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From the vertical city to the virtual-city: the rise of the cyber-city

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ABSTRACT

In this paper, we set out to examine the meaning and significance of the rise of the cyber-city (the city's structures that are part of cyberspace – material and non-material) and its transformational role in the creation of the 'virtual-city'[14].

Constructing high-rise buildings and, hence, creating the vertical city, is a major urban characteristic, due to the developing technologies after industrialisation. Similarly, the 20th century technologies of the Information Age are creating the virtual-city. The ICTs (Information and Communication Technologies) are powerful transforming agents changing vertical cities into virtual-cities, thus redefining our material reality. The transition (partly hidden) from the vertical to the virtual, ceaselessly going on in all aspects of society, is now reaching a critical point calling for a new perspective, crucial in understanding the new social phenomenon of 'virtuality'.

However, in order to gain a better understanding of the virtual-city we need first to examine the rise of the cyber-city due to its key position in the transformation process. The cyber-city (a new socio-spatial formation risen since the 1970's) does not simply act as the intermediary between the physical city and the virtual-city but, most significantly, it enables the existence of the virtual-city itself. That is why we need to know and to understand the cyber-city's complex structures and processes, and their significance in the transformation and (re)production of our social reality.

Keys: Cyber-city, cyberspace, digital city, ICTs, planning, socio-spatial, trialectics, virtual-city, virtuality.

1 INTRODUCTION

Examining the emergence of a city's 'virtual' dimension is not as simple a task as that of studying the production of the vertical city. In relation to the emergence of the virtual-city, simply put, building the vertical city is essentially the construction of high-rise buildings enabled by advancements in scientific knowledge and technological know-how. Technological inventions such as the elevator made vertical movement within skyscrapers a simple affair. Similarly, the production of new and improved materials, such as cement and steel, enabled the construction of flexible, strong, durable and functional high-rise structures.

The physical structures of all cities (indeed the physical city itself) can be described in space by using 3D coordinates (x, y, z). Further, by adding the temporal dimension (t) every structure can be located within the spacetime continuum using a 4D mathematical model. In their turn, 3D & 4D mathematical models enable geographical computer models (e.g. GIS[15]) to represent digitally that which our everyday experience relates to us regarding physical structures and phenomena within space-time.

How do we model, describe, analyse, discuss and experience virtuality and its effects in today's cities? Do we 'place' virtuality within the geographical space or in some other 'non-place' space? What is the role of cyberspace and ICTs in the creation of the cyber-city? What is the relationship between the physical, the cyber and the virtual; what is their meaning and significance?

Before exploring the above let us first examine the meaning of basic terms used here, terms such as vertical city and cyber-city.

2 THE VERTICAL CITY

We have already mentioned that the vertical city is characterised by high-rise buildings achieved through scientific and technological developments essentially after industrialisation. Urbanisation occurred so fast that within several decades most pre-industrial cities grew many times their original size. The production of additional city space, through the enormous expansion of the city's structures on the vertical axis is a response to the enormous and urgent need for more living and office space within the city. One result is that many households, and probably the main bulk of office space, are today placed above the 1st floor. Effectively, cities are now divided into horizontal layers and people are living 'on top of each other'. Due to the high rate of production of vertical space and the huge influx of people into cities, this phenomenon of urbanisation continues uncontrolled.

What is a vertical city made off? In addition to people, and fauna and flora in small quantities, it is the vast number of human made structures (buildings, streets, cars and machines) built on the Earth's crust (using cement, steel, asphalt, bricks, glass, etc.), which produces the city's morphology. It is argued that the structures originally produced to protect and serve its occupants are now serving another purpose: technology. In effect, the human city has been taken away from people, and it has been given to technology.

At the beginning of the 21st century, we are witnessing the inability to properly plan the enormous growth of urbanisation that is still going on all around us. It was almost inconceivable in the 19th century to imagine the existence of cities the size of 20 and 30 million people - the population of a country living and working within few square kilometres. The impact of uncontrolled urbanisation and the sudden increase in verticality produced dramatic economic, environmental and social changes resulting in new socio-politico-

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14 The term 'virtual-city' here does not refer to a website's structure or content with information about a city, e.g. the Virtual London (http://www.virtual-london.co.uk/ or http://www.casa.ucl.ac.uk/research/virtuallondon.htm). Instead, the term 'virtual-city' refers to that abstract, 'ethereal' entity which is part of cyberspace and the totality of the non-material structures (informational, intellectual, etc.) that are above, below, outside and inside the 'geographical/physical city'. Hence, a website of the Virtual London is only a small subset of the informational part of the 'virtual- city' of London.

15 Geographical Information Systems (GIS) are computer-based systems that have in their 'core' a mathematically described 'geography' (or geographies) and are used to produce, store and analyse digital spatial models.

economic relationships. An example is the loss of the sense of belonging to a community or a neighbourhood. Another is that due to failing social services and infrastructures cities are divided into 'rich' and 'disadvantaged' areas (e.g. ghettoes and shanty towns).

The vertical city acquired its own momentum and it is essentially out of people's control. If a city were to be considered as a living entity following its own life-trajectory, then its next manifestation on the evolutionary path is already present: the cyber-city.

3 THE RISE OF THE CYBER-CITY

The cyber-city was born through the creation of cyberspace in the early 1970s, basing its informational structure on the existing telephone network that had already broken down the geographical barriers of silence. Whereas the telephone enabled voice and sound to be transmitted, cyberspace added data and images to voice and sound transmission. Theoretically, at least, any person could communicate with any other person anywhere on Earth. That was heralded as the birth of the Information Society.

3.1 Definition of the cyber-city

In this paper the term **cyber-city** refers to the sum total of the physical city plus that part of cyberspace which is embedded within, or which relates to, that physical city. Similarly, the term **digital-city** is used to denote a digitally produced city (solely made of digital information residing in cyberspace) which has no physical counterparts, such as buildings and streets (e.g. AlphaWorld, http://mapper.activeworlds.com/aw/intro.html). We would have preferred the use of the term 'kybernopolis' (from the Greek, kyberno=cyber and polis=city) instead for that of the digital-city but, in order not to increase the confusion already present (given the plethora of terms in use), in this paper we will stick to the term digital-city. It is incorrect to believe that websites represent a cyber-city or a virtual-city because they can only represent a part and never the whole city. These websites, holding information about cities, are popularly known as cybercities, cyber cities, digital cities, e-towns, e-cities, informational cities, intelligent cities, telecities, virtual cities, virtual environments, virtual worlds, etc.

3.2 The spatiality of a cyber-city

A cyber-city's geographical component is shaped by its physical structures and ICTs. Similar to cyberspace, its information (or 'cyber') part is formless (Figure 1). Even though a cyber-city is affected by the spacetime continuum, as a whole, it has spatiality but not geography. It can be qualified by terms such as global, emergence, flows, interactive, informational, digital, intelligence, etc.

Whereas the vertical city has clearly defined geographical boundaries and each structure can be measured, analysed, discussed and represented in 3D, the cyber-city's major characteristics are fluidity and diffusion. For example, the cyber-city's information stores and information processing belonging to financial institutions (e.g. banking) may not reside within the physical city's geographical boundaries but situated in another city. The importance of that was evidenced during the black-outs of 2003 in N. America and Western Europe, in the cities affected everything that run on electricity sopped working, whereas, part of those cyber-cities were still functioning. This was made possible because part of a cyber-city's data and information resides outside of that particular physical city; it is distributed wherever there is information stored or processed digitally in relation to that cyber-city.

What is the geographical configuration of a cyber-city's ICTs? The ICTs and the electronic web's shape are based on the telephone global network web-like structure. Satellite and wireless communication systems are altering the network-like structure by adding zones and regions of information, thus, enhancing a wider diffusion and distribution of information. Consequently, the city's ICTs enable it to transcend its original localised shape and identity into a cyber-city with global dimensions. Many specialists have been trying to map the city's ICTs and their activities (e.g. data-flows, IP concentrations and data-structures) with interesting and surprising results. A good collection of maps could be found either in the two books written by Dodge, M. and Kitchin, R. (2001a, 2001b) or at their respective websites: http://www.cybergeography.org and http://www.mappingcyberspace.com.

3.3 Cyberspace and ICTs: powerful transforming agents

Before looking at their transforming characteristics, it might be useful first to examine the relation between cyberspace and ICTs. Even though there is no commonly agreed answer to the question 'what is cyberspace?', a widely accepted view is that cyberspace is made of two major components: ICTs (the city outside the wires) and the information stored in or flowing through them (the city inside the wires). Yet a third approach, supported in this paper, is that cyberspace is the total of:

hardware (e.g. cables, satellites)

software (e.g. programs and data)

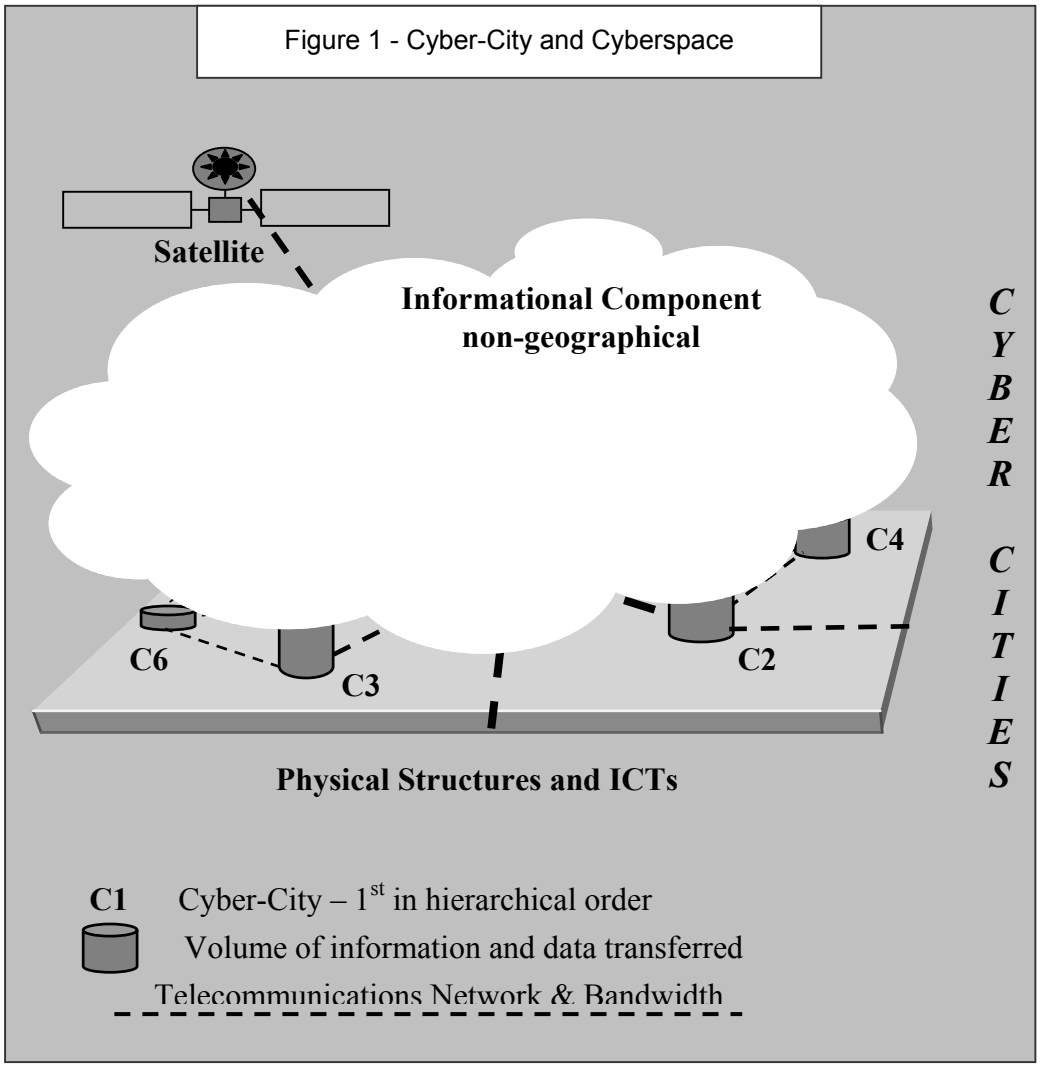
bioware (e.g. people and animals)

It is the cyber-city's informational components (ICTs and cyberspace) that give it its diffused, global dimension and, effectively, they transform physical cities to cyber-cities. The visible components of ICTs (cables, satellites, computers, telephones, aerials, etc.) enable connectivity and access to the networked resources transforming, thus, the local into the networked global. However, it is cyberspace's invisible component – the ethereal part that acts as the 'sea' of information and knowledge – which holds all parts together into a unity: the global informational network. The third, and most important, factor of transformation is humanity because it brings into existence all those phenomena and produces meaning and significance. All three agents are continuously transforming cities by rapidly destructuring and restructuring urban landscapes, thus altering the 'physiognomy' of the post-modern city.

One human activity that has been at the forefront of transformation and obvious to all, poor and rich alike, is today's economy. In order for capitalism to survive, it needs to (re)produce and expand through the creation of new worlds (physical or virtual) with the ensuing production, exploitation and consumption of new products and services. Cyberspace is a capitalist's dream come true because it is a new world without geographical limits, able to contain an infinite number of information-based products and services. It is the crucible in which dreams, pictures, information and knowledge are continuously produced and consumed. To software

manufacturers cyberspace is the 'golden goose', because the production costs for either one or millions of copies of a single software program are almost the same. It is argued that digital software is a different type of commodity from physical ones (e.g. cars) because it is essentially information that can be reproduced and accessed (e.g. through the web) accurately and cheaply at almost no additional production costs.

Figure 1 - Cyber-City and Cyberspace



Another major effect ICTs and cyberspace have, based on this new techno-economic activity, is the concentration of power that occurs around centers of management and command, which are mainly situated in big cities. These centers coordinate, invent and manage the networked activities and services of companies. Castells (1996) believes that the convergence of the information technologies creates a new material base that acts as a catalyst in the transformation of the society's structures. He also argues that since the 1970s the nation's economy has changed significantly in two ways: (1) the new information technologies are now embedded within its structures and (2) its activities and effects are global.

3.4 Globalisation and inequality

That which really distinguishes the dramatic change from the vertical city to the cyber-city is that the latter in order to function it operates on digital information and on a global scale. The major characteristics that are central to the cyber-city's operations are decentralised activity and fast access to information (e.g. financial). For example, it is due to cyberspace's ability to transcend all geographical boundaries that the Stock Exchange transactions and communications networks acquired today's global dimension.

However, the cyber-city's promise to decentralisation, democratisation and equality for all through fast access to free information and services not only has not been delivered but it arrives at a time when traditional socio-politico-economic structures appear to be moving towards greater centralisation. A number of authors (Castells, 1996; Zook, 2001) support the view that there are two opposing forces at work. Even though there is a globalising effect due to more information and services made available on the internet, the vast majority of those activities are concentrated in big cities or metropolitan areas. Consequentially, that concentration of techno-economic power exacerbates the already existing inequality between the advantaged and the disadvantaged places.

In addition, those informational related activities occur at specific places within cities, leaving other places unused. As the city's places acquire different value (financial and social), the inequalities increase resulting to informational services undervaluated as spaces are downgraded. Consequently, certain places do not attract investment due to their downgraded infrastructure, which sets in a vicious circle of poverty and neglect. On a larger geographical scale, the same occurs between cities, regions and countries.

Instead of ICTs and cyberspace reducing inequalities, it appears that together with the greater spatial distribution of the production and consumption of cyberspace related services, there is a 'preferential' concentration of those services to specific locations. For example in USA and UK these activities are grouped and concentrated in metropolitan areas, such as California and London, which also receive the lion's share of investments in those countries (Graham and Marvin, 1996; Kellerman, 2000; Zook 2001; Zook, 2002). Soja believes that this dialectical tension between those two opposing forces is the "underlying dynamic of geographically uneven development" and it is "a primary source of the spatial problematic at every geographical scale" (Soja, 1989: 107).

3.5 Whoever controls information, controls the economy

The struggle to control information and its means of production is more than ever evidenced today and it is central to world economy. Because the modes of production and consumption of information have a global dimension it is extremely difficult to isolate those modes and processes within a single city. The basic modes in the cycle of production to consumption of information are: source (e.g. data), production (e.g. software and people), transmission (e.g. HUBs, switches, cables and satellites), distribution (e.g. Internet Service Providers), access (e.g. computers, mobiles and consumer electronic goods), and consumption (e.g. people).

Attempts made to control the information flow at the source and the consumption levels, have largely been unsuccessful mainly due to (a) internet's decentralised structure, and (b) control through the law or force is very difficult to be achieved in democratic societies. Whereas local and central governments control physical consumer goods and services at the points of production and consumption (e.g. through taxes), the same did not succeed so far with data and information. Instead, central government is learning to exercise control on the transmission and distribution points, through the Internet Service Providers (ISPs). That is achievable because physical structures, people and ISPs are located in geographic space and operate under the laws of a country. In addition, multinationals, such as Microsoft, are attempting to control the rest of the processes (e.g. production and consumption).

Recent changes in the legal framework in USA (e.g. Patriot Law) and Europe make it legal for central government and its agencies (e.g. military, NSA and CIA) to gain more control of data flowing through the global informational network. Even though, cyberspace was created by the military in USA during the 'cold war' period (in the late 60's and early 70's) as an attempt to construct the first computer network and control the information flowing through it, users broke free and established the WWW based on a decentralised democratic mode of operation. However, by the end of the 20th century, powerful companies (e.g. Microsoft), organisations (e.g. CIA, NSA) and countries (e.g. USA, France, UK) have regained a measure of control over the information flowing through the Net (e.g. the Echelon listening system). Once more, it is a matter of power enforced by the few onto the many.

3.6 How free is free access on the internet?

Another important issue is that of free access to information residing on the internet. During cyberspace's first two decades information was shared widely and freely between users. However, since the 90's, organisations producing vast amounts of information are either keeping it only for internal use or selling it to users. Only very few publishers allow free access to their e-journals, e-books, etc., and academic institutions allow access to their e-library services (e.g. e-journals and e-papers) only to their internal users. Data has become another expensive commodity, such as gold; data mining is replacing gold mining.

For the majority of the poor people, accessing information on the internet is expensive because it entails use of a personal computer (PC), paying for a connection to the internet and on-line usage charges and, finally, paying for some types of information (e.g. digital maps). There are other factors exacerbating the difficulty to free access of information. A couple of the main ones are:

More information is now costly to be digitally produced (e.g. use of expensive equipment such as satellites).

More people and companies are ready to pay to access data, therefore creating a 'market' for these products.

The implications are that billions of poor people in countries, cities and communities cannot gain access to the information they need because they do not have the money, access to computers or the necessary computer skills. Castells (1996) refers to these people as the 'fourth world'. A newly created disadvantaged group, a global community deprived access to the new commodity: information.

Millions of these underprivileged people live in the cyber-cities of the developed countries. As the emphasis is increasingly placed on digital images, information, and technology, the 'fourth world' is marginalised and effectively excluded from all internet related activities (e.g. jobs and e-learning). Politico-economic decisions are made by other groups of people.

Many hope that the 'fourth world' can be assisted through free access to and training in the use of a PC and free internet access. In addition, local organisations and central governments could provide free access to knowledge and training, and help in the development of free software, such as the Open Source projects. However, at the present, as the city is increasingly becoming more virtual (e.g. virtual communities, virtual museums, virtual teaching, virtual libraries, etc.) the 'fourth world' is 'trapped' into its physical analogue reality, unable to participate in the birth of the virtual global world soon to be ushered in; as many proclaim.

4 THE VIRTUAL-CITY

Some authors regard the virtual-city as a digital space (Shapiro, 1995), others, like Castells (1996), talk about the 'Informational City' and the effects ICTs have on the networked society. Still, others (Heim, 1997; Jakobsson, 1999) view the virtual-city as a Virtual Environment (VE) or a Virtual World (VW). In this paper, the term **virtual-city** means the sum total of all information created, stored and used in cyberspace in the world referring to a real city. Thus, the virtual-city is always a part of the cyber-city.

It is argued that no e-city, e-world, VE or VW can be digitally equivalent of a real city, for two main reasons. First, they are very different types of entity, like an avatar[16] to a living human being. Second, a virtual-city could reproduce or represent only part of a

16 Avatar is a digital representation in cyberspace of a user. It could be any shape or gender. It could be destroyed and reborn. A user could use more than one avatar (i.e. representations) at the same time in cyberspace depending on the program's restrictions.

real city but never the totality of it. The complex physical interactions (body language, smells, skin sensations, etc.) that are a fundamental part of daily social interactions, are missing from the virtual-city. Even if all people living in a real city were to become users of its corresponding virtual-city, the latter could only complement, imitate or simulate a part of the real city but never stand for it. The 'blood, sweat and tears' involved in building and living in the physical city remain outside of its virtual counterpart.

In addition, it could be argued that the virtual-city is fundamentally different from the physical city because the former does not reside within the city's material structure; it does not occupy a geographical place. Rather, it is distributed and diffused in spacetime continuum, even though it impacts on the physical city and its people. It could also be said that the virtual city is a boundless, non-local, non-geographical, socio-spatio-temporal phenomenon enabling fantasy, imagination, myth, dreams, knowledge, reality, spirituality and materiality to coexist within the continuum of virtuality. All these phenomena manifest through the cyber-city's structures or else they would have been left only potentially possible. As the cyber-city embodies these phenomena into the city's structures at the same time it transforms and abstracts materiality into virtualised environments thus creating the virtual-city. It is as if there are continuous information flows (the city in the wires) from the virtual to the material and vica-versa with the cyber-city being the transformational agent in between; not separating but embracing the two into a synthetic-global-virtual world.

The virtual-city is build by data, information and knowledge. As already mentioned, part of the virtual-city is rooted in the cyber-city. Slowly but steadily the overlapping of the cyber with the virtual are manifesting a different type of 'reality', one that is mainly based on digital bits of data transformed into information and knowledge and not on the tangible and externally lived analogue world. Unlike its user, an avatar within a virtual world does not have to breathe or sleep, similarly the virtual-city never sleeps.

How difficult is it to model the virtual? During the last few decades major developments of existing digital models enable to keep up with the city's physical structures. Even though, some issues of how best to (re)present them remain unresolved, nevertheless, the crux of the problem is clearly how to incorporate and model virtuality in a meaningful way. This may not simply be a matter of improving on past methods and techniques, as when dealing with one of the three dimensions. We argue that the difference between the three known spatial dimensions and the virtual is so fundamental and significant that demands a re-evaluation of the theoretical and philosophical underpinning of practices dealing with virtuality. This is so because the phenomenon of the virtual includes, amongst others, issues such as: (a) it incorporates contradictions and ambiguities of complex and synthetic phenomena, (b) it is not geographical, (c) it requires alternative ways of thinking and approach, and as a result, (d) it demands a break with the past.

If the above is correct, then scientists and spatial specialists in particular will need to find the type of model (or models) able to respond to the challenge. One such 'new' tool is Lefebvre's (1974) trialectic model, whereas the old binary model is redundant:

(a) the Cartesian binary model (e.g. human/machine, right/wrong, 1/0, true/false, past/future, yes/no, white/black, on/off…)

(b) Lefebvre's trialectic model (Figure 2)

The binary model limits the synthetic way of thinking into a two-state logic on/off, yes/no, 1/0, true/false... That restrictive binary logic appears unable to embrace complex analogue issues without first reducing them to simplistic true/false statements. On the contrary, Lefebvre's trialectic model applied on synthetic issues could produce greater knowledge and deeper understanding because it allows contradictions and ambiguities to co-exist and be modelled. As Lefebvre, Soja (1996) and others argue, when the time-space-society trialectic model is applied on socio-spatio-politico-economic issues, it does not exclude dialectic relationships (e.g. socio-spatial, politico-economic). Instead, it incorporates the dialectic within a greater model, that of trialectics. It could be said that trialectics is not a model simply explaining away everything through conflict, opposition or antagonism. Rather, it attempts to examine social issues through cooperation instead of opposition, synergism instead of antagonism, collaboration instead of conflict, and symbiosis instead of separated existence. That which is conceived and that which is perceived cohabite the lived world.

Lefebvre's trialectics do not attempt to compress all logic into a 'black and white' logic; instead, it provides room for all 'shades of grey' in between. Because the virtual raises complex, chaotic and often contradictory issues, it is extremely important to know that trialectics could model them because it is not only tolerant but it is made to deal with complex and contradictory relationships. Therefore, here is a theoretical model tool (amongst others, e.g. the fractal, chaotic and superstring theories) ready to be applied on emerging social phenomena, such as the rise of the cyber- and virtual-city. Specifically, complex social phenomena such as virtual reality, nanotechnology, cyborging[17], bioengineering, artificial intelligence, etc. usually examined in isolation as spatial, historical, technological, cultural, economic or political issues could now be studied by applying trialectics. Similarly, issues of identity, community, security, accessibility and spatiality could be best approached through the trialectic instead of the cartesian model.

5 THE MEANING AND SIGNIFICANCE OF THE VIRTUAL

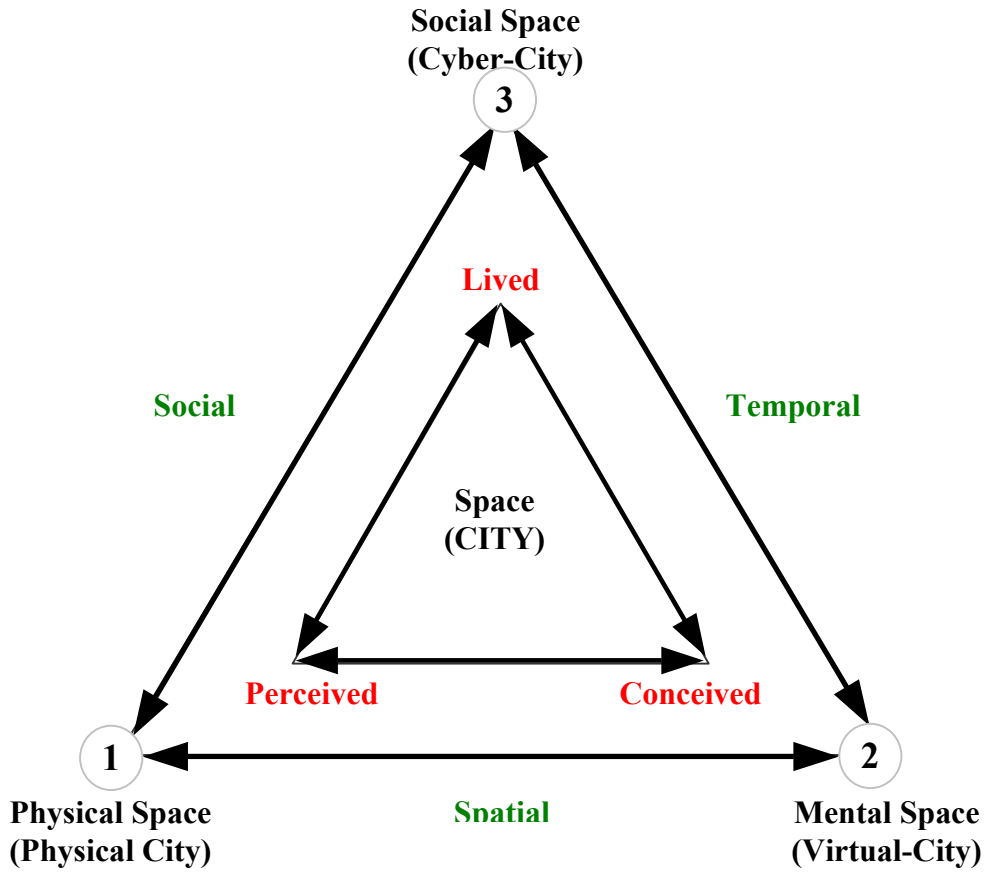
Virtuality means different things to different people, including scientists. Why is it significant for spatial and social scientists to study the virtual-city and the virtual? Perhaps one of the most important reason is that by trying to experience and research the virtual it challenges current binary ways of thinking. Another reason is that by trying to intellectualy encounter the virtual, and thus understand the contradictions and ambiguities brought by it, it brings people closer to what 'is out there, just beyond the known horizon' because essentially the virtual appears as continuous formless flows of energies (e.g. information).

It could be argued that the virtual resides outside the x, y, z and it manifests in space-time through projections. Consider, for a moment a 2D entity from Abbot's Flatland (1984) trying to imagine and model a 3D world. Given its lack to perceive and experience a 3D world, it will attempt to think, conceive and describe the 3D world as a set of 2D values within a mode of 2D understanding. Inevitably, there will be many unexplained and unresolved issues (e.g. cosmological) until the whole problematic is raised to and examined (e.g. theoretically, philosophically and mathematically) from a higher dimension. Similarly, problems in a 3D world could be solved when they are raised to a higher dimension. Hence, new models incorporating the virtual as a new dimension (or direction)

[17] The term cyborging means the meeting place of nature and technology in a single 'physical body' (e.g. human or animal); flesh and bones in synergy with hardware and software creating a cyborg.

could go a long way to answer philosophical and intellectual problems and, by doing so, they will establish a theoretical platform upon which specialists could build commonly agreed tools and practices.

Figure 2 – Based on Lefebvre's trialectic approach to Space



If the virtual could be considered as another 'spatial' dimension without place and geography, then what does it stand for? Perhaps the nature, meaning and significance of the virtual could be found by examining current anomalies, paradoxes, contradictions, ambiguities and unexplained areas of knowledge. Like the 2D citizen of Flatland, we can imagine and theorise about higher dimensions but unable to consciously experience them. By taking a step back to the 2D allegory we may find the key to our problem.

One approach will be to examine the **contradictory** effects of the virtual on spatial, social and biological structures. Looking at the virtual as it manifests itself through technology, we could argue that there is a tendency for technology to spread and diffuse (globalisation) whilst, at the same time, it embeds itself within smaller and smaller structures (localisation). For example, within a century the telephone not only found its way into every house (globalisation) but it also moved, in the form of a mobile, onto people's bodies (localisation). Similarly, within few decades computers have spread to the whole world (globalisation) whilst they have been shrugged and miniaturised onto a single wearable chip (localisation). Other technologies, such as bioengineering, information-technologies and nanotechnology, seem to be following similar trajectories. Perhaps, before long, these technologies will be found everywhere whilst, at the same time, they will be embedding cyberspace inside every structure, such as the human body.

Similarly, another approach could be to study **ambiguities**, produced by new phenomena such as cyborging, or the new phenomenon rising through the mutual existence of cyborging and intelligent structures (buildings, cars, machines, etc.), the 'intelligent city'. The latter, closer to spatial planners concerns, is not simply a result of the use of more (or better) artificial intelligent systems but it is essentially emerging because people (with cyberspace embedded in their bodies) are interacting wirelessly with the city's socio-spatial structures exchanging information that is invisible to the normal physical sense organs (e.g. ear and eye). To all intense and purposes, people and their urban structures are embarking on a new symbiosis using as a common base energy, information, intelligence and knowledge. It appears that society is witnessing the emerging of new types of life, intelligence and consciousness.

Merging dualities such as the subject and the object, the global and the local, nature and technology, reality and virtuality into a single structure (e.g. the physical human body and the intelligent city) will certainly produce many social changes. In addition, there is the real danger that people's inability to discriminate between information received directly through the physical senses and that received directly through the embedded cyber-mechanisms will suffer. Under those conditions it could be almost impossible to differentiate between fact and fiction. Living and experiencing multiple environments (virtual and real) at the same time will require a special (or different) 'human being' and a different type of 'society'.

In addition, as artificial intelligence and artificial life systems increase in number and ability during the city's evolution, human beings could realise that they are not the only producers of intelligence and knowledge. That is already happening to a small extend and it might have inaugurated a new era during which artificial intelligence and artificial life systems will, at some future time,

demand their 'right' to exist and evolve. If the above is not totally fictitious, then planning for a society living in intelligent-virtual cities where humans and their technological constructs exist in close symbiosis requires fundamental research before is too late.

We could argue that the emergence of the virtual through technology is already evident and by applying suitable models (e.g. trialectics) on the problematic of the relationship of the real to the virtual could help produce a better theoretical basis to assist with planning in the 21st century. In way will be to view virtuality not as an enemy of the real, as done previously, but as an alternative reality. Not something juxtaposed to the real but a phenomenon emerging out of the cyber-reality that unites the two (virtual-real) into a new phenomenon. Familiarity with the world of dreams and cyber-reality could act as a stepping stone towards understanding the virtual-reality. A more practical example is that instead of considering the virtual websites of cities as replicas to those of the physical city, those virtual websites could be seen as part of the cyber-city working in a complementary manner to the physical city. By doing so, the emphasis is transferred from one of oppositions to one of interrelationships between the three versions of the city: physical-cyber-virtual. Social and spatial planners could play a key role in all above issues.

Gaining further knowledge through researching those relationships could lead to greater awareness of the meaning of the 'city' through the formulation of new questions such as: How do we define a diffused global city, or an intelligent city? What types of models are needed to fully study a cyber- or virtual-city? How best could we utilise the physical-, cyber- and virtual-city resources? What type of form, meaning and functionality will a city have by the middle or the end of the 21st century?

Even though, in this paper we are not attempting to fully answer those questions, nevertheless, the position held is that virtuality appears as being a different type of thing, from that of verticality and horizontality. Perhaps, because the latter dimensions are directly bodily experienced as well as mentally, whereas the virtual has a closer relation to dreaming, feeling and intellectuality; a difference between conception and perception. Is it possible that the virtual could be used as an alternative mode of experiencing life? In experiments done with immersed virtual reality worlds, users felt and acted as 'living and experiencing' a different type of 'becoming'. Perhaps if the virtual is not limited through our binary thinking as a simulation of the physical but as something different worth exploring, then it could become an enabling creative tool revealing hidden versions of our reality.

However, because technology is not neutral, the use of virtual technology will be both, constructive and destructive. We share the view that 'technology is neither good nor bad, people who used it are' because it has been created with a purpose in mind. Therefore, the production of these technologies greatly influences their type of use and, consequently, affects how they are perceived. The aforementioned make it clear that phenomenon of virtuality requires urgent and serious research in order to understand its effects on today's society. Therefore, it is imperative to become more aware of the major issues introduced with the rise of the cyber-city and the emergence of the virtual-city and how these redefine our social reality and, consequently, society.

6 REDEFINING SOCIETY

Cyberspace's embedment in socio-spatial structures (e.g. physical, ideological, etc.) has been solidified to such a large degree so that many scientists (Benedikt, 1994; Castells, 1996) support that the two worlds – virtual and physical – are already inseparably interrelated. All modern economies, local and central governments, institutions and businesses cannot properly function without cyberspace. Its absence would cause the collapse of the current culture and all socio-economic structures, as it was temporarily experienced during the 'black-out' that took place in 2003 in Northern America and Europe[18]. Hence, the dependence on information becomes central to society and, as a direct result, the people controlling the modes of production and consumption of information are the ones controlling society. So issues such as democratic participation in reshaping the new society become more relevant than ever.

The change in the mode of production and consumption, e.g. information becoming both a commodity and a currency, transforms and redefines human values and human life. People, by using information and knowledge, (re)shape and transform both their physical and spiritual realities. Forms alter in shape, structure and functionality whilst, at the same time, the cultural expression in society is becoming more visual and increasingly mediated through technology. Specifically, many people are increasingly gaining information through the use of 'windows' (such as TVs, computer monitors, mobiles, etc.) instead of direct contact of their physical senses with physical objects. For example, information on travel destinations, consumer goods and services is experienced through those 'windows' and in most cases people believe to be looking at the 'real physical object', not its digital representation. As more people consider information unmediated through technology (i.e. face to face conversation) and information mediated through technology (i.e. talking on the mobile) one and the same, then that produces a fundamental change in the way we transform and (re)construction our social reality and society.

The cyber-city's most significant contribution is its mediating role: the way people relate to nature via technology. Specifically, the mediation via ICTs occurring at great speeds embraces the whole globe and goes deep into the innermost parts of both the physical and the non-physical structures of society. To the extend that if cyberspace has not already embedded itself within every ideology, belief system, type of thinking or physical structure (biological and non-biological) it will not be long for that to happen. Through those two processes: **mediation** and **embedding**, social reality is continuously restructured thus changing people's ideas, attitudes and behaviours towards themselves, society, technology and nature whilst, at the same time, they are modifying their social reality. In effect, humanity and its techno-scientific products (technologies and ideologies) are engaged in a mutual dance, through which the material is spiritualised through the virtual and the spiritual is materialised through the production of forms.

It could be argued that the virtualisation of the physical city is happening all around us enabled by wireless communications that have now become both the medium and the message. On one hand, the written words joined by the hypertext are transforming the linearity of text into the hyper-linkage of words and phrases, and the interrelatedness of their meanings. By doing so, they are changing both

[18] In the affected from the black-out regions, all the services that were supported for their operation on the use of electric power (e.g. transportation and communication networks) stopped functioning. Hundreds of millions of people in the affected regions witnessed a temporary collapse of the cyberbase culture.

the signifier and the signified through a new contextualisation. On the other hand, thinking through images merges the 'I' with the 'Other' and the self with the many. Finally, it enables both a breakdown and an opportunity to rebuild (hopefully more creatively and wisely) on different sets of values. Similarly, the production of new forms of expression in architecture, art, literature and other cultural, technological, scientific and social activities transforms the physical city into a cyber-city (a hybrid made from cement & steel, and bits & bytes) whilst, at the same time, it merges biology with technology in the production of cyborging.

Today, we are witnessing a stupendous global event: a great, unstoppable, furious, silent, dynamic all embracing transformation acted mainly on the urban global stage. The main actors are human beings and their technologically produced creations. Both the unfolding scenario and the ending of the play are unknown. The virtual dimension of life, as expressed through the virtual-city's information flows, weaves the metaphysical together with the physical into a mythico-technical fabric where both the fantastic and the real are given opportunities to coexist. All these are manifested through that living organism (albeit bio-technological) which we refer to as the cyber-city. The post-human and the post-city are emerging not as merely a fiction or a myth but as the possible next step in humanity's evolution.

7 CONCLUSION

The vertical city with its high-rise buildings has created the cyber-city and the many virtual worlds. Thus, the physical city has been redefined through the emergence of ICTs and cyberspace and it has been transformed into a cyber-city that, in its turn, has given birth to the virtual-city. Without the cyber-city, the virtual-city remains but a dream, a utopia or a dystopia. With the rise of the cyber-city emerged the virtual reality worlds through which many believe they will find their 'Shangri-La', 'Paradise', 'Eden' and 'Shamballa'.

The global character of the cyber-city and the 'ethereal' formation of the virtual-city invite deeper understanding. Hidden within the trialectic relationships between the physical-cyber-virtual could be the key to deal with the city's crises.

People let to believe that everything experienced through the mediating technology is 'real', unavoidably leads to confusion between physical reality and virtual reality. Hence, as virtuality establishes itself in everyday life, it brings closer the imaginary and the fictional to the real, thus challenging us to apply different ways of thinking and models (e.g. trialectics) on real-life situations.

Many argue that if society was more prepared and had planned prior to those dramatic changes then most of today's urban ills would have been cured. Applying that argument on the transformation of today's society (from the physical to the virtual) it could be said that planning for the virtual age should have started few decades ago; at the creation of the cyber-city. However, it is not too late to gain lost ground by concentrating resources on how best to transform humanity from the homo sapiens to the home-virtualis.

For that to be achieved we need to put high on the agenda issues such as humanity, intelligence and consciousness.

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