectivities that result from this process" (Commonwealth, p. x). According to Hardt and Negri "the common appears as the basis and goal of struggles—not only the common as a given element such as land or natural resources but also and more important the common as a result such as networks of social relations or forms of life" (Hardt and Negri, Commonwealth, 2009, p.117) Finally these

complex relations emerging as vast oceans (Empire and the Multitude), transgressing frontiers (public and private space is blurring), new territories of resistance and creation emerge (physical and digital spaces of the city are intertwined), simultaneously as a relational mechanism of power and control of the *Empire*.

Heterotopia and digital cities

The concept of heterotopia has largely influenced theories on space in the field of architecture and urbanism. The essay *Des espaces autres* or *Of other spaces*, is based on a lecture given by Michel Foucault in 1967, and published in 1984. The text develops a description of heterotopias and the meaning of this concept. Foucault describes different conceptions of space since the Middle Ages, and the 20th century as the century of space in contrast to the present epochs' obsession with history and time. It is important to explore heterotopias in the city, particularly in digital cities, because there exists such kind of other spaces, relating both the physical and imaginary spaces, while we inhabit the nodes of connection in these relational fluid spaces. The concept of heterotopia focuses on other spaces, counter-sites and the in-between, spaces that are interrelated and intersecting. This could be very useful for the exploration of new experiences and senses of space and the city intertwined with cyberspace. "In the Middle Ages there was a hierarchic ensemble of places: sacred places and profane places; protected places and open, exposed places; urban places and rural places (all these concern the real life of men). In cosmological theory, there were the supercelestial places, as opposed to the celestial, and the celestial place was in its turn opposed to the terrestrial place" (Foucault, 1986, p 22). However, he says that contemporary space is not entirely desanctified. Conceptions of space are still dominated by oppositions. For instance, public and private space, the family space and social space. These spaces are, according to Foucault, "nurtured by the hidden presence of the sacred" (Foucault, 1986, p. 23). In the exploration of spatial experience in the digital city these notions are interesting because we are actively constructing, consciously or unconsciously, such spaces. Embedded in spatial experience appears to be based on these oppositions, for instance the physical space of the city as real, and the digital as a separate "unreal" space.

The idea that a site is usually defined by a cluster of relations is of relevance for us, while exploring our experience and perception of space in the city, and particularly the spaces in digital cities that emerge as intertwined digital and physical spaces. Examples can be found in the spaces of interaction in digital networks, augmented reality, and the intertwined spaces among physical and urban space. These nodes of collaboration or interactions are what constitute the network (e.g. nodes of real-time interactions among multiple actors, both human and non-human: in Wikipedia, *WkiCity Rome* or the space we interact in while navigating the city in augmented reality.) Foucault mentions the train and the mirror as such places defined by relations and contradictions, and as well in movement. He describes "certain ones that have the curious property of being in relation with all the other sites, but in such a way as to suspect, neutralize, or invert the set of relations that they happen to designate, mirror, or reflect (…) These spaces, as it were, which are linked with all the others, which however contradict all the other sites" (Foucault, 1986, p. 23). These spaces are of two types: utopias and heterotopias. Utopias have no real place (and represent a perfection of society), whereas heterotopias can be real places that exist, although not necessarily in a physical place.

"Heterotopia is the opposite of a non-place, although it can realize places to be in non-places (…) and "embodies the tension between place and non-place that today reshapes the nature of public space" (Dehaene and De Cauter, 2008). According to Marc Augé, "If place can be defined as relational, historical and concerned with identity, then a space which can not be defined as relational, or historical, or concerned with identity will be a non-place" (Augé, 1995, p. 77-78). In *Non Places. Introduction to an Anthropology of Supermodernity*, he argues that supermodernity creates such non-places. So heterotopia today is still an important issue in the study of the current transformations of the city, and emphasizes the possibilities of interaction, agency and transformation. The possibilities of transforming non-places into heterotopia is also important to explore further, and opens for new ways engaging citizens to actively participate in a bottom-up approach of creation and collaboration in urban spaces. There is a potential for new ways of organizing, engaging, sensing and creating space, as well as new forms of political activism and collaborations to emerge.

In digital cities, however, it is difficult to distinguish between public and private space. The concept of heterotopia can thus be useful because this kind of space is in constant transformation, and can also be a mental space of imagination, creativity and resistance. Virtual worlds such as in Second Life or computer mediated worlds in video games are not present as physical places. These spaces are virtual and examples of mental imaginary spaces, realized in a digital space, although as real as physical spaces, furthermore these are heterotopias; simultaneously real and "unreal". The multiple layers of networks, communication and content in digital cities are some of multiple layers of "the real". Not necessarily more "unreal" than the physical reality. In digital cities, the perception and experience of the space transgress the physical borders of the city and reveal fluid and relational spaces, where the physical and virtual/ digital are intertwined in a hybrid space in a mixed reality. Communication, interaction and "logging into" places in digital cities, that have no physical location change our relation to space, furthermore this affect social interactions and how our bodies sense and experience space and the city. Hence, the virtual or digital space is as "real" as the physical urban space. An example of heterotopia in digital cities might be the experience and perception of cities in "augmented reality". Such as the mirror, the boat or the train, our bodies interacting in digital cities are in a sort of heterotopia that relates to other places, a space of flow in-between, a counter-site, or even digital interzone. New sensations of space and the city are fluid and relational, overlapping layers of "places", "other places" and "non-places". So heterotopias could be the sites connecting these different "places", where users' bodies interact, and they can contain all of these "places" where both imagination and interaction are shaping space, not necessarily located in the physical city.

Digital cities, explored as an immense artifact and also as a laboratory, are not only a technical infrastructure but indeed symbolically and politically constructed. "The study of laboratories has brought to the fore the full spectrum of activities involved in the production of knowledge", according to Knorr Cetina, so "it showed that scientific objects are not only 'technically' manufactured in laboratories but also inextricably symbolically and politically constructed" (2005, p.143). The idea that everything is negotiable in the making of scientific knowledge is also relevant and moreover crucial in digital network and architecture. In the flux of real time creation of knowledge in the web, on *Wikipedia* or *WikiCity*, as mashups, interactive architectural

software, there is a constant process of interaction and negotiation between the *actants* of the network. In digital architecture based on topology, the process of negotiation between flows of knowledge and motion can be observed between both human and non-humans (Neil, 2009). Hence, non-human actors and artifacts are also involved in this process of negotiation, and moreover embedded with knowledge and politics. Transferred to the diverse experiences of digital cities, this can be relevant for studying epistemic cultures and the creation, negotiation and representation of the kind of knowledge and politics embedded in the network. "Society is not the whole 'in which' everything is embedded, but what travels 'through' everything, calibrating connections and offering every entity it reaches some possibility of commensurability" (Latour, 2005, p. 241). According to Latour, though, the "net" metaphor remains so powerful because it leaves unconnected what is in the empty spaces, and does not try to fit everything into groups or frames. This point is also important while *actants* in digital cities encompasses both human and non-humans, belonging to multiple contexts and groups, moreover undefined or invisible. Latour uses the "net" as a metaphor pointing to the "missing masses", that we don't know much about (2005, p. 245). The notion of "missing masses" is of relevance in this study of an exploratory nature, investigating the process of becoming of digital cities. Here, the "missing masses" can refer to transformations, multiplicities, borderlines, becomings and unformed matters which cannot be mapped into differences and entities. These "missing masses", empty spaces are what holds the network together, or as the infinite oceans where the connected archipelagos or boats are floating. The production of empty spaces in these nets can be linked to the relation of the creative resistance of the multitude.

Blanchot's and Foucault's concept of *outside* ("*dehors*") exists as "other worlds", the beyond, or the flow we inhabit these other worlds, that "for the artist or the poet, perhaps, there are no two worlds, not even a single world, but only the outside in its eternal flow" (Pelbart, 2000, p. 201). Blanchot in the study *outsides* in literature or art, points to in the study of Kafka, a paradoxical existence found in such outsides: "we do not know if we are excluded from it (which is why we search vainly in it for something solid to hold onto) or whether we are forever imprisoned in it (and so we turn desperately outside)" (Blanchot qtd. in Pelbart, p. 201). The making or experience of digital cities, new fluid spaces, art, and dreams; these *outsides* are shaping our subjectivities. Foucault explains how this outside is immanent in subjectivity, and the process of subjectification, and "'to think otherwise': to be invited to fold otherwise the forces of the outside. The invitation to the outside or the passion for/of the outside finds here its strategic and political function, when it triggers a subjective mutation, that is, a redistribution of affects, of what attracts and what repels" (Pelbart, 2000, p. 208). Digital cities exist both as such *outsides*, virtual and mental spaces as well as heterotopique spaces in an infinite ocean or connected bodies in self organized network and flows. We have to re-invent and explore the not yet realized possibilities of creation and resistance; new fluid spaces, counter-sites, thoughts from outside, territories beyond frontiers, where new subjectivities and spaces of heterotopia emerge.

Finally, the making of digital cities and the emergence of new spatial experiences is a process where we are mutually shaping, and being shaped by technology; the ambient technology embedded in the city and urban space also has an impact on our perception and experience of the city. It is, I believe, paramount to explore further potential for agency

of users who no longer are only users, but also designers, artists etc. The boundaries are blurring. These spaces of co-creation, relating other sites, which makes up the space of the city, a process, where sharing, co-creation, creativity and transformation is taking place, new political activism might emerge, are transgressing the traditional borders of the designed physical city space. In order to make changes in the society for the poor and excluded it is a paramount to get access to knowledge, education, through participation in the digital commons; re-inventing the common, transference of power, for as such contribute to empowerment, social transformation and democracy.

Spaces of heterotopia, interaction and collaboration, not necessarily possible to locate in a physical place, reveals a potential for transformation and change, but also of tracking and control. It is possible to make the "invisible" visible, connect multiple invisible layers of information, tracking information-dust, and difficult to separate between public and private spaces in digital cities. New ways of sensing space and interactions emerge. What makes up space in the city is not merely defined by the monumental physical or visual, but the flux and multiple layers of content, information and the subjective experience of those.

New ways of imagining and organizing space mentally, as we read, write or sense the city are being re-negotiated as we participate, confront, navigate and create the city. However, it is crucial to gain more understanding about the process of imagination, mental representations and becoming of space and city, feedback loops: places, non-human actors (things), human actors: all these actors have agency, are sentient, and are shaping each other.

What happens to our imagination and perception of the city if we in the future navigate the city in possible "real-time" maps which are not (as Google Maps) a familiar representation of the physical city? Representations of the city, such as *New City*, and applications such as *Serendipitor* are examples of such new experiences of city and space. If digital cities propose applications which actively encourage participation, action, engagement and creation, taking into account the real-time dynamic of the city, and that non-humans and places have agency and are sentient, and that experience and conception of space is not purely visual, this might pose both theoretical and methodological implications in how to study the city, our experience, and how to shape it, and how new sense of space emerge. New possibilities could emerge, be imagined, sensed and created while exploring heterotopique spaces.

The imaginary and virtual space, heterotopias, the not yet realized and created, floating as potential of resistance or creation, in the infinite ocean or empty spaces (of digital cities) contains the power of resistance and transformation; to create (digital) cities, imaginary worlds: "to create a space that is other, another real space, "a creative force, (both in order to create resistance and to re-invent the city.) The potential of production, of creation and resistance of the multitude (also of the excluded and poor) has to re-invent the common and create new subjectivities and ethics that can actively participate in creating new territorialities, (transgressing the physical frontiers, public and private space), to expand the common.

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