

CYBERSPACE AND THE TRANSFORMATION OF CITIES TO CYBERCITIES: A TRIALECTIC APPROACH

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Abstract

The present paper elaborates on the major transformation processes of a city into a cybercity and the process of embedding the virtual into the real. The paper aims to shed light on the integration of human capabilities (intelligence, imagination, creativity) by use of ICTs applications that drive processes, which transform the city of geography and place into a hybrid: the cybercity. The emerging cybercity expands beyond its traditional geographical boundaries of place, embracing a new digital virtual space, which is placeless and timeless. At the same time, the embedding of human intelligence in the urban material structures creates intelligent and smart environments that transform society.

Keywords: *Cyberspace, cybercity, digital virtuality, transformation, trialectic, virtual*

JEL classification: R10, R11.

1. The Nature of Cyberspace

Modern cities, like human society as a whole, are ceaselessly transformed. Human beings and ICTs emerge as the two main factors involved in this type of transformation that is most visible in the modern urban environment. Establishing a scientific explanation as to the nature of the transformation of cities into cybercities, due to the embedding of cyberspace in society, is a very difficult task, mainly because some of the major processes of transformation are extremely complex and transparent.

The use of proper analytic tools (e.g. Trialectics) can reveal part of these hidden transformative processes that underpin all (epi)phenomena related to cyberspace, thus aiding to a better understanding of the true nature of a cybercity.

Even though generally the terms ICTs and cyberspace are used interchangeably, there exists a small, but significant, difference between the two. The ICTs constitute only a part of the totality that is called cyberspace. Cyberspace incorporates not only digital, electronic, and photonic technologies, but also human beings and their attributes (thoughts, knowledge, dreams, intentions, feelings, etc.). As a whole, cyberspace is larger than the sum of its parts, because it includes an infinite number of possible connections and relationships on various levels of existence (e.g. economic, political, scientific, and cultural). Yet the question remains: what is cyberspace?

People like Richard Coyne [4], see cyberspace as a matrix of infinite dimensions, created when the real and the virtual come together. All actions using ICTs are embedded within cyberspace, including all virtual/potential reality.

Similarly, Downing et al. [8] describe cyberspace as being that part of human society, which exists in the networked information systems rather than a specific geographical place.

A different interpretation is given by Sterling [27], who regards cyberspace's informational component as a type of space that exists somewhere out there, but not within the digital electronic/photonic machines or, even, between them (i.e. in the wires).

Closer to Sterling's view are the ideas of Cobb [3], Rushkoff [23], and Leary [17], who describe cyberspace as something enabling people to live in the virtual worlds of thoughts, ideas, and information as non-material entities, while leaving their bodies behind within a specific geographic location.

A common element to all the various definitions given above is that cyberspace is seen as something like an informational web or matrix embedded in social reality. Even though cyberspace becomes accessible mainly through

electronic/photonic devices, due to recent inventions, today people have the possibility to wirelessly connect to it through biophotonic and bioelectronic devices (e.g. biochips and biosensors) embedded within their bodies. The amazing advancements occurring in areas such as nanotechnology and molecular bioengineering could soon seamlessly integrate people to the global informational web. Having said that, is it really possible to accurately define cyberspace's basic structure?

The majority of the models, such as those proposed by Shields [24] and Groothuis [12], employ, directly or indirectly, outworn binary approaches. As a result, they describe cyberspace as made of two major components: (a) material/physical (e.g. cables, computers and satellites), and (b) non-material or informational (e.g. data). This binary way of thinking is witnessed in the way people refer to cyberspace by using phrases such as 'the world outside the wires' and 'physical city' (the material component), and terms such as 'the world within the wires', 'information city', 'e-city' and many others referring to the non-material informational component.

Even though other scientists suggest different (non-binary) models (Benedikt [1]; Dodge and Kitchin [6] and [7]; Graham and Marvin [11]; Kitchin [15]; Mitchell [20]), nevertheless, they disagree with the notion that a simple model or a single theory (e.g. feminism, Marxism, technological determinism, and postmodernism) will be able, by itself, to fully explain the complex phenomenon known as cyberspace. They regard the multifaceted embeddings within the material and the non-material structures to be creating a third category embracing the two other structures.

Therefore, cyberspace's synthetic and multifaceted embeddings can be regarded as a coming together or a coexistence between material (tangible) and non-material (intangible) structures that form a third category within cyberspace (Castells [2]; Crang et al. [5]; Dodge and Kitchin [6]; Graham and Marvin [11]; Heim [13]; Mitchell [20]).

The various rigorous scientific attempts made to untangle cyberspace's threads of meaning using binary models have failed, because they do not address the essential difference that exists between cyberspace's major components. The binary models impose a restriction to the depth of analysis due to the granularity of the binary analytic tool, which is too coarse. It reduces the complexity and ambiguity inherent in social life to a true/false, and on/off conflicting and opposing state (Lefebvre 1991: 38) [18].

Instead, and in order to achieve clearer results from the analysis, we employ a different approach based on Henri Lefebvre's trialectics (Lefebvre [18]). Lefebvre believes that the dialectic relationships still operate, albeit transformed, within his trialectic approach. In addition to the two categories present in a binary model, in trialectics the third category acts as a hybrid and a meeting place of the other two. It expands the domain of meaning, and enables the transcendence and coexistence of opposing and contradictory mind sets, thus giving rise to multiple ways of interpreting nature.

An example of the above can be clearly seen in the three aspects of space introduced by Lefebvre in his trialectics of spatialization (Figure 1), namely:

- (a) Physical space, spatial practice (perceived);
- (b) Mental space, representations of space (conceived); and
- (c) Social space, representational space (lived).

Lefebvre insists that these three types of space are very different to each other. Even though they coexist and they are interdependent, only the third type of space, Social Space, is lived. In the process of spatialization described by Lefebvre, a complete analysis can only be done if, and only if, all three types of space are examined together.

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Similarly, by adapting Lefebvre's trialectic approach, and by applying it to the analysis of cyberspace's nature (Figure 2), we get the three fundamental components of cyberspace described as:

- (a) Material or geographical (perceived)
- (b) Non-material, virtual, mental or potential (conceived)

(c) Hybrid, cyber or embedded (lived)

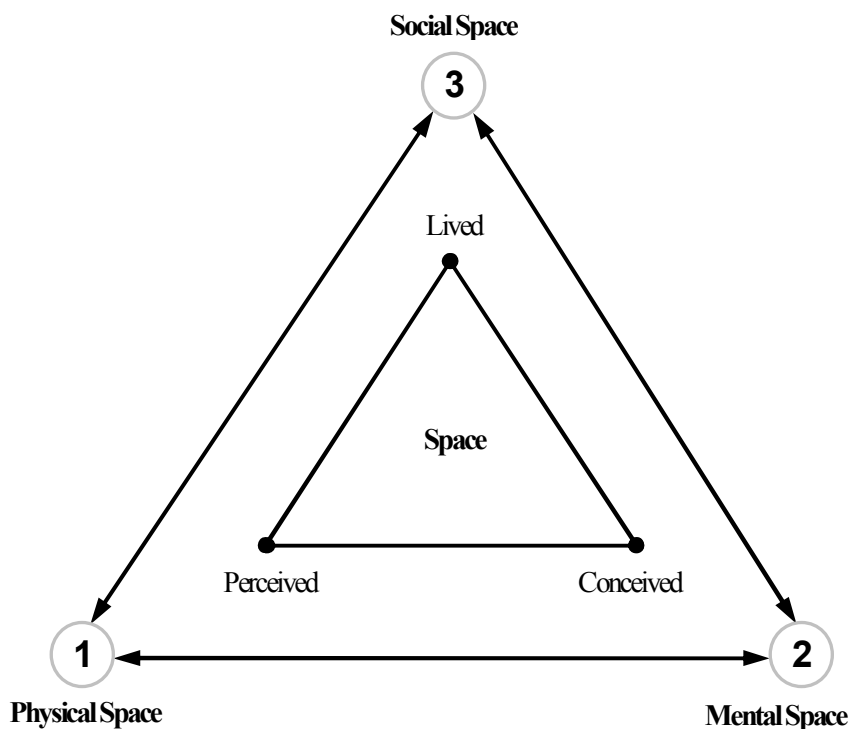


Figure 1 – The three main structures of Space
(based on Henri Lefebvre's Triad)

If the above analysis is correct, then there is a very important meaning derived from the results: the third component is a hybrid, it is the result of the embedding of the virtual to the material, and it is the only one that is lived. This means that the other two components (geographical and virtual) could only be fully revealed through the existence of the third (cyber), and not in isolation. In other words, the true nature of cyberspace is (will be) revealed not simply through perception or conception, but when it is experienced in everyday life as a whole. Lefebvre, with regards to space, arrives precisely at the same result when examining the process of spatialization: the Physical and Mental types of space are experienced through the existence of Social Space, and never in isolation (Lefebvre [18]).

The above provide a very good theoretical foundation to expand our knowledge about cyberspace's nature and structure, arriving closer to its understanding. After all, as Stenger explains, it is not possible to fully define cyberspace because it is like the country of Oz 'it is, we get there, but it has no location' (Stenger 1991/1994: 53) [26].

Therefore, cyberspace can be considered as many things: another parallel Universe (Cyber-Universe) with different space-time characteristics (Benedikt [1]), an electronic networked space navigable through the use of cybernetic devices (Gibson [10]), and a Galactic Network within which, as Licklider believes, people will fully interact symbiotically exchanging information (Kleinrock [16]).

Even though cyberspace is anchored in geography, it cannot be completely mapped not due to the lack of knowledge or technological means, but because a part of cyberspace is non-material (i.e. information) and, therefore, it has no geographical structures (Dodge and Kitchin 2001: 259) [7].

2. What is a Cybercity?

In addition to the many different views of a city, depending on the way people experience specific parts of a city at a certain point in time, and by applying the same trialectic approach to the modern urban environment, the city unfolds its fundamental triple nature as:

- (1) Material or Geographical City
- (2) Non-Material or Virtual City
- (3) Cyber City or Cybercity

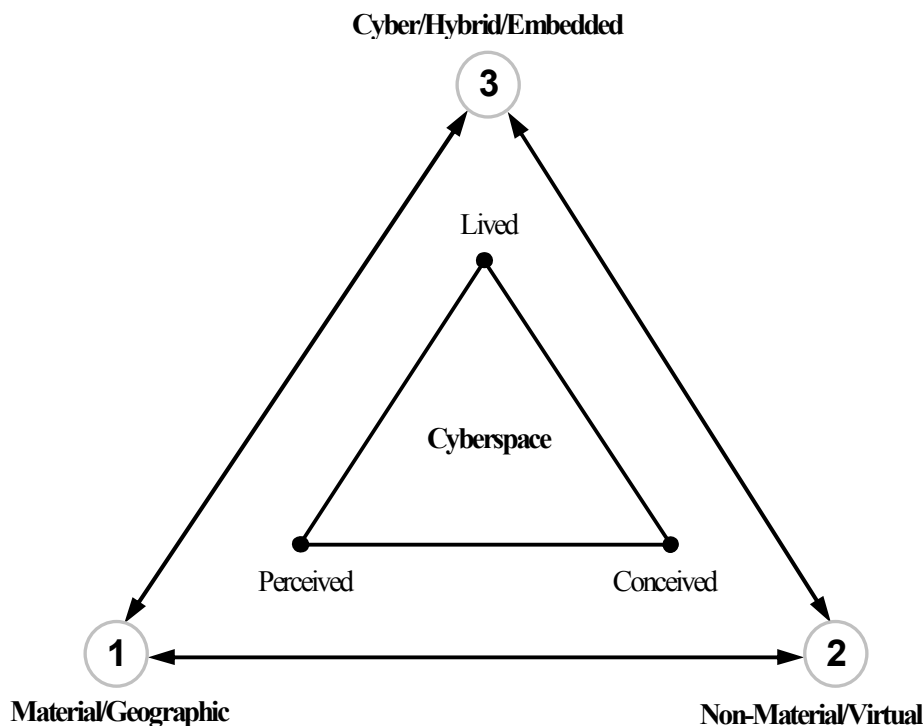


Figure 2–The Three Fundamental Structures of Cyberspace
(based on Lefebvre’s Trialectics)

As is the case in Cyberspace, these three aspects are interdependent and interrelated (Figure 3).

- (1) *The Geographical City* (sometimes incorrectly referred to as the Physical City) is the city that is bound by geography and it is the city of places and history. It is the city revealed by the human physical senses. Every phenomenon within the geographical city can be described through Einstein’s space-time continuum model (three spatial dimensions and one temporal).
- (2) *The Virtual City* is the city that is made of information and it does not represent a Geographical City (as a whole or in part). The spatial element within the Virtual City is not geographical, but it is programmed to simulate the three known spatial dimensions. This is not a *city of places*, because the term *place* implies a geographical location. Similarly, the temporal dimension is programmed to represent the temporal element within space-time continuum, as it is experienced in everyday life. *Alpha World* is an example of a Virtual City. In this category belong virtual digital imaginary environments, created for video and computer games, and movies such as the *Matrix*, and the planet *Pandora* in the film *Avatar*.

(3) *The Cyber City* is the city created through the embedding of the Virtual into the Geographical. It is a meeting place between the material structures and the non-material digital informational flows. This hybrid state enables it to accommodate complexity, ambiguity, and contradiction. It is that environment in which people experience their everyday life and it is permeated by cyberspace's *digital ether*.

It is significant to note that the cybercity is a hybrid entity, created through the embedding of the virtual in the geographical city of places. It is through the cyberspace's virtual component (i.e. digital virtual) that human spiritual properties (e.g. thoughts, desires, dreams, and intentions) are digitally codified and then embedded in the modern city.

Due to the virtual component's qualities, cybercities share three major characteristics. First, they are global. They spread beyond their geographic boundaries. Second, they are fluid. They are more like spaces of information flows rather than spaces of places (Castells [2]). Third, they cannot be completely defined by location. Part of a cybercity cannot be described in geographical terms, it exists somewhere that can be described as a non-geographic space, without places.

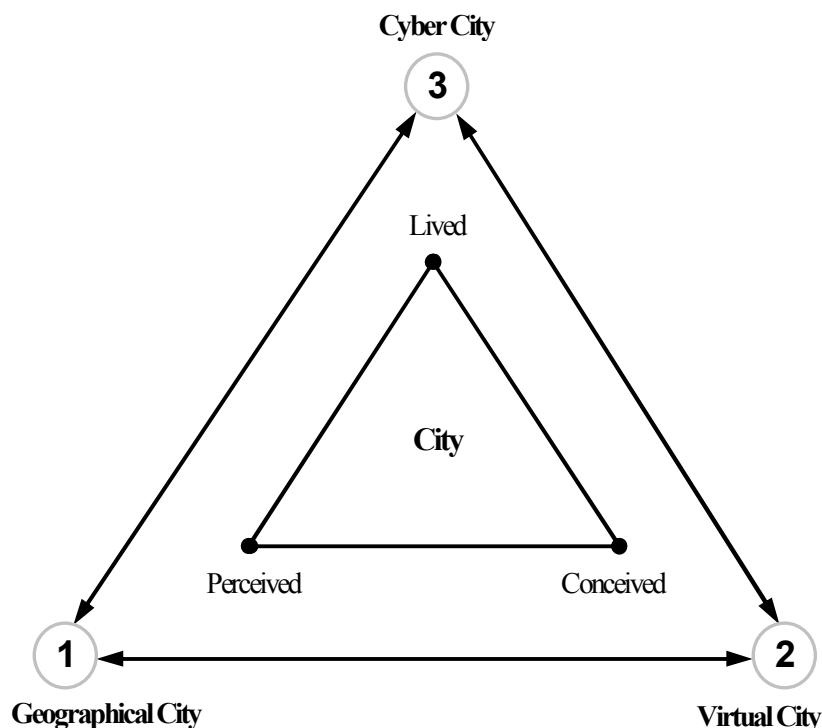


Figure 3 – The Cyber City
(based on Lefebvre's Trialectic)

The creation of cybercities has not put a stop to the increase of urbanization. On the contrary, in some instances, it exacerbates the existing phenomenon of urbanization. Cities have not vanished as it was previously believed by people like McLuhan [19], Toffler [28], Virilio [29], and Negroponte [21]. Instead, it is estimated that by 2030, 80% of the World's population could be living in urban environments (<<http://www.citymayors.com/>>).

Therefore, it is important to understand the significant role of cybercities in the emergence of the information age. Conceptions and perceptions become the main threads used to weave the complex tapestry of social life, experienced within modern cities. The existence of cybercities signifies the incessant processes of transformation and creation of new forms, environments, and meaning.

3. The Main Transformation Processes

In the last decades, human society is undergoing a tremendous transformation that is becoming apparent not only from the changes occurring to the material/tangible human-made structures (e.g. buildings) but also, more importantly, from the ways people relate to their environment (i.e. through digital technology), and from their different way of thinking (e.g. socio-technological).

In this process of transformation the cybercity, both ontologically and epistemologically, becomes central because it is the result of the digital virtual embedded in the material/geographical city. There are two main transformative agents contributing towards a cybercity's globalization: human beings and cyberspace. This type of transformation embraces all social functions and structures: material, non-material, and people. Through these processes, human society transforms its habitat and, at the same time, it is transformed by it.

The rate of penetration and usage of ICTs-related social infrastructures and services in the city is fast increasing. Digital technologies and information are part and parcel of public and private services, such as electricity and telecommunication systems. Whereas the outside structures of a city that comprise its shell, such as buildings, do not change so quickly. This relative slow rate of change in the transformation of the shell of a city could give the false impression that the new paradigm of informationalism (Castells [2]) is not yet upon us. And, as a result, it could be inferred, incorrectly, that the cities of the 21st century are similar, or not significantly different, to those of the early 20th century.

The constant flow of digital information through the global communication network enables people from all over the globe to come together. The ICTs, instead of discouraging people from meeting face to face, in most instances, are assisting in the creation of the globalization of urbanization which, in turn, it changes the way people think and live, and experience themselves and their environment. Of course, ICTs are only one factor affecting the globalization of urbanization, people move to cities due to economic, cultural, and other reasons.

Therefore, the above do not simply refer to the transformation of material (e.g. tangible) structures, and the changes occurring to the forms and functions of urban environments. Most important, these changes signify a global cultural/spiritual transformation, creating a new human civilization based on digital information.

Cybercities are the places where the dawn of new techno-sciento-spiritual age is ushered, where intelligence, dreams, and desires could be materialized through the use of ICTs. For example, the embedding of human knowledge and intelligence as artificial intelligence does not only render cybercities intelligent but, through the expansion of human awareness, it brings closer the realization of new types of consciousness through the coexistence of biology and technology (e.g. cyborging).

It could be said that the major contribution of humanity and cyberspace to this expansion in awareness and this shift in consciousness could be organized in three main categories.

First the ICTs and cyberspace become, at the same time, symbolic and technological. As such, they enable people to produce new meaning and employ new tools, such as mobile technology and computers.

Second, the digital information constitutes an ever increasing component of the intangible digital matrix that underlies all communications within the global social web. Cyberspace's digital ether underpins the fabric of human society.

Third, the embedding of human psychological and spiritual attributes (dreams, wishes, desires, knowledge, intentions, intuitions, etc.) in the material socio-spatial and the non-material (e.g. ideological) structures, transform both human beings and society as a whole. Similarly, the digital virtual becomes part of the virtual/potential (εν δυνάμει)¹ world and by doing so it closely interacts with the human psyche.

¹ Following in the footsteps of ancient Greek philosophers, like Aristotle, *εν δυνάμει* means that something exists as a *possibility (potency)*, before it is materialized or actualized as a phenomenon by acquiring form within the phenomenal world.

Therefore, it is the transformation of space-time that lies at the core of the impact that the virtual/potential cyber-technologies have on humanity: social transformation occurring through spatio-temporal transformations (Kitchin 1998:15 [15]).

Edward Soja arrives at a similar understanding when he proposes that space-time, as a way of thinking and praxis, exists within the core of the modern society and that it becomes visible through the sensitivity and the actions displayed during the reconstruction of that society with respect to spatiality and spatialization (Soja 1989:173 [25]).

Based on the aforementioned, and using Lefebvre's trialectic approach, it is now possible to put forward a hypothesis regarding the major types of transformations occurring due to the emergence of cyberspace and ICTs, not only as tools but also as ways of changing ourselves and changing the material basis of today's society.

The three transformation processes due to cyberspace's embedding in society, as shown in Figure 4, are based on the cyberspace's three main components: Material, Non-Material, and Hybrid and they can be described as follows: (1) Materialization, (2) Spiritualization², and (3) Expansion of Consciousness/Awareness.

- (1) *Materialization*. The shape giving potential existing within the non-material/invisible world (desires, thoughts, etc.) as it finds expression first through the digital virtual and then through material things.
- (2) *Spiritualization*. The spiritual human qualities transform matter through the embedding of the digital virtual. An example of its effects is the transformation of material structures into what is usually referred to as *smart* or *intelligent*.
- (3) *Expansion of Consciousness/Awareness*. Human consciousness emerges, expands, and is transformed within the social becoming as a result of the other two processes: Materialization and Spiritualization.

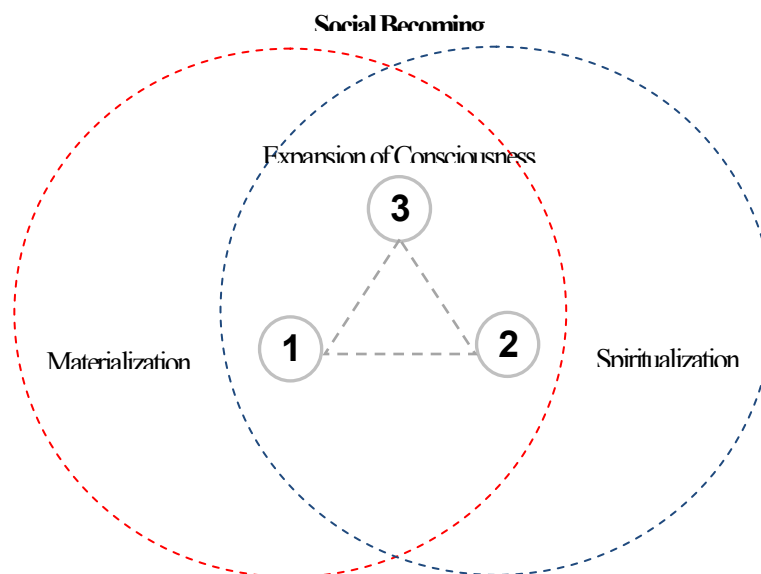


Figure 4: The three types of transformation

These three processes could be regarded as the three main phases in the major information flow affecting the whole of society on all social-spatial-temporal scales.

The term Spiritualization, as it is used here, relates to the ideas of people like Emmons [9], Noble [22], Zohar and Marshall [32], Vaughan [30], and King [14]. For example, Zohar and Marshall [32] define the term 'Spiritual Intelligence'

² The term *Spiritualization* refers to a type of enrichment and enhancement given to the form aspect of material reality through the use of human spiritual/cultural qualities. It is not simply a process of intellectualization or mentalization, but something much more.

(SI) as ‘the intelligence through which we gain access to our deepest meanings, intentions, and highest motives’. Similarly King [14] believes that SI is ‘a set of adaptive mental capacities based on non-material and transcendent aspects of reality’.

The idea of the existence of a non-material metaphysical reality is not a modern age construct, it originated thousands of years ago. For example, the ancient Greek philosopher Plato introduces such notions through his famous theory of Formless Forms, the world of ideas, which is also depicted through the Allegory of the Cave. Similarly, Aristotle in his book *Metaphysics* explains that matter, as the first substance (πρώτη ὄλη), cannot be revealed by using the human physical senses because it is formless, a potential (ἐν δυνάμει) that underlies all physical reality.

Therefore, the idea of the virtual as potential (ἐν δυνάμει), which is central to the process of transformation as described above, is also not a new one. For example, for thousands of years, the virtual has been expressed through ceremonies, structures, and imaginary environments and, generally, it has been conceived as something linked to other spaces, dimensions, and domains. Shields [24], in his book ‘The Virtual’, gives a good enough explanation as to the meaning of the virtual when he explains that the dictionaries define this term

‘as that which is so in essence but not actually so’ [...] More philosophically, the virtual captures the nature of activities and objects, which exist but are not tangible, not ‘concrete’. The virtual is real but not concrete (Shields 2003: 2) [24]

The aforementioned support the hypothesis presented in this paper that the relationship between the virtual and the real cannot be adequately defined by opposition/contradiction (because the virtual is also part of the real), nor by mirroring and representation (because elements that exist in one do not exist in the other). Instead, the relationship between the virtual and the real will be better understood if it is approached through the idea of their coexistence within a Greater Reality - part of which is still unknown.

Therefore, the digital virtual, the informational component of the virtual that is part of cyberspace, carries a tremendous significance, because it is at the core of the transformation of the whole human society, not only of the urban environment.

4. The Significance of the Transformation Processes due to Cyberspace’s Embedding

The human mind creates concepts through which things are represented, embracing a person’s inner and outer reality. Words, as names or terms, are also representations of concepts. In order to transmit knowledge there is the need for both the transmitter and the receiver to know the syntax rules and their meaning. Therefore, information and consciousness play a central role in the process of creating meaning for ourselves.

Where a man’s word goes, and where his power of perception goes, to that point his control and in a sense his physical existence is extended. To see and to give commands to the whole world is almost the same as being everywhere (Wiener 1950/1954: 97-98) [31]

Wiener’s ideas are very important, and still extremely relevant today, because they assist to understand the significance of society’s transformation in relation to cyberspace’ embedding in it. The significance to today’s society can be seen in the following paragraphs incorporating Wiener’s main ideas.

Human beings, as creators/transmitters/receivers of information, expand their horizon of collective awareness through the use of technology. By doing so, their senses extend as if the physical senses themselves have been extended to cover the whole spatio-temporal domain of information. A human’s physical organ’s sensitivity scale of hearing and vision remain constant, however digital sensors provide information of electromagnetic waves beyond the physical audible and visual range. For example, data from infrared or X-ray scanning can be displayed using different colors within the visual range of the human eye.

Human nature is created through information, therefore without information a person cannot grow or survive (physically, psychologically, and spiritually). This is so because there is a paramount need to be able to process information.

Consequently, according to Wiener, communicating and controlling information is part and parcel of a person's inner life and, in addition, it enables a person to be a social being (Wiener 1950/1954: 18) [31].

The main hypothesis behind the trialectic relationship humanity-information-nature is also found in Wiener's central idea that the existence and survival of a human being is closely interrelated with the ability to process information. Therefore, humanity's survival depends on that ability.

Through the use of ICTs and cyberspace, human beings can expand their conscious awareness, knowledge, and imagination beyond the physical limitation imposed by geographical boundaries. Sensors, micro- and nano-devices bring information directly to the physical senses, thus enabling people to extend their awareness as far away as information can travel. The limit is their imagination.

At the same time, through the use of new technologies such as nanotechnology, and molecular biology, human beings will be able to (re)build atom-by-atom and molecule-by-molecule any physical structure. By doing so, people will be able to embed within those structures their knowledge and dreams, first by codifying knowledge and then by manipulating their material reality. Through the embedding of the codified human intelligence in the urban material structures, people create intelligent and smart environments that transform society. Thus, digital information is becoming a major currency in everyday life, giving rise to a new post-modern information society, post-humanity.

Examples of the value of digital information and its importance in the daily activities of people, organizations, and countries are visible in the: markets, internet, media, education, and the plethora of data bases necessary to keep the service industry running. In the modern urban environment, it is almost impossible for citizens to go about their daily lives without having access to the digital information made available.

In a research made by GlobeScan for the BBC, the sample was from 26 countries, it seems that 87% of Internet users and 70% of non-Internet users believe that access to the Internet must be a 'basic human right' (<http://news.bbc.co.uk/2/hi/8548190.stm>). The United Nations organization supports and promotes the freedom of access to the Internet. It is a type of human right that has already become law in countries like Sweden and Finland.

Similarly, Hamadoun Toure, General Secretary of the ITU (International Telecommunications Union), supports the right of every citizen to the Internet access, because it is the most democratic and most information-rich source/repository of human knowledge available today. He, therefore, insists that it is as essential for people to have access to the Internet as it is for all other basic infrastructures, e.g. electricity and water (<http://news.bbc.co.uk/2/hi/8548190.stm>).

Toure's argument, coming back to Wiener's idea of a person's need to process information, drives home the idea that the knowledge available in cyberspace should be treated as a source openly available to humanity and not as a commodity. The free exchange of ideas and the free sharing of knowledge through electronic mediated discourse enhance the establishing of true representative democracy.

Unfortunately, by using the same technological means (e.g. ICTs), humanity could be enslaved by a group of people, powerful elite controlling the main techno-politico-economic structures and sources (Castells [2]). Similarly, people and countries are using cyberspace as a new domain to fight out their wars (e.g. military, economic, and ideological). Cyber attacks, cyber warfare, and cyber espionage against individuals, groups, organizations, and governments are on the increase costing billions of €/€ and many human lives (<http://foreignaffairs.house.gov/112/Fis041511.pdf>).

ICTs and cyberspace have not only given birth to the age of digital data and information flows, but they have also kick started a new revolution in consciousness. The changes and transformations, locally and globally, due to the embedding of cyberspace affect people's way of thinking and living. It is the birth of the post-human and the dawn of a new civilization where people, both individually and collectively, are urged to assume new roles and identities within information- and knowledge-rich environments.

5. Conclusion

By using Lefebvre's trialectic approach, instead of a simple binary model, the cybervcity emerges as a hybrid complex environment, created through the embedding of the virtual city to the geographical city.

Similarly, by applying Lefebvre's trialectics, we gain greater knowledge of the transformation processes of society due to the embedding of the digital virtual to the material. The processes of materialization and spiritualization create a third process: expansion in consciousness/awareness through the use of ICTs.

The embedding of cyberspace in society opens up tremendous opportunities to humanity. The expansion of awareness and consciousness through the globalization of information gathering and processing enables people to extend themselves to a variety of spatio-temporal scales, expanding their information-horizon beyond the range of their physical senses.

The transformation of cities to cybervcities through the embedding of cyberspace, so far, appears to be assisting the globalization of urbanization. Cybervcities emerge as the modern urban intelligent environments within which human beings increasingly produce and control more digital information than ever before. By doing so, people transform themselves, society, and their material reality.

Through the use of ICTs, humanity finds new ways of creativity as well as new ways of destruction. While the use of cyberspace could liberate the human spirit in building a better society by providing free access to human knowledge, at the same time, the same technological means could be used to enslave humanity. Due to our civilization's dependency on cyberspace, a small group of people could gain total control of the main information flows and ICTs and, by doing so, affect major changes in society.

Humanity's main challenge today, through the transformations produced by the embedding of cyberspace, is to face the new crises/opportunities by assuming a spiritually mature stand in order to create a new civilization for the benefit of all.

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