

İSTANBUL TECHNICAL UNIVERSITY ★INSTITUTE OF SCIENCE AND TECHNOLOGY

**URBAN NETWORKS
AND
THEIR EFFECTS ON URBAN STRUCTURE**

**M Sc Thesis by
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MAY 2005

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ABBREVIATIONS

ICT	: Information Computer Technologies
TCP/IP	: Transmission Control Protocol / Internet Protocol
WWW	: World Wide Web
MUD	: Multi-User Dungeons
ITS	: Intelligent Transportation Systems
PAN	: Personal Area Networks
LAN	: Local Area Networks
WAN	: Wide Area Networks
ISDN	: Integrated Services Digital Network
ARPANET	: Advanced Research Project Agency Network
DDS	: Digital Data Store
SCOT	: Social Construction of Technology

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SUMMARY

The basic purpose of the thesis is to critically study the significance of the urban networks in relation with the city and to demonstrate their influence on the urban structure. It is important to examine how these networks lay on the complex city fabric and how do they intersect, determining the paths and the interaction of the citizens, since they map our relationship with the city and manifest several aspects of that relationship in detail.

After the first part where the general purpose and the scope of the thesis is introduced, the second part initiates by exploring the general definition of a network and the different types of networks. Utility networks basically include transportation, communication infrastructure and the historical evolution of them in a mutual relationship with the changing urban structure. Social networks, on the other hand, maps the relationships between individuals, representing their connections of various social familiarities ranging from casual acquaintances to close familial bonds. At the third part, information computer technologies and telecommunication networks are presented in detail with the general definitions, basic concepts and the reasons of their fast progression that is still in evolution. Additionally, the interactions between these different types of networks and the superimposition of them are studied in order to grasp the present urban structure that is composed of these network layers.

In the third section, urban influences of information computer technologies are explored, starting with the introduction of the different theoretical approaches on this subject. The relationship between urban structure and information network is studied in three parts. In the first part, physical transformations in various spaces such as libraries, work places, schools, entertainment facilities and homes are taken into consideration. Virtual cities are also explored as the 'new' spaces in cities. The second part includes social consequences like the emerging notions of network society, electronic communities and it is followed by the third part which discusses the global affects and the broader-scale urbanist impacts. In the last part of the third section, the impacts and effects of the information networks on urban structure and design are explored. Firstly, the conceptual affects and changes in temporal and spatial norms are studied and that is followed by the influences of telecommunication systems on urban structure and design.

And lastly, the conclusions which also include further questions are brought up.

ÖZET

Bu tezdeki temel amaç kentsel ağları incelemek ve bunların kent strüktürü ve yapılaşması üstündeki etkilerini ortaya koymaktır. Ağların kent dokusu üzerinde nasıl birbirleriyle ilişkiye geçtikleri, çakıştıkları, etkileşimde bulundukları, sadece kenti değil, insanların hareket ve yaşamlarını da anlamak, ayrıca kent ile ilişkilerini ortaya çıkarmak açısından da önemlidir. Tezin genel amacının ve kapsamının anlatıldığı birinci bölümün ardından ikinci bölüm, ağ ve kentsel ağ kavramlarının tanımlanması ve farklı ağ tiplerinin üç kısımlı halinde incelenmesi ile başlamaktadır. İlk bölümde fiziksel, altyapısal iletişimi ulaştırma elektrik, su ağları incelenmiş ve bunların tarihsel gelişimi kentlerin gelişim tarihi ile paralel olarak ortaya konulmuştur. Burada fiziksel ağların kentlerin yapısal gelişimiyle nasıl ilişkide olduğu ortaya çıkmaktadır. İkinci olarak bireyler arasındaki ilişkileri konu alan, odak noktalarını insanların oluşturduğu, bireysel ölçekteki sosyal ağlar incelenmektedir. Üçüncü bölümde ise, bilişim bilgisayar ve telekomünikasyon ağları ele alınmış, temel tanımlamalar, kentle ilişkisi açısından önemli kavramlar tanımlanmıştır. Ayrıca bu ağların hızlı gelişiminin nedenlerine de kısaca yer verilmiştir. Bundan sonra, tüm bu ağların kent üzerinde çeşitli ölçeklerde nasıl çakıştıkları incelenmiş ve bu çakışma ve etkileşim sonucunda ortaya çıkan ortak odak noktaları hem kentsel, hem de küresel ölçekte örneklendirilmiştir.

Bilişim telekomünikasyon ağlarının kent üzerindeki etkilerinin daha detaylı incelendiği üçüncü bölüm telekomünikasyon-kent ilişkisinin incelenmesinde literatürde karşılaşılan farklı yaklaşımların tanıtılmasıyla başlamaktadır. İlk olarak, geleneksel anlamlarından farklılaşarak değişen yeni ticaret, eğlence, çalışma, eğitim ev kavramlarının incelendiği fiziksel – mekansal etkilere ve değişimlere yer verilmektedir. Burada, sanal kentler de incelenmektedir. Ardından ortaya çıkan elektronik toplumlar, ağ toplumları gibi kavramlarla beraber sosyal düzendeki değişimler incelenir. Bölümün sonunda ise küreselleşme kavramı ile birlikte kentlerin küresel ağlardaki konumları ve birbirleriyle ilişkisi gözden geçirilmektedir. Üçüncü bölümün son kısmında bilişim ağlarının kentsel strüktür ve kent tasarımı na etkileri ortaya çıkardığı değişimlere yer verilir. Zaman- mekan kavramlarının nasıl değiştiği ve bu değişimin tasarımı ve yapılaşmayı nasıl etkilediği ortaya konulmaktadır.

Son bölümde ise sonuçlara yer verilir.

1. INTRODUCTION

‘‘As we are entering the information age, the space of flows dominates over the traditional space of places, and everything which is relevant for people has the trend to organize through networks.’’

Manuel Castells

Network is a variety of collections of interrelated elements comprising a unified whole. Networks establish the urban web and constitute the complex connections of our urban life. They are the main components of the cities that play an essential role in shaping the urban structure. Today, the displacement and interchange in the metropolis are comprehended by the influential combination of the different communication and movement channels which are essentially understood as circuits for directing flows. *‘‘The Metropolis Dictionary of Advanced Architecture’’* explains that the territory, the environment and some architecture can be described as a ‘‘superimposed and intertwined set of nets or webs’’. The basic parameter of development of these webs is connectivity which is formed between different functional layers, various programs and flows.

Throughout the history, we witness the deep impacts of transportation and utility infrastructure on urban development. Roads, bridges and waterways were built in order to traverse the physical limitations. Construction of water and sewerage systems, along with the progress in transportation network, and the constantly developing communication facilities had changed the basic decisions on the urban design principles. Besides the traditional networks of transportation and utilities, social and information networks which are not physical are being implanted recently and created a new realm both for social life and communication systems. The historical evolution of utility networks and their impacts on cities that are explored in the second section reveals the mutual relationship explicitly. The superposition of these networks constitutes the city itself and indicates the specific nodes of

interaction of leisure, business transactions and communication for citizens. Net works provide the basic foundation for economic and social activities which are transportation, communication, energy and finance.

The basic aim of the thesis is to study the significance of these net works in relation with city and to demonstrate their influence. It is important to examine how these net works lay on the urban fabric and how do they intersect, determining the paths and the interaction of the citizens since they map our relationship with the city and manifest several aspects of that relationship in detail. As we analyze the complex map of urban net works, we can pursue each path and understand the mutual interactions among them that actually shape and enact the total city. In the third section, the informational computer net work is emphasized and studied in detail since its strong affects and salient consequences are still in progress of evolution. We are said to be in the midst of an "Information Revolution", in which advances in information technology are transforming the way we work, shop, learn, travel, communicate, and live. Recently, social scientists regularly talk of a new, emerging 'digital age', an 'information society,' or a 'network society'. Such a transition is broadly regarded to be a new industrial revolution, since it is a societal, technological and economic modification across capitalist civilization through which every characteristic of society is changed just like its precedent. Since the innovations of information technologies are accelerating rapidly, infusing in every aspect of the contemporary life, it is necessary to study them also in relation with the urban studies. With the emergence of virtual spaces and changing concepts of time and space even the very basic definition of the city and urbanism are being challenged.

Will we need physical spaces at all in future when all of daily actions are started to be carried online? Will informational net works which overcome the spatial and temporal boundaries form another order for business, daily, economic, political and social aspects of our lives? Will this hidden layer of fibers lead to drastic changes both in physical and social urban structure? Will face-to-face communicational interactions loose its indispensability since it becomes very easy to contact anyone around the world? Will the cities go into a process of dispersal or concentration as the net works provide both easy access to distant points and concentrated nodes? The small but fastly extending significant indications of these transformations are notifying the approaching brand new world. And from the perspective of urban

planning, what responsibilities are there for urban policies, plans, and for urban design, within the shift to an informational urban life, based more and more on all types of on-line interactions?

There are many questions that seek answers about the emerging innovations. This study aims to collect various approaches together in a meaningful whole to trace some paths towards those answers.

2 THE DIFFERENT TYPES OF NETWORKS FORMING THE URBAN STRUCTURE

2.1 General Definitions

2.1.1 Networks

Network is a variety of collections of interrelated elements comprising a unified whole. Latour explains the simplest properties common to all networks as follows:

First of all, networks eliminate the concept of proximity. Elements which are physically close can be very remote if they are disconnected. The notion of network lifts the jurisdiction of geographers in defining space and offers us a notion which is neither social nor 'real' space, but associations (Latour). Secondly, the notion of network eliminates the concepts of macro and micro which indicates the scale. Instead of scale, the dominant factor is connections. A network is not considered bigger than another but, it is simply longer or more intensely connected. Latour asserts that, instead of having to decide between the local and the global view the notion of networks permits us to conceive a highly connected global entity which remains constantly local. Thirdly, the notion of network eliminates the third spatial dimension. A surface has an inside and an outside separated by a boundary. A network is all 'boundary' which has no inside or outside. A network is a positive notion which does not need negativity to be understood. It has no shadow (Latour).

Jon Udell, suggests that networks made out of anything (molecules, nerve cells, electrical network, transportation systems, web links, human beings) obey the same laws of growth and arrive at similar structures. In every network, certain nodes differentiate. They attract more links and shorten the distance between endpoints (Udell).

Kevin Kelly explains that the most important characteristics of the networks are to have autonomous subunits, exponential growth of interacting possibilities, the

possibility of alternative paths and high connectivity. The network concept is related to telecommunications as well as to general living systems in terms of functioning and development.

A territory, a landscape and some architecture can be described as a ‘‘superimposed and intertwined set of nets or webs’’ (Gausa et al) and this statement attributes meaning on certain spaces generated by grids. In urban and architecture history, networks can primarily be traced by grids which have no shape, thus can be reshaped by what is enclosed by them. Therefore grids are the basic structures, which constitute infrastructure and the general network systems (Figure 2.2.3, 2.4, 2.5).

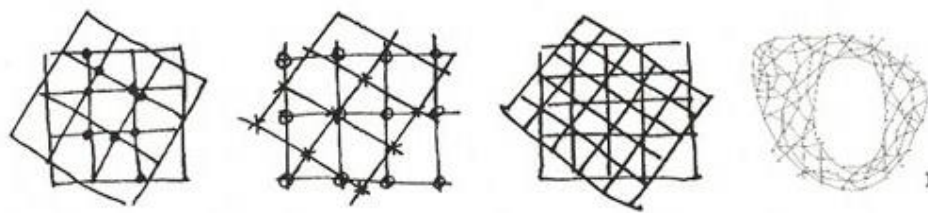


Figure 2.1: Roof geometric scheme for Chemnitz Stadium 2002 (Gausa et al).

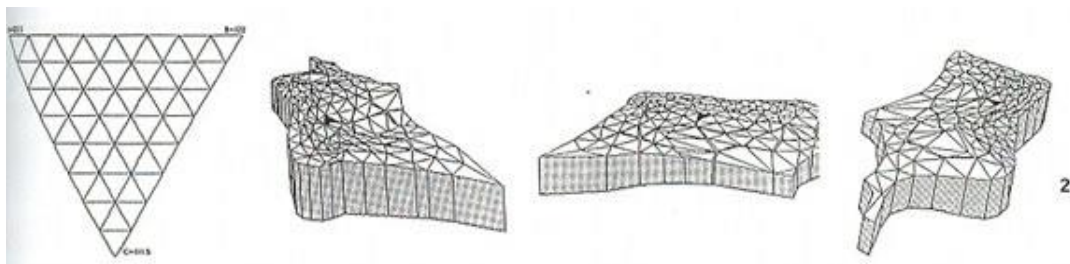


Figure 2.2: Carlos Ferrater, Botanic Garden Barcelona, 1999. (Gausa et al).

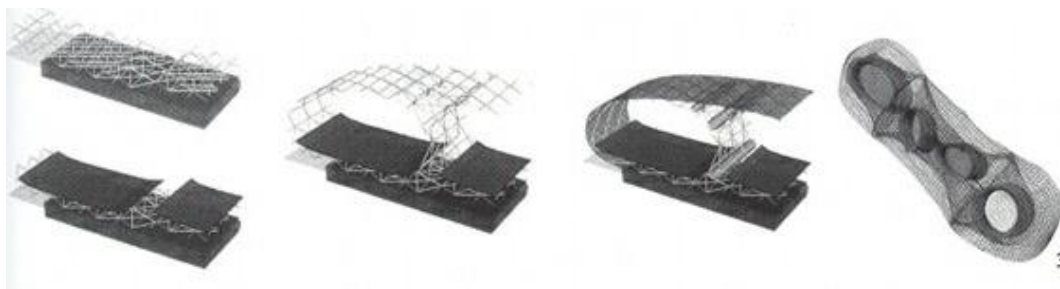


Figure 2.3: Ben Van Berkel, Competition for national Swiss Exhibition, 2001. (Gausa et al).

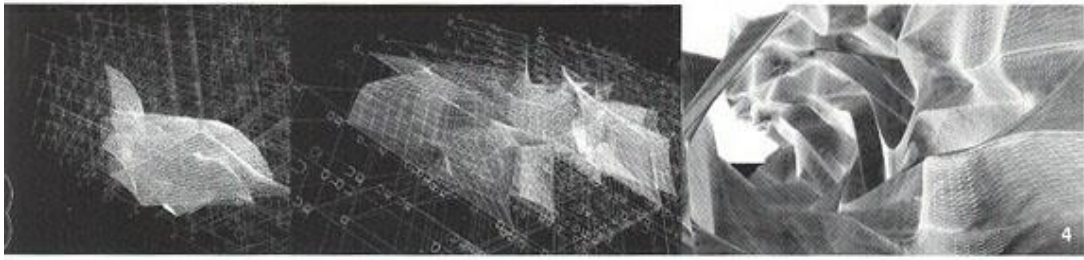


Figure 2.4: Karl CHU Phylum 1999 (Gausa et al).

Today, the complex displacement and elaborated interchange in the metropolis is comprehended by the combination of the different communication and movement channels. The most essential characteristics of these channels that are formed by networks are an efficient 'connectivity' formed between different functional layers and flows.

The main components that constitute networks are the nodes, connections and flows. They both determine the capabilities of networks and the relationship among their parts. Since they are independent, the harmony and the functionality of them are essential for the general efficiency of the network. The additional components enrich the networks and the users despite of some negative consequences. Nodes, which can help to maintain a well-established communication, are the main components of the networks besides the 'connections' and the 'flows'. *"A network is a set of interconnected nodes"*, Castells says and he continues: *"What the node is, depends on the kind of concrete networks of which we speak. The topology defined by networks determines the distance (or intensity and frequency of interaction) between two points."* (Castells 1996, 470) (Figure 2.5, 2.6). Networks to Castells are open structures, able to expand without limits, integrating new nodes as long as they are able to communicate with the network. They are open, innovative, expandable, integrating and flexible structures.

Nodes are linked through various sets of connections. The density and complexity of these connections determines the efficiency of the whole system. Various flows go through these connections, maintaining the functioning of many organizations of contemporary life.

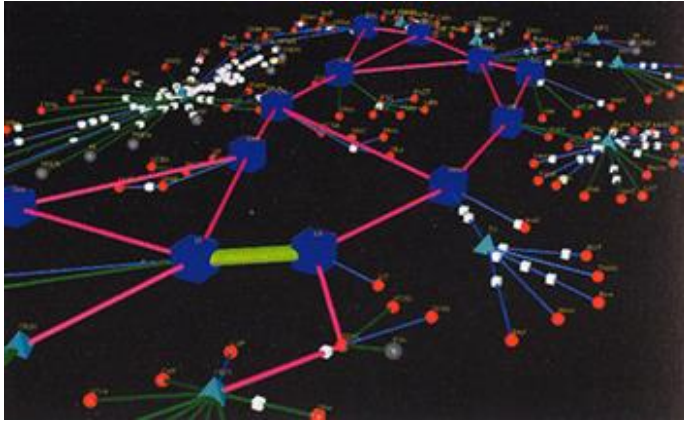


Figure 2.5: Connection of nodes

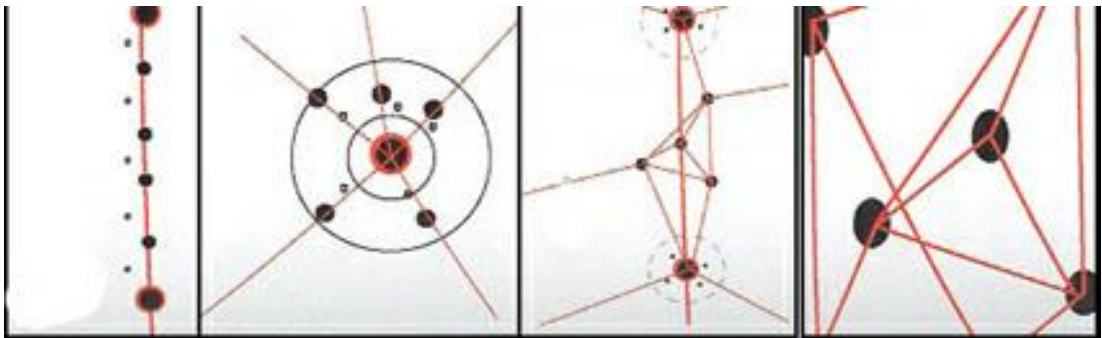


Figure 2.6: Connectivity of nodes (Causa et al).

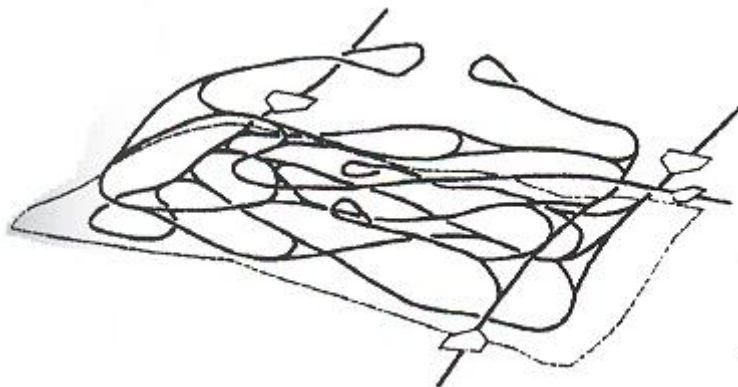


Figure 2.7: Representation of circulations in a library (Causa et al).

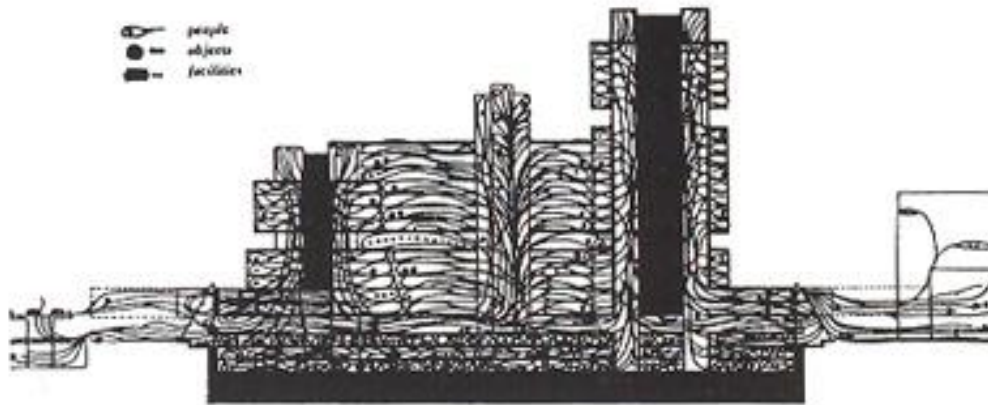


Figure 2.8 Circulation Diagram, Rem Koolhaas, OMA (Causa et al).

Every modern city, incorporates complex connections to transmit the flows of people, goods, water, energy and information. Flows of various objects, people can be traced in all spaces (Figure 2.7, 2.8). Networks such as transportation infrastructure, data transmission channels and telecommunication lines are not simple technical consequences but the structuring basis of the new space that carry out these flows and proliferate interchanges. Transportation networks are the largest and most apparent of these. While the ancient cities counted on streets to transfer pedestrian traffic and carts, the contemporary cities consist of complex combination of transportation lines. As American cities demonstrate low density, auto-centered urban development, European cities have the high densities necessary to flourish rail transportation (Ellis). The system of railroads and roadways that structured the industrial city has widened to include highways, airports and rail systems with the added complexity of digital telecommunications. Imken calls this web of connections the “*global matrix*”, where real-time technology and physical space exhibit a mutually reinforcing relationship (Imken, 93).

The networks also include infrastructures necessary to provide social services such as water supply (storage, treatment and delivery); waste water (sewer mains, collection systems, treatment and disposal systems); solid waste (collection facilities and equipment, disposal sites); transportation (highways and streets, bridges, railroads, water ways, ports, airports, public transit); telecommunications; fire safety (stations, vehicles, communications and water supply); energy (hydroelectric plants, nuclear reactors, generators, power grids); health (hospitals, nursing homes, orphanages,

emergency vehicle services); and education (schools, colleges, universities and libraries).

Networks, whether they are transportation or informational are parts of the bigger systems which maintain the economic, social and vital activities of the society. Infrastructure networks are both consequences and causes of development. They are always in correlation with the changing and developing technology.

As communications technology evolves, so do communications networks. Canadian media artist Hank Bull claims that, ‘‘What the network does basically is extend our nervous system around the globe so that it becomes your body’’. With each new network new capabilities come, resulting more information to share, in richer formats, over more channels, with more parties, at greater speeds. In fact the pace of this evolution has been constantly accelerating as shown in Table 2.1.

Table 2.1: The pace of network evolution

Period	Network
1930s	Telephone
1940s	Fax
1950s	Internet
1960s	Email
1970s	Wireless
1980s	Instant Messaging
1990s	Web

In physical networks such as transportation system, the architecture is determined by fixed links between the nodes. Social networks based on human relations such as kinship groups, also demonstrate architecture. Just like physical networks, interrelated components of social network carry, transmit and exchange information. However, the relationship between nodes is psychological rather than physical (Sassen, 2002, 43). Informational networks such as Internet also has architecture to create a structure out of logical relationships that are written into the software code (Mitchell, 1991).

Castells indicates that networks establish the new social morphologies of our communities and the networking logic constantly changes the operation and the results of the processes of production, experience, power and culture. He adds that, in the information age the space of flows and networking alter people’s experiences as well as their understating of environment (Castells, 1996).

As it is clear from the different points of views, networks which direct both ancient and contemporary flows actually set up the basic organization of many major as well as minor physical, social and invisible relations. Their flexible and adaptable structure without any constraints of form attain to constitute interactions and connections between certain strategic points. Consequently, they build up the structures of the main orders in our lives.

2.1.2 Network of Cities

On the contrary to the big metropolises of the twentieth century, the information society has created the network of cities. The cities, being the nodes of this network constitute the accumulation point for various local and global transactions and conduct them to other nodes. Currently, it is the connections and flows between the cities that place them in a critical position rather than their boundaries or physical area extent. Through strong and complex connections, cities can extend their cultural, political, economic influence upon others and even establish a dominant power without a physical expansion as it was commonly expected in early ages. The same relationship exists between network and computer as the city and territory. Nodes and territorial IP numbers have to be very effective to make the whole system of cities more efficient. Otherwise, information flows become haphazardly scattered and cannot reach their destinations.

Network is a structure in which two orders exist: the local and the global. Both are essential for the perfect functioning of the whole system. The links between the nodes change what they relate, thus in a sense they create a new city. Local networks can create similar neighborhood networks on an urban scale, ultimately progressing networks throughout the country or all over the world. Traditionally, urban nuclei are established either at crossroads as meeting places with easy territorial access like Paris and London, or along paths, determined by the transportation flows of each age. In both cases, the ultimate aim of the city is to grow and expand according to the military and social circumstances. Today, the cities are working to establish a 'network of cities' in order to be organized territorially and to become more effective internally. These cities are highly interdependent and differentiated from one another at the same time. Diagrams can demonstrate the development of urban networks graphically (Figure 2.9).

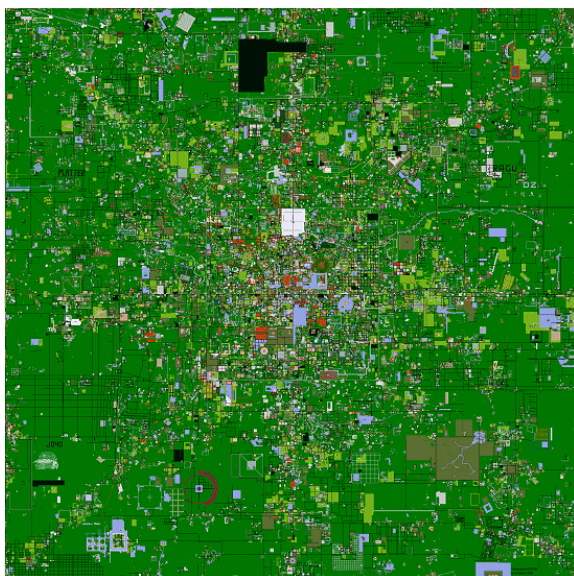
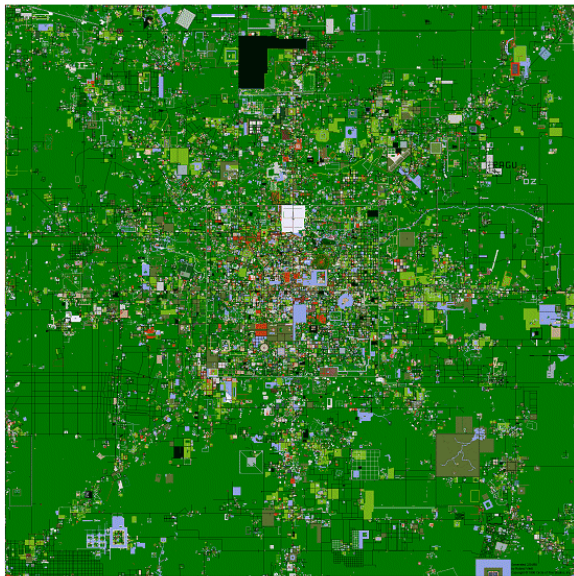
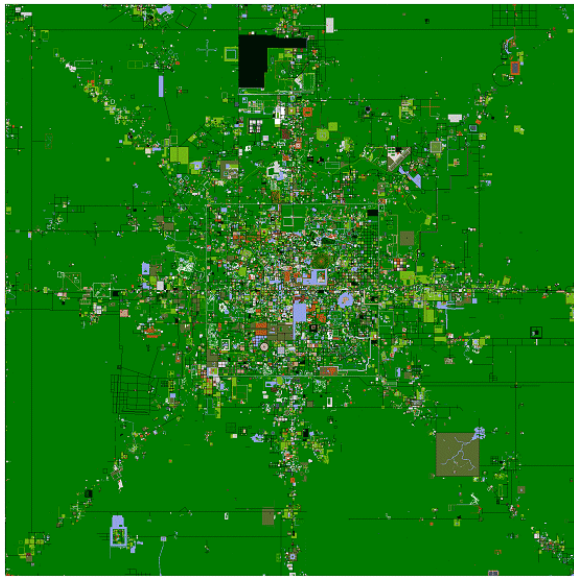


Figure 2.9: Development of Urban Networks (Dodge, Kitchin)

2.2 Physical Utility Networks

Urban structure consists of various networks that serve the city, facilitate its inhabitants, establish connections and relate necessary components together. In this section, the types of networks are studied in three general categories. Firstly, the physical utility networks that include transportation lines, water, electricity, gas lines, and communication systems together assemble the material infrastructure of the city. Tarr defines infrastructure as "*si ne ws*" of the city roads, bridges and transit networks; its water and sewer lines and waste disposal facilities; its power systems; its public buildings; and the parks and recreation areas (Tarr). The second type, which is the social network represents the interpersonal relationships and the network of locations and personal affairs organized as a consequence of these relationships. Lastly, the informational network which is the most recently structured one is explored. It wires the world with computers, electronic communication facilities and creates an innovative order that totally changes the traditional concepts of time and proximity in the contemporary age.

2.2.1 Different physical, utility networks and their affects on urban structure

Transportation and the utility systems which include water, electricity, gas lines as well as energy systems together constitute the physical networks. They are the very 'glue' that hold together the modern society. Cities and urban systems are intensively dependent on dense and complex technical networks (Graham Marvin, 1996).

Transportation is the movement of goods from one place to another. The term is derived from the Latin word '*trans*' and '*portare*' which means across and carry respectively. It consists of rail way, air way, water way and road transportation which are composed of different connections and nodes. Roads link two or more access points and form the connections of the transportation networks. In the rail way system road is a single track which may be an isolated line or a part of a wider system (Figure 2.10).



2.10: Net work of roads

Although it was always a critical facility in human history, transportation acquired a renewed significance with the initiation of the industrial age. While sea lines crossed the seas and oceans either to carry goods or passengers, railroads wired the continents to conduct necessary raw materials to their destinations. With the invention of automobile, network of highways was constructed and grew increasingly, becoming the most preferred transportation means (Figure 2.11, 2.12, 2.13). Additionally, air way provided fast and easy access to distant destinations and turned the globe into a smaller, reachable place. With each step of progress, the daily life and business transactions become faster, easier and traditional perception of the time-space concept of the early ages is changed.

Then, it became easier to travel, to carry goods, to reach a destination that once was out of scope of the civilization. In today's world, transportation network is one of the busiest of all.

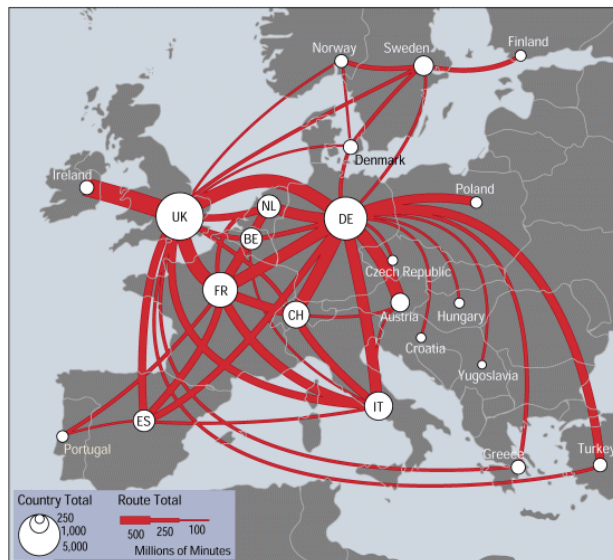


Figure 2.11: European traffic flows, 1997 (Dodge, Kitchen).



2.12: Traffic Flows

Additionally, transportation enables the regional specialization of labor. New markets emerge between areas with different specialization by transportation. Besides its basic role as the provider of mobility of humans, transportation also complements with the economic, political, sociological and cultural framework of the society. The position of transportation also determines the political strength of its owner as it was in the beginning of the twentieth century with control of the seas or as it may be in the future about the hypothetical supervision of outer space.

Utility networks are intelligently devised systems of technology which support the mobility of energy, water, waste and information and thus constitute the foundation

of the development and operation of the production, consumption processes as well as the functioning of society at large. They maintain access to energy, water, communication and remove wastes by capacious networks of pipes, ducts, cables. Today, since utility networks are in a comprehensive reorientation process in relation with the changing local and global dynamics of post-fordist era, they also drastically affect the governance and social formation. The cost, quality, accessibility and certainty of these networks and the technologies they use, influence upon the restructuring and functioning economic and social development of cities.

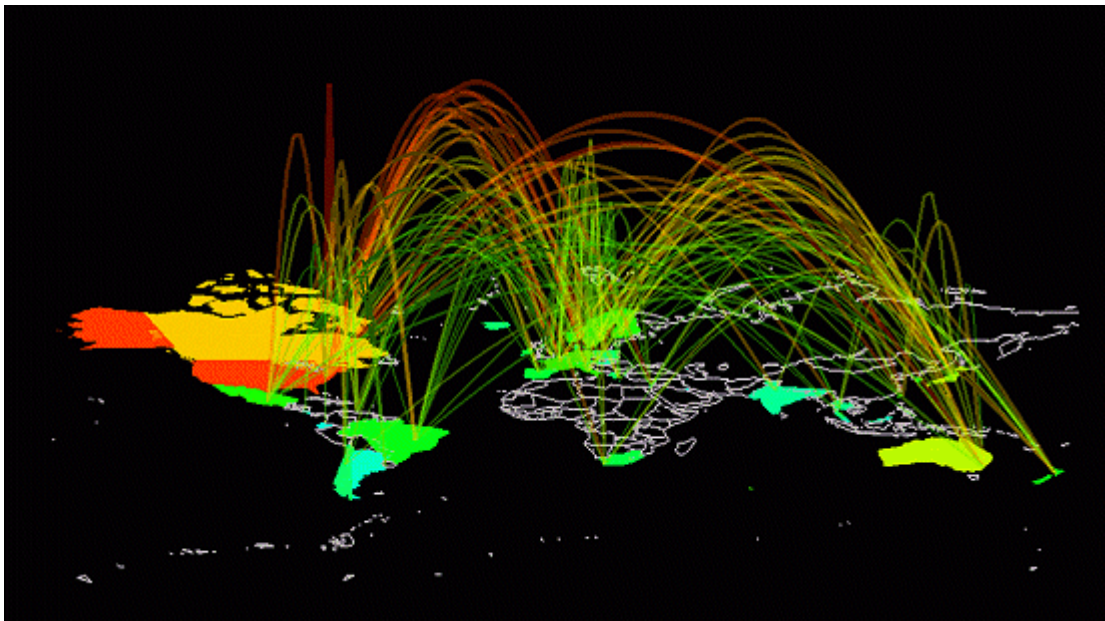


Figure 2.13: Interactive visualizations of traffic flows by Stephen Eick (Dodge, Kitchen).

All the firms, organizations, households situated in a dense urban system are depended on complex utility networks. Indeed, without them the operation of modern, ‘*net worked*’ city becomes impossible.

Communication networks permit us to communicate with others by transmission of voice, data, video to carry on the compulsory affairs of life and can include telephones, computers as well as satellites.

On the other hand, since the utility networks need long term investments and large quantities of capital, they are highly depended upon the economic situation of the cities and local regions. Therefore, a healthy mutual relationship between net working and economic, social and political structuring leads towards a perpetual progress on both sides.

By the end of the 20th century, the invention of mobile phone liberated human's communication from the need of a stable spatial position. Wires were no more needed in communicational networks and this fact was considered as one of the most significant innovation of the present era. Later, the greater success came when wireless communication evolution was combined with the technological computer networks that will be discussed in the following sections.

The table in which the nodes refer to physical locations in space and links to physical connections between the nodes shows the classical networks and differentiate their three main components (Nagurney, Dong).

Table 2.2 Examples of Classical Networks

Net work System	No des	Li nks	Fl ows
Transportation			
Urban	Intersections Homes Places of Work	Roads	Autos
Air	Airports	Airline Routes	Planes
Rail	Rail yards	Railroad Track	Trains
Manufacturing And Logistics	Distribution Points Processing Points	Routes Assembly Line	Parts Products
Communication	Computers Satellites Phone exchange	Cables Radio Cables Microwaves	Messages Messages Voice Video
Energy	Pumping Stations Plants	Pipelines Pipelines	Water Gas, Oil

2.2.2 Historical Evolution of Utility Networks and Their General Effects on Urban Form

In the course of history, the cities have always tended to extend their boundaries as the circumstances of population, commerce and economics have improved. The enlargement of cities by the formation of new dwellings, public spaces, roads, etc has been affected by the political, social and cultural priorities and values of the country of which the city has belonged.

That inclination toward ongoing expansion has converted morphological and functional dynamism into noteworthy features of cities. Dynamism has been articulated through the procedure of two correlated processes; that of assembling of forms and activities and that of separating between them. Since the complexity constantly increases along with the physical growth, the connectivity among the various parts and nodes of the city becomes the essential quality that provides the integrity of the urban fabric. Thus, besides the physical forms and functions, connectivity also appears as an indispensable element of urban structure.

Once a settlement expands beyond the level of a small town, the issue of connection attracts attention for its essential qualities. Since connections form a system out of separated components, and establish a coherent whole which can expand, they are considered as one of the major elements of the networks of today.

Throughout the history of urban planning, the medium of transportation played a critical role in formation of the urban morphology. The structure of the road systems, established in accordance with the transportation means and nodal point of the cities, shaped the urban fabric by determining certain widths, boundaries and divisions of the building blocks.

Through the development of urban morphology, grid scheme can be regarded as the elementary network structure that shaped the urban layout for centuries. The emphasis on connections, on central points or spaces of interaction, the clear-cut lines devised a simple network. Therefore examining the evolution or use of the grid system may be helpful in discerning the formation of networks in urban layout.

A structural system primarily emerged in Greek cities, especially with the design of Hippodamus whom Aristotle introduces as ‘‘*The son of Euryphon, a native of Miletus, the same one who invented the art of planning cities.*’’

The design of Miletus by Hippodamus (498-408 BC), with grid system establishes the idea of total conception as a key factor of morphologies of cities. Hippodamus is usually recognized as the inventor of the grid patterns or at the least the orthogonal town which is frequently defined as ‘‘*Hippodamian*’’ such as Olynthus, Priene, and Miletus (Figure 2.14, 2.15). Kostof attests that, orthogonality is not a simple formula of urban design, but a matter of creating an urban order (Kostof, 1992). The advantage of the grid is its flexibility which can fit both in classical Greek cities and

modern metropolises. The most important contribution of Hippodamus was to regard the city as a total system and to provide the complexity of elements it needed (Vance, 49) and leaving enough space and possibility for growth and evolution. That idea devised an efficiently transferable format to conduct growth and manipulations over a long period of time. Although the grid system was primarily evolved as a land-division purpose for an orderly settlement and not necessarily as a circulatory system, it was also utilized to connect outstanding ‘nodes’ of Greek city such as Agora and Temple (Acropole). In Miletus, for example these nodes were Agora, the theatre, nymphaeum, stadium and the temple of Athena. Overall, towns with modular components can be regarded as an invention which introduced proportion, adaptability and a kind of equality into the urban design process.

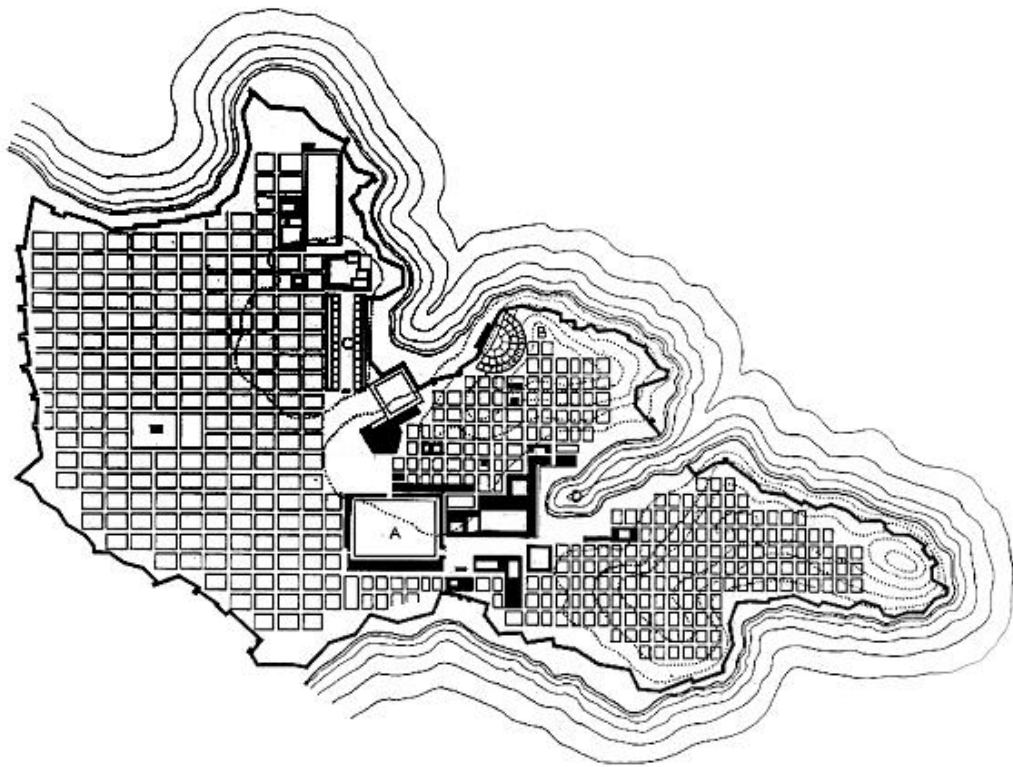


Figure 2.14: Miletus as laid out by Hippodamus, 450 BC (Vance).

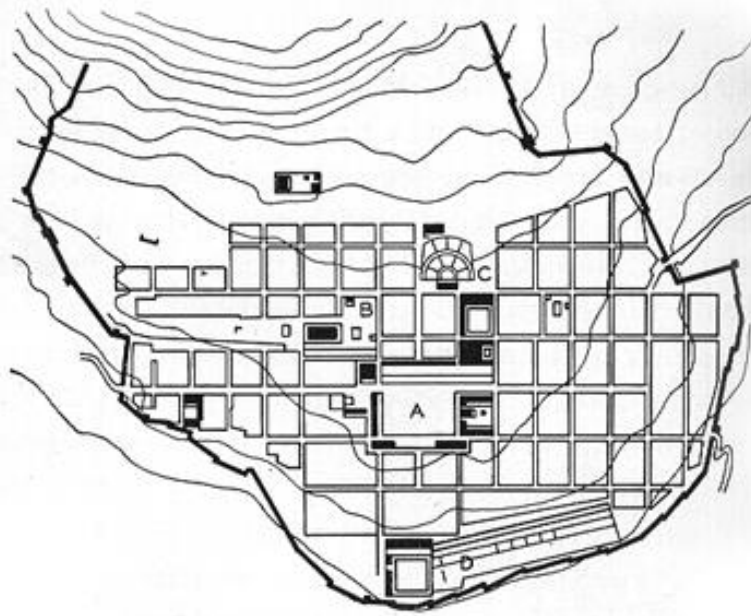


Figure 2.15: Layout of Priene (Vance)

Later on, Romans were mostly occupied with large-scale city building during the fortification of their empire. Although Rome was created by centuries of organic development, Roman military and colonial towns were laid out as a grid system (Ellis). In Roman grid towns, two axial roads at right angles to each other were placed with a forum at the center and smaller field tracks were designed parallel to these axes, forming a grid of squares or rectangles. Romans, who were the engineers of the era, were the first to devise an adequate system for bringing water into the city (Vance) which can be regarded as the origin of the modern utility networks. The city was efficiently served by the main sewage system so well that the main sewer, Cloaca Maxima is in use even today (Vance).

Medieval cities are usually associated with narrow, curved streets opening to large squares with a cathedral and a city hall. With the freeing movement of the geometric order, natural pedestrian paths generated short cuts through large grid blocks and consequently organic patterns have emerged in the post-roman city. Furthermore, circulation pattern was reshaped in relation with the cultural town market, since most of the streets were opening to the market square. The nodes of the medieval city such as a castle, a cathedral have directed the circulation network toward themselves. The structure of the transportation system commenced to be shaped primarily in

consistence with the topography, so did the urban structure (Ellis). The grid system had some disadvantages in organizing the hierarchy of movement according to the public locations within the city. The main specifications of hierarchy were the regular width of the streets and the position of the main nodes on the orthogonal structure of the network. Medieval towns which generally had circular forms, expanded in a network of radiating roads converging on a central point (Vance).

In the era of Renaissance, architects attempted to shape the urban space by aiming to create an aesthetic harmony in the city. Some parts of the cities were rebuilt to construct artistic squares, street vistas and symmetrical arrangements (Ellis). The grid system was frequently applied in extensions of towns such as Nice in France. Newly established feudal towns like Sicily had simple grid plans with a single large open space. For example, in the process of rebuilding of London in 17th century after the Great Fire, the conditions of circulation were improved in the first place and as a result, the streets were constructed broad enough for wheeled vehicles, wagon and carts (Vance, 245) (Figure 2.16).



Figure 2.16: 17th century London (Vance).

On the other hand, Istanbul, named as Constantinople in the Byzantine period had a general layout in which the city walls, the forums and cisterns that were the main

nodes of the city were highlighted (Figure 2.17). The avenues linked the scattered forums of the capital city the defined by Theodosian walls and Constantinople was expanded until the fifth century and filled with important monuments such as the Hippodrome, the original church of Hagia Sophia and Church of the Holy Apostles. Also, as the growth of the city necessitated an efficient water system, an aqueduct was constructed to be the main utility network which is presently known as Bozdoğan Keneri. It was reinforced by a network of underground conduits and cisterns that transported and stored water around the city (Çelik, 19). After the conquest of the city by Ottomans the fundamental decisions of urban construction had changed. Although there were large avenues that connected the big squares in the Byzantine period, in Ottoman periods small, introverted subunits called ‘mahalle’s were developed which were originating from a central node. The mosques and the külliyes became the main nodes of the city instead of forums and churches.

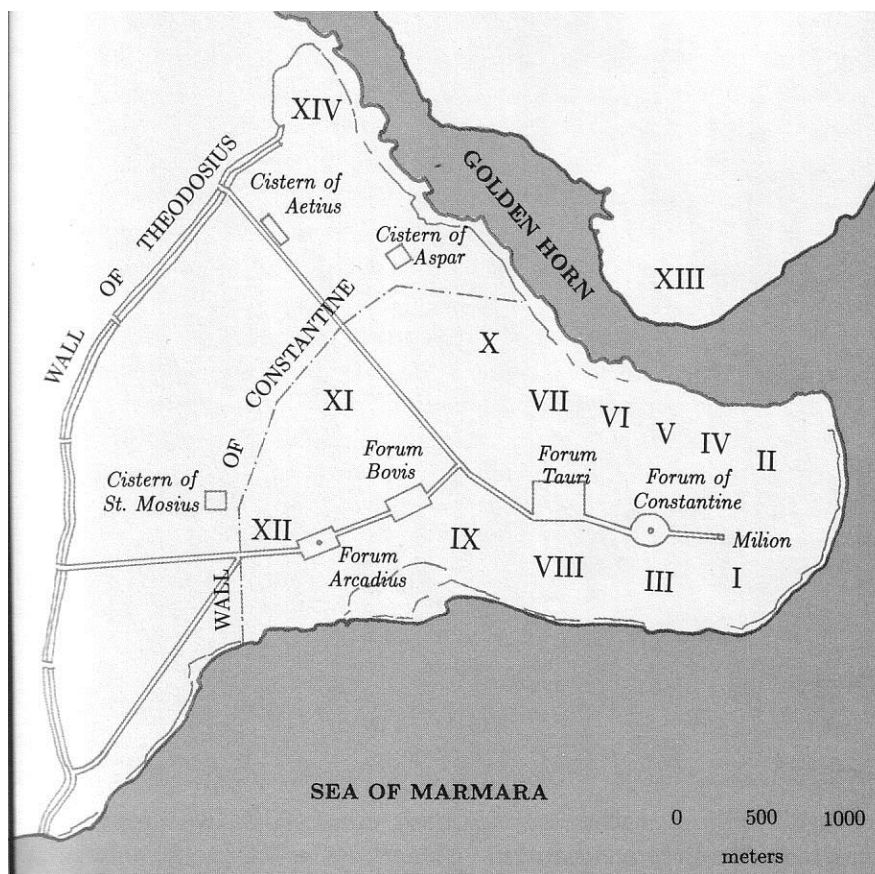


Figure 2.17: Byzantine City of Constantinople (Çelik).

In the 16th century, the monumental architecture flourished with the constructions of Architect Sinan during the reign of Suleyman. Sinan's külliyes which included a mosque, a courtyard, hospital, a medical school that identified Istanbul's urban form

by breaking up the irregularity of the city by their geometric schemes. One of the main tasks of Sinan was to provide an improved water canal system. The urban structure of the city consisted of irregular street patterns with mosques, külliyes and schools at the node points (Figure 2 18).

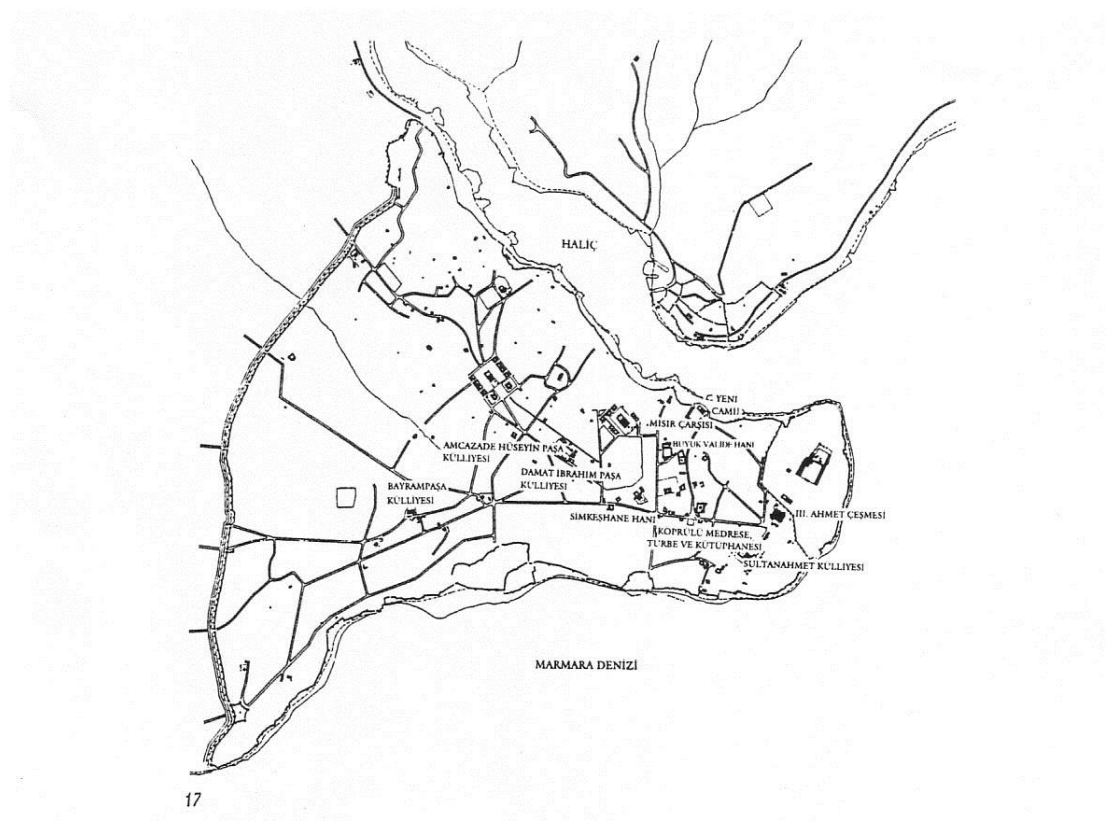


Figure 2 18: Istanbul 1603-1730 (Çelik).

The baroque cities emerged with the establishments of great nation-states between 1600 and 1750 that were composed of large urban spaces such as long avenues, radial street networks, monumental squares, geometric parks and gardens alongside new palaces, courts and offices. In 17th century the new aesthetic of the Baroque urbanism which was based on the dynamic structure of the diagonal commenced to transform European capitals. Although the radial-concentric road scheme for traffic was emerged as late as Middle Ages in merchant towns, it was after the acceptance of the coaches in 17th century that introduced the radial city as a city diagram (Kostof, 1991, 192) in which the centerline and the axis symbolized the mighty power of the monarch. Louis XIV, for example ordered the removal of his palace from congested Paris to the open grounds of Versailles and he ordered the avenues to radiate from his palace (Figure 2 20). The entire city of Karlsruhe was also designed to radiate from the prince's palace (Figure 2 19).

After the fire of 1666, Christopher Wren proposed a monumental plan for the rebuilding of London. He pointed out a new power dominant in England by placing upon the major focal point to Stock Exchange. But the plan was not applied because of regulatory problems about property boundaries (Gallion, 46)

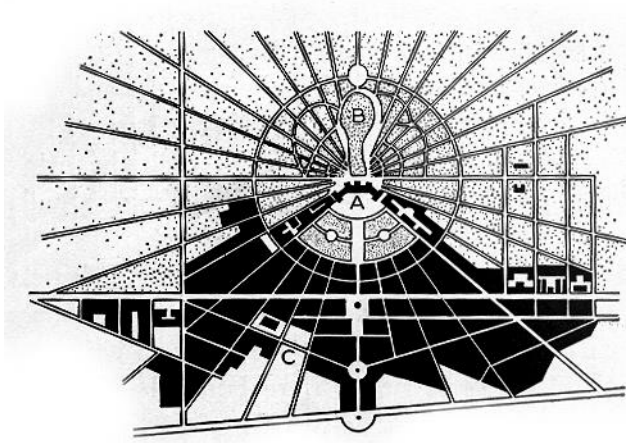


Figure 2.19: Gty of Karlsruhe (Vance).

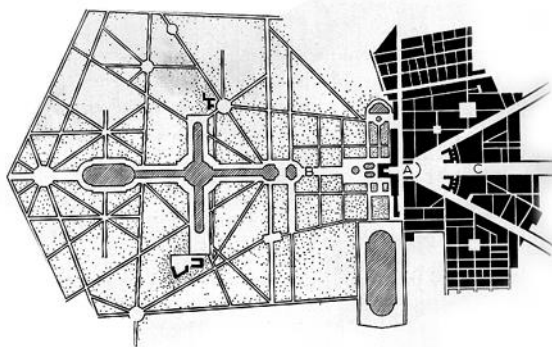


Figure 2.20: Gty of Versailles (Vance).

Since the diversification of transportation means such as railroad, streetcar and automobile networks initiated to get more complex, straight radial roads were built to link the suburban belt with the center. Kevin Lynch described this order as follows: *‘‘There should be single, dominant center, of high density and mixed use, from which four to eight transportation lines radiate outward. These lines would contain vast transit systems as well as the main highways...At intervals outward from the main center, there are concentric highways...’’* (Lynch, 373).

In 17th century new colonials started to shape their city in the new continent of America. The first colonies set up, adopted the grid pattern with two main intersecting axes and a public square at the intersection, thus grid was decided upon

as the urban form for most of the states. The equality, non-hierarchical and neutral manner of the grid are the advantages of this homogeneous system. Grid system regarded as a tool to express egalitarianism. The equal share of the land properties with certain width of avenues in between was most efficiently maintained by this system. In newly developing regions it has provided a fast and fair system of urban development. Philadelphia, plan drawn by John Reed in 1774, was the first large American city that was configured with such a system (Kostof, 1991). Boston, Richmond and especially New York were planned in the form of identical blocks. Although there were some exceptions such as New Amsterdam, most cities adopted grid plan (Figure 2.21). The almost medieval, irregular pattern of the Dutch settlement of New Amsterdam in 1660 still exists. On the other hand, Philadelphia and Savannah had grid plans and structured with a regular pattern of rectangular streets (Figure 2.22). In the plan of Washington DC, diagonal and radial streets were superimposed upon the typical layout (Figure 2.23).

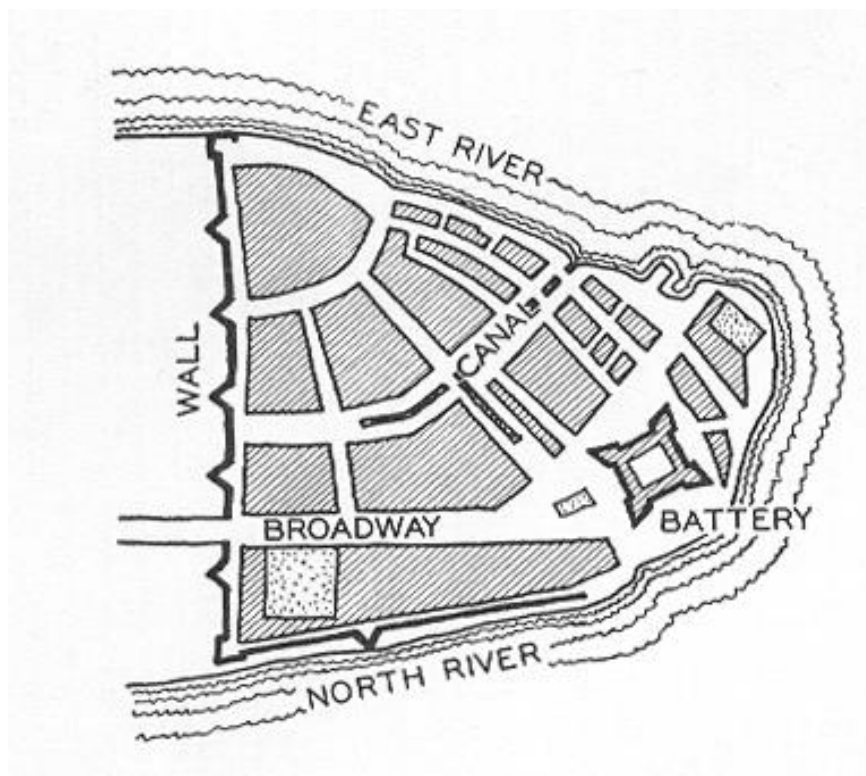


Figure 2.21: New Amsterdam (Vance).

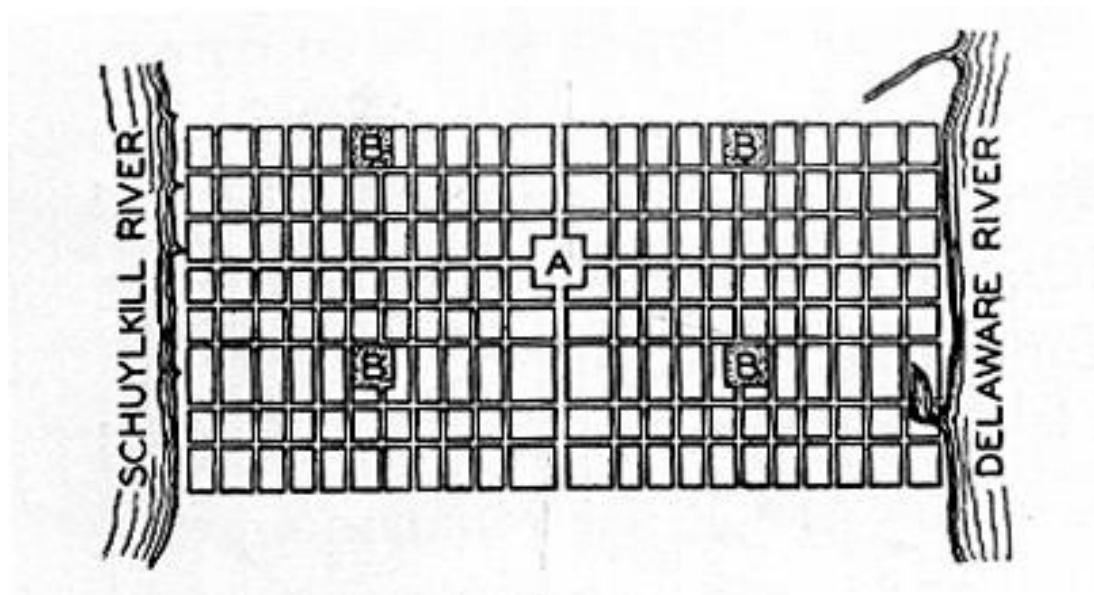


Figure 2 22: Philadelphia (Vance).



Figure 2 23: Washington D.C (Vance).

Meanwhile, after the erection of many monuments in Istanbul in the 17th century, influences from European architecture initiated to show its affects in the 18th century, while the general network got more sophisticated with new streets. From 1838 to 1903, Ottoman Empire underwent an intense period of economic and

sociopolitical transformation and modernization process. New industrial sites were established and many institutional and structural reforms were enacted in accordance with Western models. During the second half of the nineteenth century and the beginning of the twentieth century, the physical boundaries of Istanbul expanded in a great extent. The Taksim- Harbiye and Harbiye-Şişli strip become one of the major arteries. During 1876, with the westernizing influences, scientific approaches were adopted in the urban construction. German engineer, Helmut Von Moltke was hired in 1839 to improve Istanbul's street network and he proposed a scheme which emphasized to construct main arteries in the city (Figure 2.24).

Later on, legal regulations were prepared in order to classify the street network and order them. The period from 1865 to 1869 was the most active phase of urban planning in 19th century Istanbul. Before 1840s, rebuilding of the city was continuously repeated because of the frequent fires. After the major fires, many streets were regularized and turned into arteries.

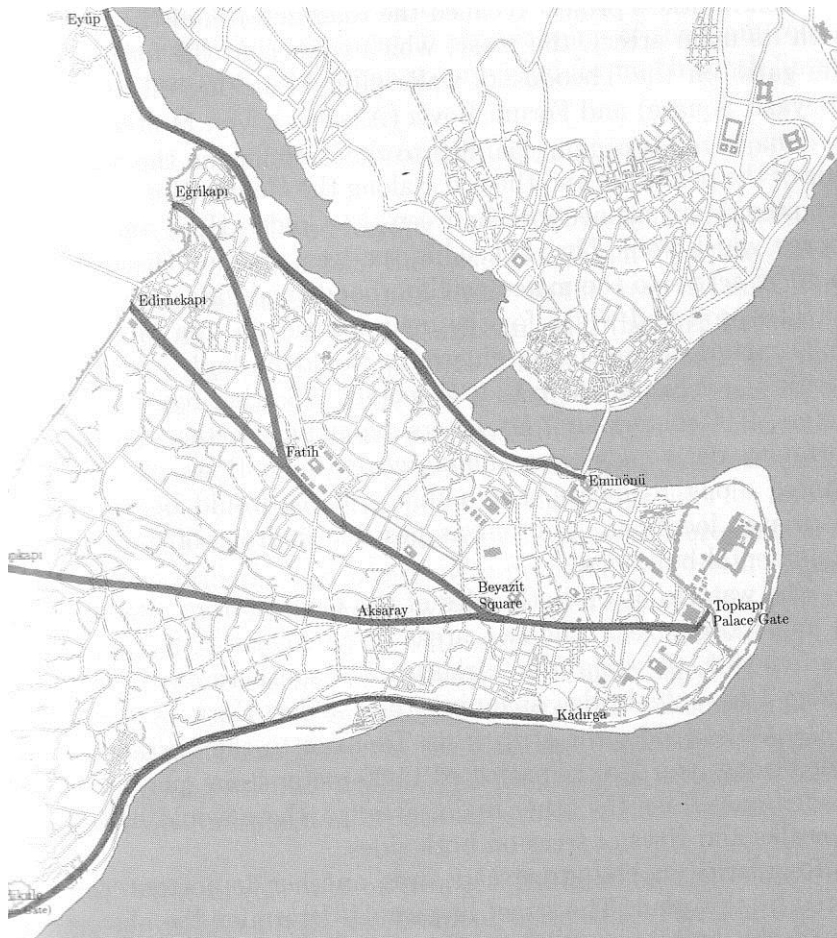
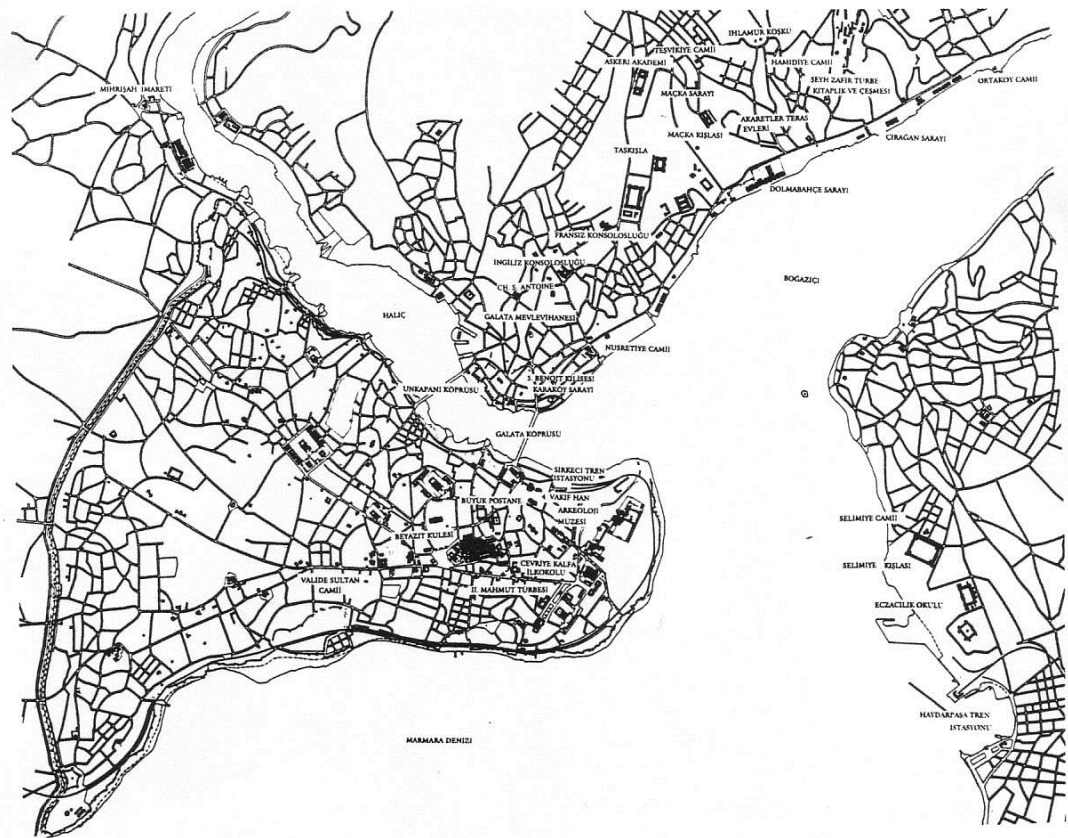


Figure 2.24: Moltke Plan (Celik).

Regularization meant replacing the old street network, composed of short, crooked arteries with well-connected wide roads. Topography and existing buildings also influenced the planning. Roads and sewage lines were constructed together. The new schemes aimed to bring order to the irregular street patterns and to improve access to the major nodes of the capital (Figure 2.25).

In the second half of the 18th century, urban development was configured not by political, religious or cultural elements but by the market and commerce. The industrialization in the beginning of the 19th century improved the infrastructure of rural transportation in England.



18

Figure 2.25: Istanbul 1789-1878 (Çelik).

In the 17th century Paris and London experiments were done in order to generate vehicular transportation. Basically because of the economic reasons, it was only in 19th century a genuine public transportation was obtained. The development of omnibus, first in Nantes in 1825 and in Paris in 1828, began to modify the structure of cities. The industrial order relied upon the transportation of raw materials to the factory and final products to the consumers. In 1825, the first steam railroad for

public transportation in England was inaugurated and a line was started to operate in the United States in 1829.

In the crowded city, people used the horse-drawn carriages. The 'voiture-omni bus' for passenger transportation was introduced in Paris in 1819 as 'horse-cars' in New York City in 1831 (Gallion) and altered the urban structure (Vance, 365). Although in 1867 an elevated cable car was built in New York City, steam train replaced the cable in 1871 (Figure 2.26). The electric street railway became the basic urban transportation means and a circular, fully developed city appeared (Vance, 385). In 1904, the first major subway was launched in New York City (Gallion).

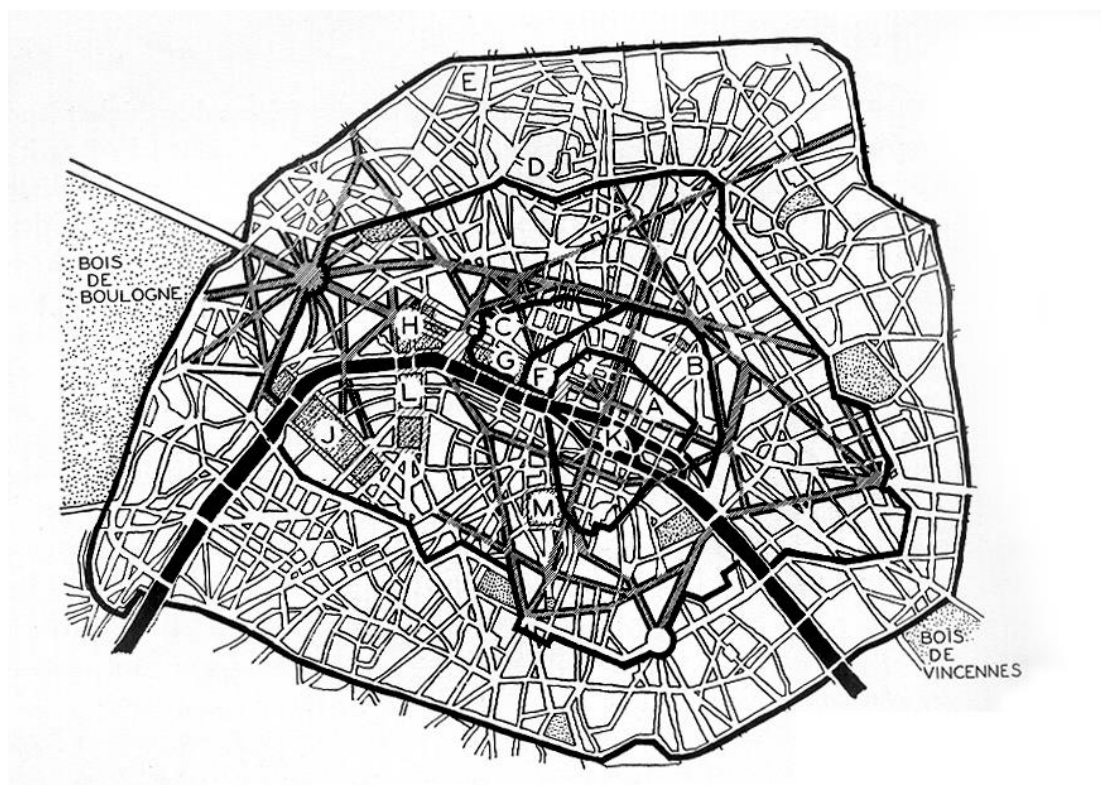


Figure 2.26: Paris, different infrastructures (Vance).

On the contrary, in Istanbul, the transportation network developed as four interconnected systems of water transportation, horse-drawn tramways, a short subway and trains. The need for communication across the water resulted in the development of an early transportation system and sea traffic had become quite dense in the nineteenth century. In addition to the small private and public boats, new scheduled ferries established a new network on the Bosphorus and connected two sides of Istanbul together and it ultimately developed into a broad network that would become a major public service. Additionally, during 1860s, tramways were

constructed in order to facilitate the land transportation and they connected the inner neighborhoods to each other. A 1896 map demonstrates only three short lines on Istanbul side: Eminönü - Aksaray, Aksaray - Yedikule, Yedikule - Topkapı. The tramway made the districts livelier and helped the westernization process by facilitating the modern urban life (Figure 2.27). In 1913, the first electrical tramway reached to Sisli. There was also a short subway in Galata district. Through the implementation of the fourth network, the first railroad line which ran from Haydarpasa to the town of Izmit was completed in 1873 on the Asian side. On the European Side, the link between Istanbul and Edirne was completed in 1875. By the late 1800s, the different transportation systems provided connection points in the city such as Eminönü that was the major node, the terminal point for the trains, boats and trams. Galata and Karaköy were similar (Figure 2.28).



Figure 2.27: Istanbul tram routes in 1800s (Celik).

At this point, in Europe, the baroque principles which Versailles expresses most clearly also used by Baron Hausmann in his restructuring of Paris between 1853 and 1870 (Ellis).



Figure 2.28 Istanbul, 1900s (Çelik).

The industrialization of the 19th century leads to many improvements in the infrastructure of the cities. Following the Industrial Revolution, cities have gone through radical changes. The ideas of standardization and mass production led to rapid transit development of electricity trains and subway systems. Populations immigrated to cities with factories and new markets which were then accessible by railroads and steamships. Many technological advancements such as the development of internal rail transportation systems effected the urban design overall, by expanding the radius of the urban settlement, creating suburban areas around the centers. In 1830, horse cars were emerged, in the 1870s cable cars and, by the 1880s electric trolleys were used as transportation means (Ellis). In 1850 a comprehensive railway network was assembled in New England. Through the

canalization of the rivers and construction of railroads, a new system of urbanization based on innovative transportation networks was developed (Vance, 368). As a result of the emergence of this new type of network, vast cities of complex economic structure appeared in Britain (Vance, 368). The suburban villa districts appeared serving Stockholm and Vienna after the establishment of the rail services there. Interurban lines of Tokyo's Meiji-era had designated the future direction of suburban expansion in 1880s (Kostof, 60).

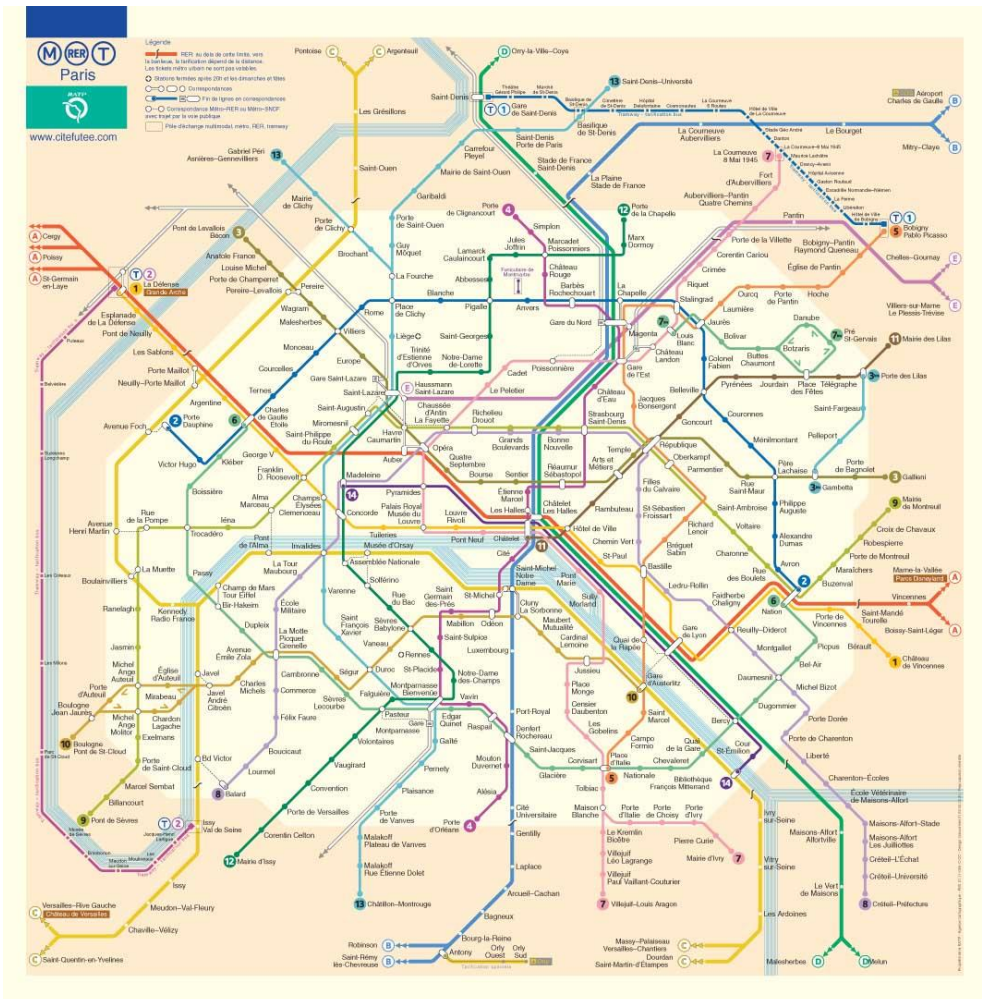


Figure 2.29: Paris Subway Network

In the United States, the railroad led to the formation of two types of settlement not met in colonial era: the industrial satellite and the suburbs which were occupied by the excess population of the city. Small-scaled suburbs had also existed in medieval cities and they emerged around Paris and London once again after 1830 when omnibus lines provided intra-urban transportation (Vance, 369). In North America, both the United States and Canada, the suburb was clearly the creation of the railroad

which brought forth a fundamental morphological shift (Vance, 370). This shift changed both the prince's capital and the merchant's town into modern metropolis. In London, in 1863, the first subterranean line was inaugurated (Vance, 384) and the lines connected most of the financial and recreational centers in the city, creating the origin of the advanced subway system of today. In New York, steam drawn elevated trains were constructed despite of the environmental objections. Both underground and elevated transportation lines were costly projects suitable for big cities (Vance 385).

The appearing problems of pollution, crowding and disease in the center, increased the desire to move to countryside. By the 1830s, railroads enabled the upper middle class to come to the city center. During 1890s, cheap urban transportation by electric trolleys, subways (Figure 2.29) (Walker), and elevated fast transit lines was also provided (Ellis). The Trans-Siberian Railroad in the old U.S.S.R. is the longest railroad in the world, stretching 5,787 miles from Moscow to Vladivostok on the Sea of Japan; a journey which takes eight days. Its construction (1891-1916) had a dramatic effect on the development of Siberia (Holiday).

In 1880s, the first central power plants start to produce electrical power supplying energy for big cities. Telegraph and telephone networks helped the expansion of the concentrated urban activities to broader areas and marked the initiation of electronic communications era and the process leading world-wide integrated digital network has got started. By 1900 over two billion telephone conversations a year were transmitted through the Bell telephone system alone (Cotton, Oliver).

Trolleys and the railroads systems were concentrated in the city center which was still the focus of the industrial city with its entertainment and commercial activities. The working class usually habited close to city center, adjacent to their workplaces. The working class spread to the countryside when the steam railroad was joined by the electric car line with affordable fares, triggering a mass immigration towards the suburbs. Later on, the subway system multi laterally affected the urban morphology. The shift from trolleys to private automobiles in 1920's led to rapid extension of hard surface roads. However, by the availability of the steam power in 1930s, factories started to be established in the cities in proximity to the port facilities, rail lines and labor force (Ellis).

After the rapid growth and industrialization and the following 'modern' problems of pollution of the nineteenth century, the connection between impure water and disease was recognized, encouraging the installation of adequate sewer and water systems in American and European cities. They were also provided by lines of electricity, gas and communication signals (Ellis). Beginning of the 1880's, American cities began to construct sewers, and by 1910, most had some sort of system (Blake).

New York, Philadelphia, and Boston in 1920s represented the commercial city with their crowded, mixed use regions (Ellis). During the twentieth century, following the production of automobile as a private mode of mass transportation, the centers of the American cities have evolved into information processing finance and administration rather than manufacturing (Ellis). The metropolitans in particular needed the automobile highway system. As the railroads in 1850s and electric traction lines at the end of the 20th century, superhighways began to shape a new urban morphology.

The car changed the nature of the traditional city, proceeding to a fast relocation of many central functions to new sites within the suburbs. Industry began to leave the city (Vance, 455). Manhattan symbolized the abandonment of the Colonial, pre-capitalist closed grid which had firm boundaries of topography and an absolute design and adopted the open grid of the new Republic Era. The open grid of the capitalist economy had a capacity of unlimited expansion. The relative newness of city grids made the transformation to metropolitan scale easy (Kostof, 1991, 121). As a result of the common use of automobiles, traffic problems appeared and it was followed by enlargement and improvement of roads (Vance 451). Limitless increase in modern city traffic was the most accepted acquisition of the grid. According to the estimate in 1933, the automobile had tripled the radius of the metropolitan region and the traffic flow nine fold (Kostof, 1991, 153). The volume of traffic jam increased worryingly.

Employees of the finance sector had begun to travel on a network of urban free ways built during the 1950s and 1960s. Vast urbanized regions were emerged with the connection of separate districts by long highways (Ellis). In 1950s, the construction of the largest public works in American history, the Interstate Highway System, which connected all major cities of USA had begun. The main worries caused the abandonment of the grid, leaving its place to modernist superblocks bounded by

major traffic arteries. In International Congress of Modern Architecture, or CIAM's 1933 paper, known as the Athens Charter; it was stated that traffic flow and its design was the primary determinant of the city form (Kostof, 1991, 153). City center has become the new district for offices, hotels and convention centers. More recently, offices which do not need a central location have been placed to office parks in the suburbs. Today a larger part of the population lives in suburbs (Ellis). The U.S. highway network connects with the other highway networks of Canada and Mexico through the three networks spanning the whole North American continent (Figure 2.30).

‘In the middle ages, the city was shaped according to the principle of 4 km of walking when the garden cities of 1920s were being conceptualized, their development was on the basis of 20 km of cycling. However, the city limit grew drastically with the introduction of automobile to the city. The city then expanded to the limits of one hour driving which consequently resulted in a 80 km territory.’ (Metacity).

At this period, in the republic era of Turkey, many foreign consultants were asked to prepare different alternatives for the urban design of Istanbul. At this stage, French architect and planner Henri Prost who stayed in Istanbul from 1936 to 1951, played a crucial role. Main arteries he proposed are still in use today. Prost mainly contributed to the ‘beautification’ of Istanbul by proposing main arteries, urban gardens and series of open spaces (Figure 2.31).

In 20th century drastic improvements took place in transportation field. The narrow earth path transformed into the broad, straight, modern highway. Since the automobile, the airplane, the Diesel locomotive and electric powers have introduced a totally new dimension for the urban pattern; consequently all cities have gone through a complete transformation. In lots of cities grand boulevards confronted the conflict of being turned into traffic arteries. The streets built for ancient purposes were seek to be used as means for modern traffic.

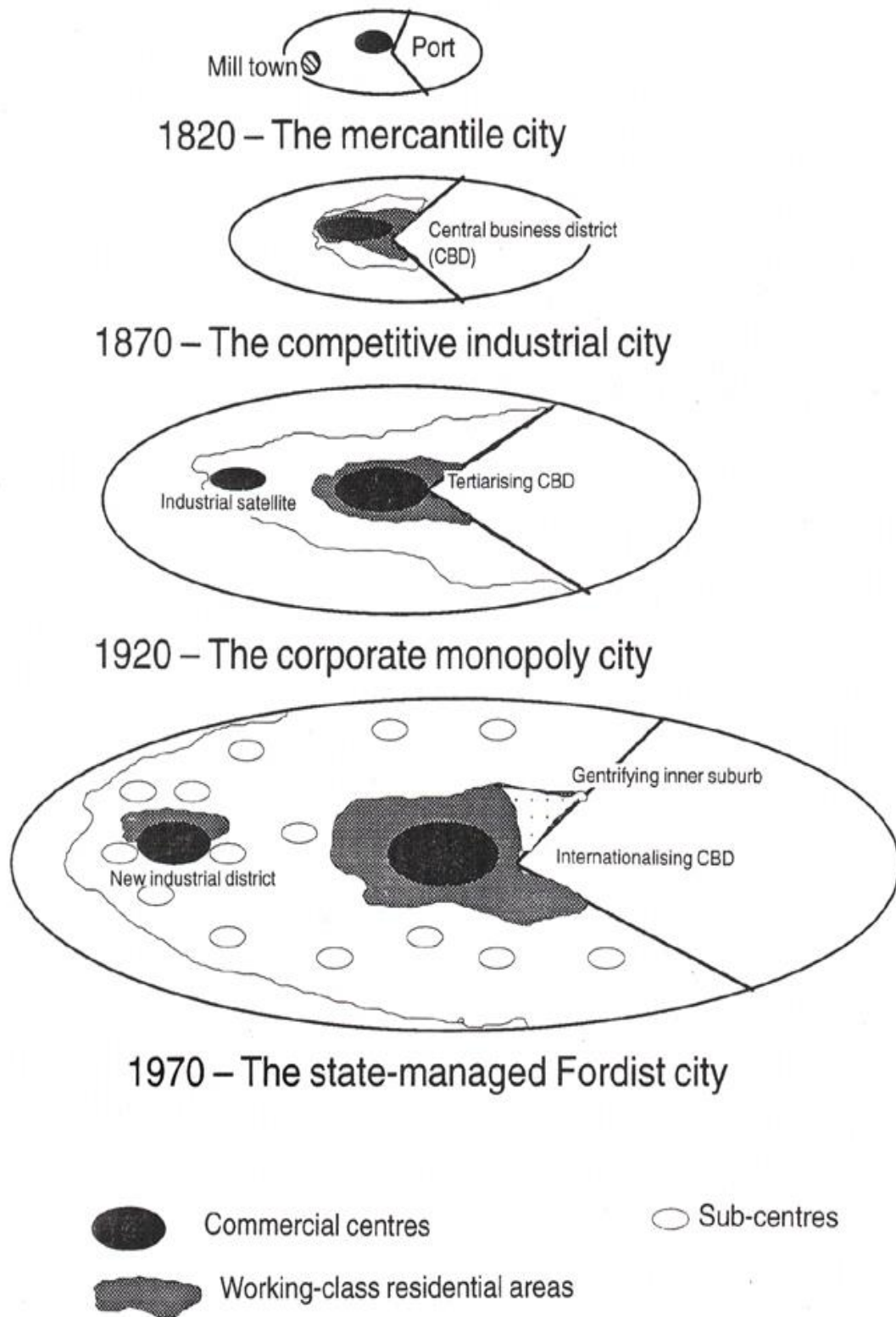


Figure 2.30: Evolution of urban form of a North American City 1820-1970 (Graham Marvin, 1996).

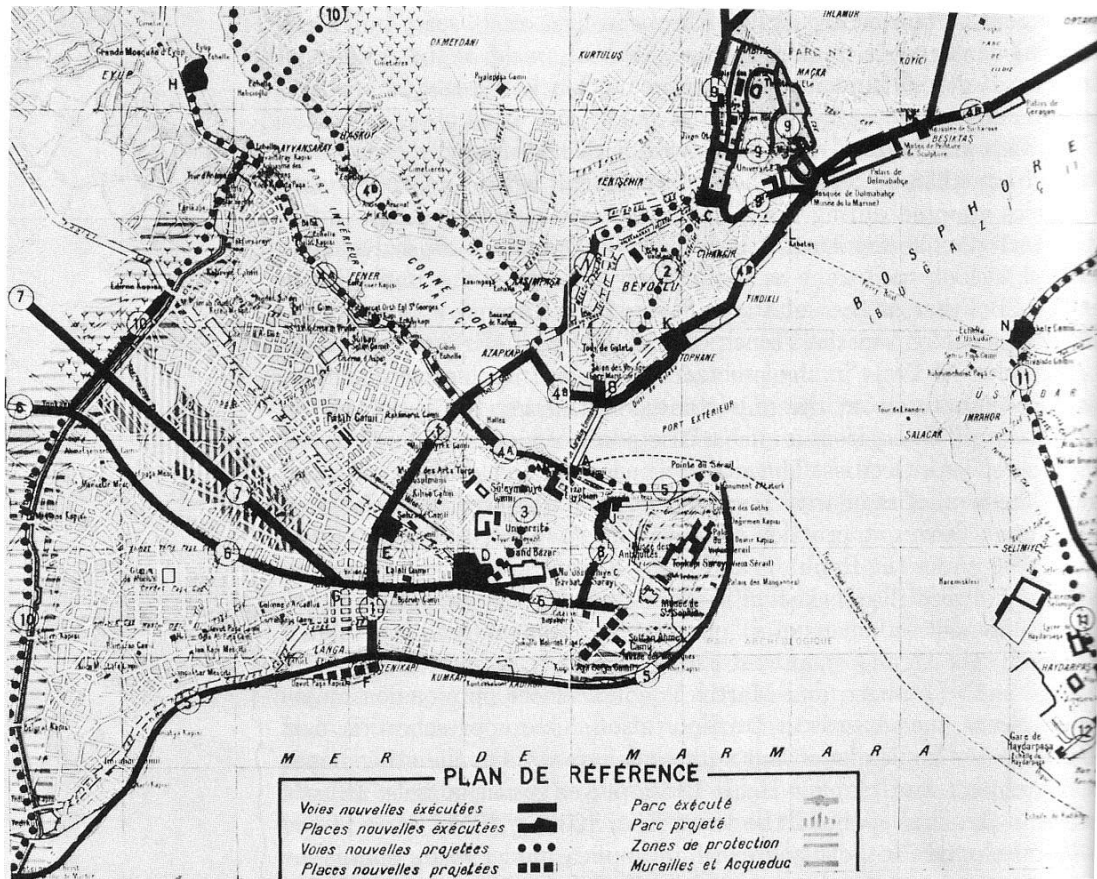


Figure 2 31: Prost Plan (Celik).

After the Second World War, European cities transformed with a new infrastructure based on automobile and which was developed in order to maintain the standards of mobility. Le Corbusier's Plan Voisin foresaw a new city in which all scales of infrastructure were enlarged as a consequence of automobile and the differentiating scales.

At Chandigarh, which was planned in 1951 by Le Corbusier, the residential pattern is set according to the interpretation of green landscape and a grid pattern of primary roads defining superblocks. The blocks are oriented inward, so the traffic roads do not have much street life. The crossing of the two main axes forms the civic center just like the forum in Roman grid. Le Corbusier geometrized the major streets and classified them according to the 'seven V' system, 'sept voies' which he thought to be universally applicable. In the seven V sequence, V1 represented a regional road and V2 a major urban artery. V3 was aimed to carry fast traffic around residential superblocks while V4 provided a commercial street. V5 and V6 streets would supply access to individual dwellings. Lastly, V7 would maintain pedestrian circulation to schools, clubs and sport areas. A schematic residential superblock 800 meters by

1200 meters in dimension, containing a grid pattern of streets combined with park bands was also a part of the scheme (Evenson).

In the process of metropolization, expropriation and demolition on a massive scale, reconstructed the urban block patterns like Hausmannian alterations in Paris. In Vienna, Berlin these methods were extensively used (Kostof, 1991, 150).

The metropolis model as a limitless, gridded city established its dominance widely around especially in the capital cities of Europe. In 1858, around the old city of Barcelona, Ildefonso Cerdà has laid out an unchanging grid sliced by supergrid of boulevards (Figure 2.32). According to him *‘the square block is the clear and genuine expression of mathematical equality which is the equality of rights and interests of justice itself’* (Kostof, 1991, 152). The city began to get decentralized. Since it was easy to go to suburbs or distant places by automobile, people began to move and new suburban towns appeared.

Besides the structural advancements and alterations of transportation, political and philosophical shifts of ideological mainstreams modified the organization and integration of urban networks. The use, functioning and the management of utility networks expressed a specific thinking process in many ways.

Before World War I, in Industrial era which was primarily characterized by extensive serial production and mentioned as *‘Fordist City’* (Graham Marvin, 1994), innumerable small utility networks were constructed. These were closely related to the urban economies of the period (Graham Marvin, 1994).

Between two world wars, in the era in which mass production and consumption society evolved, the scale of the utility networks developed into regional, even into national scale and they were technologically improved. The rising nationalist movement reflected its impacts also on the urban structuring as in all other fields. The characteristics of the Fordist era appeared even in the structuring of the networks which constituted the city.

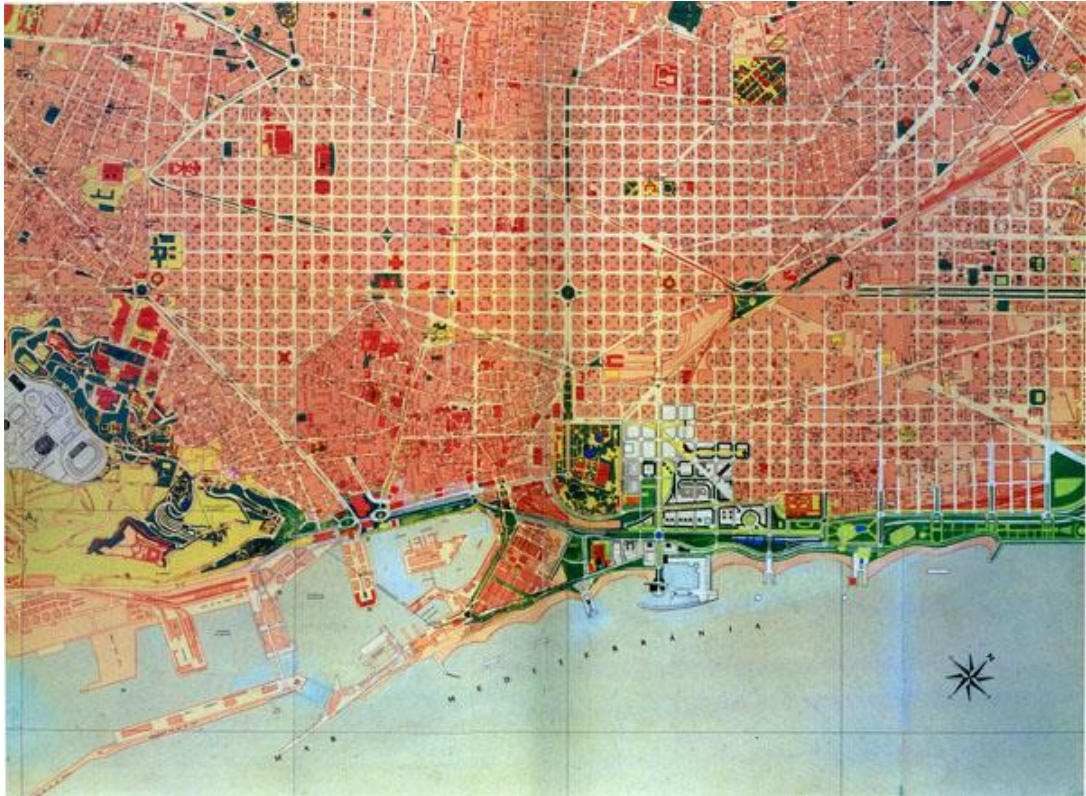


Figure 2.32: Barcelona Layout (Dodge, Kichin).

From then on, 'standardized' energy and water started to be distributed through 'national networks'. This nationalist character of the era, integrated cities into a 'nationalist' urban system and standardized the economic and social developments. This structuring which evolved around a centralist administration, took away the networks which have become the central nervous systems of the country away from the control of local administrations and organized them under a single nationalist development ideology. Thus, in the process of modernization, the 'threat' of scattering and chaos was vanished and it was planned that an egalitarian system in all aspects can be created by obstructing the effects of geographic and economic differences on the structuring of the cities. A central organizational network was emerged out of the local network systems.

The domestic access to telephone, electric, water and gas services was a natural social right and the development of the utility structures became a part of a wider development programs. In for dist era, the improvement of the utility systems has the priority in the urban development plans. The movement towards the mass production and the consumption of standardized consumer goods; the integration of disparate cities and localities into functionally integrated national urban systems; the

development of multi locational firms; and the sub urbanization of cities were all reliant on the new capabilities offered by nationally integrated utility networks (Capello and Gillespie, 1993; 26).

In 1950s, a comprehensive reconstruction and regularization projects were implemented in Istanbul as a result of monopolist, nationalistic policies. Lots of boulevards and main arteries that structured today's road network such as Sirkeci-Florya seafront road, Eminönü-Üsküdar road, Barbaros Boulevard and the widening of Karaköy-Dolmabahçe traffic artery, Vatan and Millet avenues were the products of this period which immensely manipulated the urban pattern. The problem of unplanned construction and implementation of serious project without careful analyses resulted in deterioration of the traditional exceptional pattern of the city. As a result of incorrect policies the sea and rail network were not improved efficiently and the subway was not built until 1990s. Automobile transportation network gained the priority. Since the roads were constructed without any major plans, the nodes formed in later years such as the junctions where old and new networks that coincided with them created further problems in transportation (Figure 2.33).

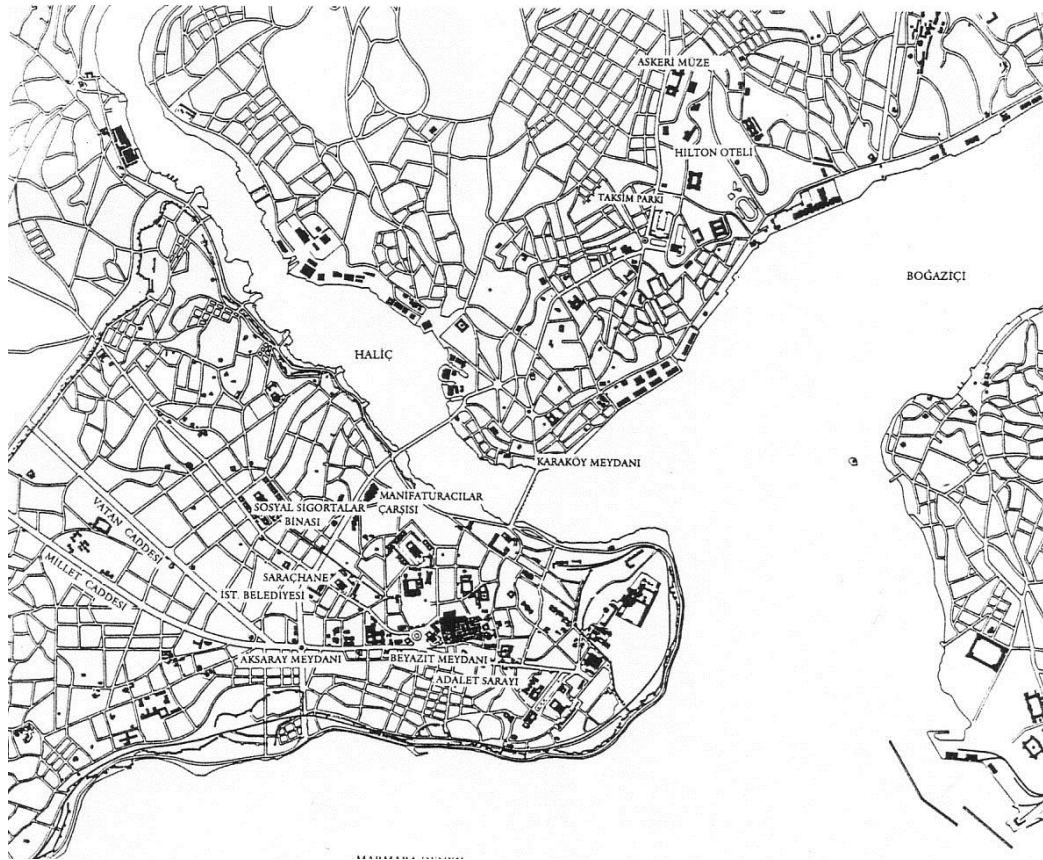


Figure 2.33: Istanbul 1950-1960 (Çelik).

Today, the destruction of the monopolistic principles of the Fordist era together with new structural process brought up by the flexible approaches of globalization and privatization have changed utility networks functionally and structurally. National monopolies are rapidly being replaced by regulated market forces operating at local, regional, national and international scales. This modifies again the location dependence of utilities and reorients the relationships between utilities, and urban development. Utilities have moved from public domain to private domain. Cooke has described this epoch as ‘*era of global-localization.*’ (1992)

The conjunction of various units of different network systems and different spatial layering creates a new structure which becomes the foundation of global network systems in which a vast group of initiatives look forward to produce brand new projects. Multinational, dynamic initiatives which are in a constant competitive progression have replaced the former monopolistic administrations and established international co-operations.

By the mid 1980's, all western national states reconfigured their entrepreneurial actions in order to have a role in the production of geographically global infrastructure (Graham Sassen, 2002, 72). Such an inclination resulted as privatization, liberalization, and development of public infrastructure by private sector in strategically important city regions. This eventually lead to a strategy of development of connective infrastructure which links the global city centers that totally differs from the idea of development of the modern ideal where the aim was the homogenization of the space on a national scale.

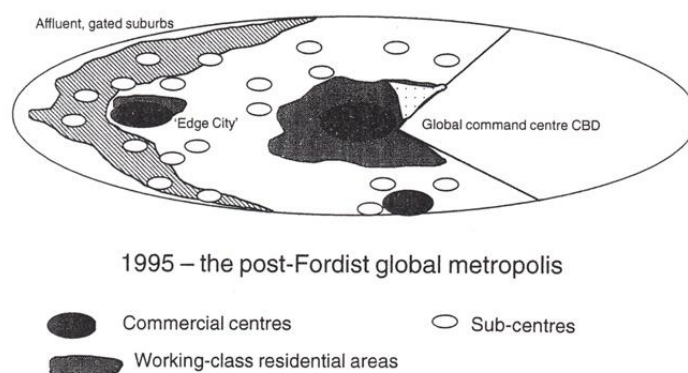


Figure 2.34: Post Fordist global metropolis (Graham Marvin, 1996).

Now the city struggles to become a node in the global network of cities. The shift in the global economic, social organizations modifies the territory-based place into a

node of the new global world. The transition from the local to the global space is mostly realized through the network system of highways that link the global world (Figure 2.34).

Today, a new era of urbanization has arrived beyond metropolis. The former metropolis has evolved into a multi-centered urban region. Each of these centers have undergone a different urbanization, forming what the geographer Jean Gottman termed "megapolis."

2.3 Social and Cultural Networks

'The history of communications is not a history of machines but a history of the way the new media help to reconfigure systems of power and networks of social relations'.

Murdock, 1993

A social network is a map of the relationships between individuals, representing their connections of various social familiarities ranging from casual acquaintances to close familial bonds. In social networks, people and organizations are being linked. Social networks view social relationships in terms of *nodes* and *ties*. Nodes are the individual actors within the networks, and ties are the relationships between the actors. There can be many kinds of ties between nodes, depending on the relationships that is being studied; therefore, a social network is a map of all of the relevant ties between the nodes which describes the process of connecting individuals via friends, relatives, and acquaintances and indicates a person's 'personal network' (Figure 2.35, 2.36).

In the old times, communities were place bounded, so that most of the interactions occurred within their gates rather than across them. Such communities had door-to-door connectivity. Although people had commonly walked while visiting each other, they sometimes traveled on horses and on carriages. The significant point is that people physically went through villages and neighborhoods in order to communicate. Most people in a settlement, who knew each other, were restricted by their feet power about people they could get in touch with. The acquaintances were essentially between households of the settlement.

Some inequalities were present in such door-to-door communities. Every individual in different neighborhoods had access to different resources. Neighborhoods were dense and compact within themselves and that made the control of both the people and the goods easy. The speed of communication which was accelerated by the telegraph was even more effective than the increased speed of transportation. The huge boost of speed with the use of Internet turned most community relations into place-to-place or person-to-person interactions (Wellman).

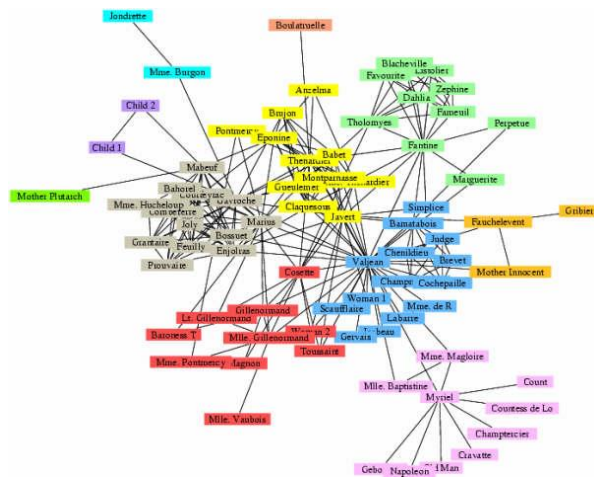


Figure 2 35: Map of a social net work

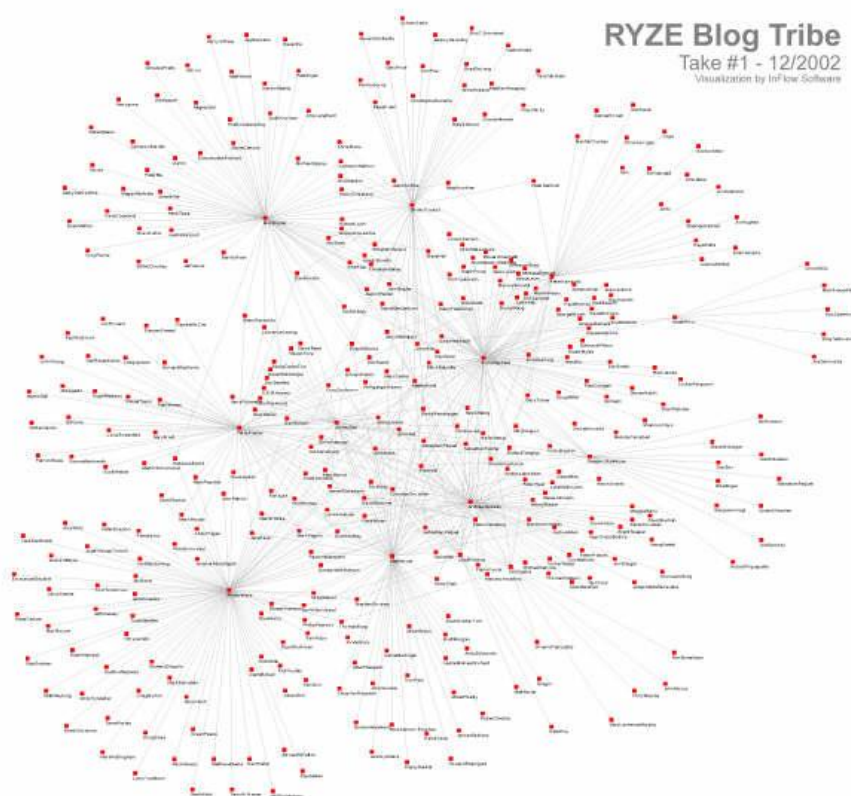


Figure 2 36: Map of a social net work

Although people continued their relationships through phoning, writing, driving, it can be observed that most citizens have little interpersonal relationship with their neighborhood and most of their communal interactions have moved inside the private households. Prevalence of network rather than groups has crucial effects on communities. For example, networks facilitate the ability to connect simultaneously to multiple social settings, reduce the control exerted on individuals, assist in reestablishing ties between people who had not seen each other for a long time and integrate different social settings. Networks also give preference to the intellectual specifications and interests of people instead of portraying age, gender, race characteristics which may cause prejudices.

Today's information has penetrated nearly in every aspect of a contemporary citizen's daily life. Televisions that became an essential part of society's life since 1950s had got sophisticated with advanced satellite networks serving through hundreds of channels from all around the world. Radio outputs now function everywhere, conducting all kinds of information. Movies which were once available only in theatres recently became obtainable at homes. Personal computers provide us limitless information through network connections.

Castells argues that the 'information age' declares 'a new information society' which is developed by the growth of networks (Castells, 2000, 693). He asserts that the society is living through a transformation towards an 'information age' that is marked by the expansion of networks that connects people, institutions and countries. He examines both the positive and negative consequences and how the network society exacerbates divisions between rapid integration of global affairs and heightened social divisions (Figure 2.37).

Although there are divergent opinions about the information and characteristics of information age, there is a common agreement that information is also central to the present social systems with its perpetually ascending usage and dominance.



Figure 2.37: The Network Society map (Dodge, Kitchin)

2.4 Informational Computer Technologies (ICT) and Telecommunication Networks

The epoch we live through is dominantly marked by the innovative informational computer technologies that lead all aspects of contemporary life towards a more advanced level of civilization. Informationalism is defined as the main source of productivity (Castells, 1996, 17) and it leads to a 'new economy' as well as to a 'new society'. Perpetual informational developments and correlated advancements alter the daily life, business transactions, international relations and orders in a way that is evaluated both as positive and negative by different opinions.

In this section, after defining certain terms and notions about informational computer technologies, innovations and recently emerging concepts such as the Internet, cyberspace, simulation will be introduced. Then in the last part the general reasons of the rapid and continuous growth of informational computer technologies will be discussed briefly.

2.4.1. The Definition And The New Terminology Emerged After Information Computer Technology Networks.

‘The only organization capable of unprejudiced growth or unguided learning is a network. All other topologies limit what can happen.’

Kevin Kelly

Information network is defined as a system that links computers and other information and telecommunication technologies together, either by cable or by ‘wireless’ (radio or optical means) so that they can exchange information (Cotton, Cliver). It is also referred as a ‘digital infrastructure’ of telecommunications which describes a network of glass fiber, copper wire, and invisible radio signals intermingled with specific computers that guide the flow of information. The services and infrastructure which link computer and digital media equipment over telecommunication links is referred as ‘telenatics’, following the French word ‘*télématique*’. Telenatics provide the technological base for fast innovation in computer networking and voice, data, image and video communications. The connections and computers function together to conduct the flows of digital bits that carry all information and communications, whether voice, video, or computer data like World Wide Web pages from the Internet (Niles). And hence, the arrangement of interconnecting transmission lines and switching nodes in a network constitutes a network topology.

In informational networks, the traditional copper and coaxial cable links are being supplemented or replaced by optic fiber, wireless, microwave and high efficient satellite systems. The capabilities of optic fibers are awesome: each hair-like strand can now accommodate up to 60,000 simultaneous telephone calls (as opposed to 6-7,000 for a much wider coaxial cable) (Graham Marvin, 1996) (Figure 2.38). Four levels of telecommunication infrastructure have been developed in cities. First, there are wireless and mobile telecommunication systems which link telephones and computers to fixed telephone systems. Second, there are broadband cable networks that are built basically to deliver cable TV to residents. Third, there are new satellite infrastructures, through which high-speed data communication, mobile phones are

being developed. Lastly, there are microwave systems which support short-distance transmission for voice, data or TV services (Graham Marvin, 1996).



Figure 2.38: Fiber Optic Network (Dodge, Kitchin).

Informational network may be organized in different levels such as Personal Area Networks (PAN), Local Area Networks (LAN) which is a type of communications network that connects computers and other devices over a limited distance such as within a building or Wide Area Networks (WAN). WAN is a computer network that interconnects terminals at many sites over very large (national or international) distances, using existing telephone networks. The advanced WANs of today enables people to remote shopping, distant learning and provides medium for all kinds of data exchange. In order to facilitate the transmission of digital data such as interactive images, data, video and audio services over telecommunications networks, a set of standards, Integrated Services Digital Network (ISDN) is developed. High-speed *broadband* is now the desired quality standard for digital infrastructure.

To apprehend the architecture of global networking technologies, social, and economic forces, historical conditions under which new advances are introduced, institutional laws, key decision makers and their higher aims should also be taken into account. The exponential growth of technology marked by the perpetual

discoveries of transistor (1947), the integrated circuit (1957) and the microprocessor (1971) (Castells, 1989, 12). And followingly, the computers lead to revolutionary developments in information systems in the last three decades. Using the information technologies such as computers for design has evolved through four phases. The initial step was taken by the development of Sketchpad by Ivan Sutherland at MIT in 1965. For the first time, a three-dimensional computer generated image appeared on the screen. The second step was taken in 1980s by the improvement of the studies of artificial intelligence and the main target was the efficiency of design and the effective interaction with computer. After these two generations of design mostly based on two-dimensional sketches with layers, the third step introduced the true third dimension in the virtual realm. After realizing the realistic and interactive possibilities of virtual space, the creation of purely virtual design became a target of its own besides facilitating the production of plans. Architecture and design were among the first areas where virtual reality technology was utilized. In 1989, the first virtual reality application for personal computer was applied by Autodesk, California CAD software enterprise.

In cities, informational networks are physically maintained by optic fiber grids. Optic fiber grids in the business centers of global cities function adequately only if they are seamlessly connected to international urban systems. For this reason, today, many international telecommunication companies invest enormous resources to establish the satellite and optic fiber infrastructure imperative to link certain international regions together into a highly connected communications landscape. These transactions mostly focus on three global areas: North America, Europe and East and Southeast Asia. Recently, transoceanic and trans terrestrial optic fiber and satellite capacities focus on linking North America across North Atlantic to Europe and across North Pacific to Japan (Sassen, 2002, 87). Digital networks can extend much further than the networks of the past. Indeed, wireless systems, both terrestrial and satellite are now providing a new way to reach even rural inhabitants. Satellite telecommunication systems are not affected by the geography at all and can service more economically to low-density areas.

One investment, for example, known as FLAG (Fiber Optic Link Around the Globe) maintains a new ultra-high capacity, (120,000 simultaneous phone calls, which will be 28,000 kilometers long, expanding from London to Japan via various metropolitan

regions. New York leads all the world cities with nine separate optic fiber infrastructures. London was the most competitive city outside the USA with six separate optic fiber grids. The other cities that work to follow are Stockholm, Paris, Sydney, Hong Kong, Frankfurt and Amsterdam.

The city of London uses roads, canal pathways, of hydraulic power ducts, underground railway tubes, sewer and other utility ducts as a medium for the extensive electronic infrastructure. Eventually, these urban networks connect into transatlantic and transglobal optic fiber grids and augment the quality and order of trans-global connectivity. Besides optic fiber networks, London possesses many satellite data and voice facilities, microwave communication grids and many service operators from all over the world (Sassen, 2002, 85).

Castells indicates that the new information technologies differ from the previous ones in two aspects: Firstly, the quintessence of the new technologies is focused on information processing which means that both the raw material and the outcome is information (Castells, 1989, 13). Computers organize, store, and rearrange information while telecommunication transmits it, eliminating the barriers of distance and time. Secondly, the other major specification of the new technologies is the fact that the essential impact of the impacts on processes rather than on products (Castells, 1989, 14). As it was the new energy source, the electricity that led the development in the industrial age, through the current informational revolution, recently discovered products all serve the ultimate aim of the process itself. Since processes, unlike single products, penetrate all aspects of human activity, they consequently conduct towards fundamental restructuring in social organization, altering the means of production, consumption, management by flows of information. About the fact that new technologies aim towards information processing, Castells argues that since information is based upon culture, the target of information technologies is to establish more interactive relationship among the society and scientific knowledge.

Telecommunication networks consist of various connections of individuals, institutions and technologies which maintain means to process and exchange of information. Networking technologies greatly affect the communication process by altering the speed and cost of communication, the distance that information can travel, the amount of intelligence that can be transferred and the perceptions of the

sides communicating. Nowadays, many new concepts have emerged with these innovative technologies and every one of them open up new perceptions for the users. Some of these important concepts are studied in the next part of this section.

2.4.2 Emerging Concepts of Information Computer Technologies

Information Highways

The 'information superhighway' metaphor which goes back to 1998, indicates the dense information carrying networks that are established to link various places around the globe just as concrete highways physically carry goods from one place to another. Yet, there are some differences between regular highways and information highways. Highways, for example are planned as fixed entities whereas information highways are self-organizing and have no central power, with a constantly changing configuration. Various proposals claim that these national and international high bandwidth communication networks which are also termed as 'data superhighways' will play the same role in economic development that canals, railways and roads have done in the past. Bandwidth is an arrangement of frequencies that can pass through a transmission channel, limiting the amount and quality of information such as video and audio data that can be transmitted between hardware systems (Cotton, Cliver) and the transmission capacity of a system. '*Information Superhighway*' is based upon a stronger metaphorical figuration: it is a virtual topography in which speed, motion and direction become possible, unlike the simple telephone conversation or television.

Networks of information systems and optic fiber infrastructure of communication is to the present digital technology as networks of railways to the industry of the eighteenth century. As the industrial revolution has changed the course of the history, the information revolution in which the present era lives through is also altering the basic foundations of the global society. Just as transport networks facilitated the suburb and the commuter, so data networks will expedite the 'telecottage' and the 'telecommuter'. Apart from technologies that process, transform, conduct information, digital industries are formed by the synergy of media, telecommunication and computers.

The development of data superhighways, like the transportation networks before them, would have important effects on lifestyle. The data superhighway which is emerged mainly in USA, now started to span around the whole industrialized world.

Cyberspace and the Internet

Cyberspace: A consensual hallucination experienced daily by billions of legitimate operators, in every nation ... A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding.

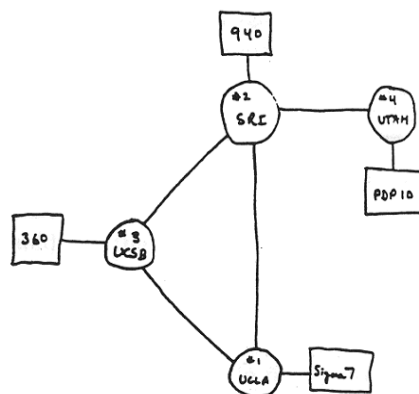
William Gibson, *Neuromancer*, 1984

The term cyberspace literally means 'navigable space' and derived from the Greek word *kyber* (to navigate). In W Gibson's 1984 novel *Neuromancer*, the original source of the term cyberspace refers to a navigable, digital source of networked computers accessible from computer stations, a visual, colorful, electronic datascape known as 'The matrix' where individuals interact with information. After *Neuromancer*, the term redefined many times, but always referred to emerging computer-mediated communication and virtual reality technologies. In the dictionary of 'cyberspace lexicon', cyberspace is defined as 'the virtual space of computer memory and networks, telecommunications and digital media, created by the global network of telephone, satellite, communications and computer networks, interactive cable television, ISDN and internet quantum space of microchip, electromagnetic and digital optical storage technologies.' (Cotton, Oliver).

The initial steps of cyberspace were taken by the generation of telegraph network in 1830s and expanded rapidly by the development of the telephone. In 1920s radio waves were also included in these set of networks and the years 1930s introduced cables that carried television signals. The newest innovation about the cyberspace emerged after the connection of computers to the telephone system. And soon, the computer networks proliferated drastically creating mail systems and many kinds of information exchange facilities. In 1960s, money became digitalized and started to flow in networks of banks.

It was the year 1969 when the first long distance computer network ARPANET (Advanced Research project Agency Network), exponentially grew and covered the

whole world. It was firstly developed for defense reasons by the US Department of Defense. The Internet and virtual reality both initiated by ARPANET. In April 1971, there were 23 ARPANET nodes (Figure 2.39, 2.40, 2.41). In 1983 the ARPANET was divided into two separate networks of MILNET and ARPANET (Figure 2.42). MILNET was used for military purposes and ARPANET was used for research and educational purposes. MILNET remained connected only at a small number of gateways for exchange of electronic mail that could be easily disconnected for security reasons if required. After the foundation of two other firms, the development speeded up and more and more networks were connected to Internet and by 1993, it included nearly 2 millions of computers in more than 130 countries (Mitchell, 108). Email was a key development on ARPANET by which the users of a common machine could leave messages for each other and thus exchange information. In 1970, Ray Tomlinson wrote the first programme that enabled mail to be sent across a distributed network. The programme quickly distributed to ARPANET sites (Dodge, Kitchin, 9).



THE ARPA NETWORK

DEC 1969

4 Nodes

Figure 2.39: Topological map of ARPANET 1969 (Dodge, Kitchin).

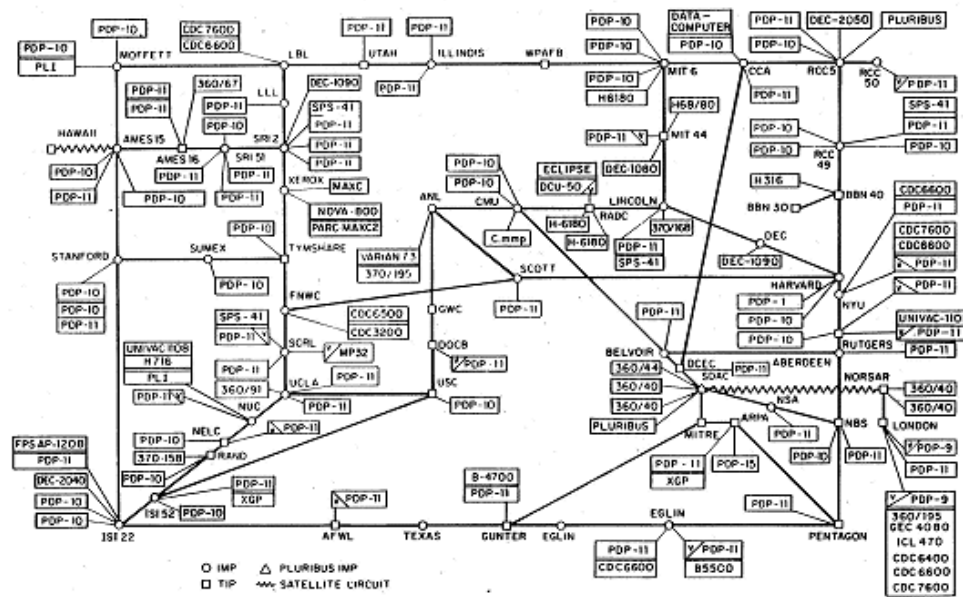


Figure 2 40: Topological map of ARPANET in 1977 (Dodge, Kitchin).

In 1989, the World Wide Web was invented by Tim Barnes-Lee in CERN Laboratory. They implemented a hypertext system to maintain efficient information access to the members of the international high-energy physics community. In 1992, WWW browser was available for download via FTP by CERN. This was the big start for the World Wide Web.

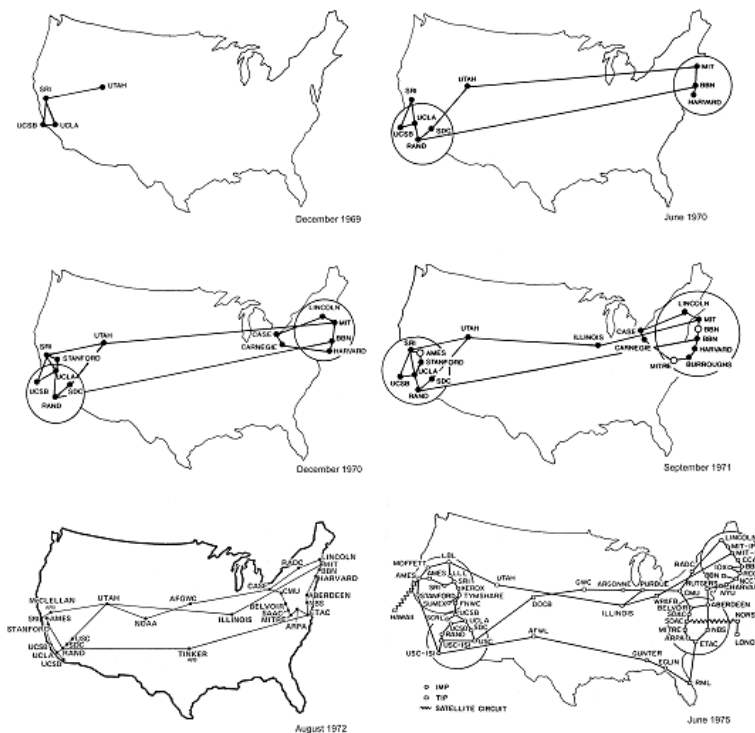


Figure 2 41: The development of ARPANET (1969-1975) (Dodge, Kitchin).

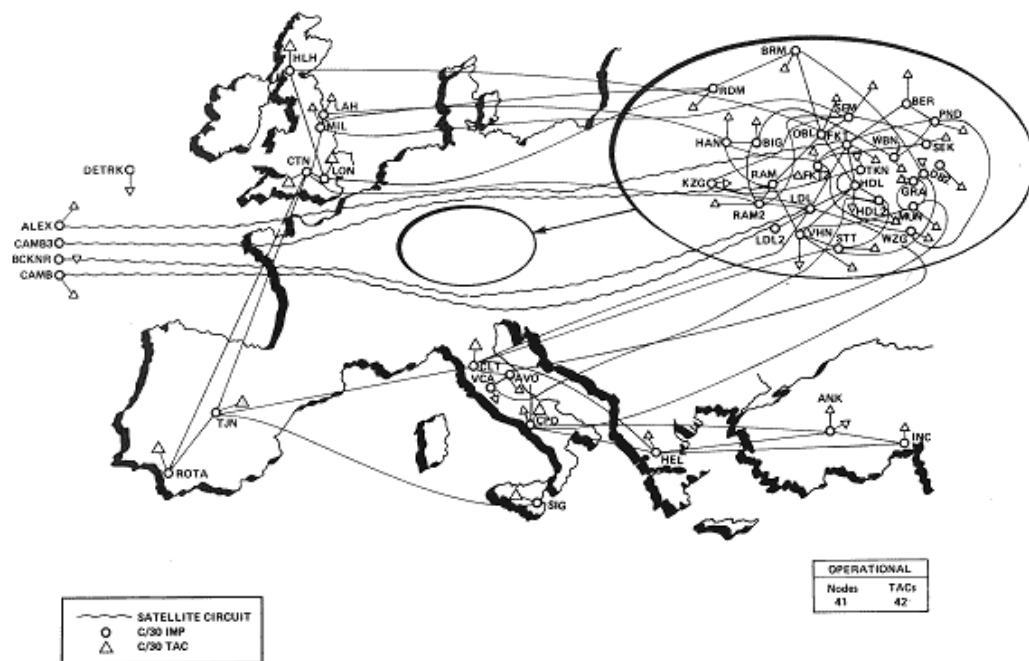


Figure 2.42: Milnet Network in Europe (Dodge, Kitchin).

As the information highways are proliferated and personal relations started to depend on digital systems more, the cyberspace is regarded as a significant component of society's daily life and activities. In 1970s, Marshall McLuhan who had foreseen the erosion of barriers of distance and time by the emergence of a 'Global Village', defined cyberspace in his book *"War and Peace in the Global Village"* as *"an electronic extension of our central nervous system"*

Richard Buckminster Fuller, thought of a computer simulated World Game in which all the physical and informational resources of the planet would be simulated and different alternatives of consumption would be tried out by manifold people connected to the network in order to decide on the best strategy to use these resources. If this kind of a seemingly futuristic idea would be realized, huge steps in resource management would have been taken by the participation and contribution of thousands of people in this common experience.

In a general sense, an internet, which is the shorter term for 'inter-network' is widely and quickly available interconnection of systems of computers linked to each other by 'wires', telecommunication technologies (cables of copper, glass as well as radio and microwaves). Internet, both as a technological advancement and a popular tool can be regarded a form of simulation and creates an alternative world in which we

conduct our lives. The links have various speeds/capacities and some of them are permanent while others are transient, dial-up connections. The Internet is the information and facilities provided which uses a packet switching communication protocol called TCP/IP (Transmission Control Protocol/Internet Protocol) suit. Therefore the largest Internet is called 'the Internet'. Anyone with a computer, a modem and a telephone can connect to the Internet. Almost all of the developed and developing countries are working to establish a dense internet network (Figure 2.43, 2.44).

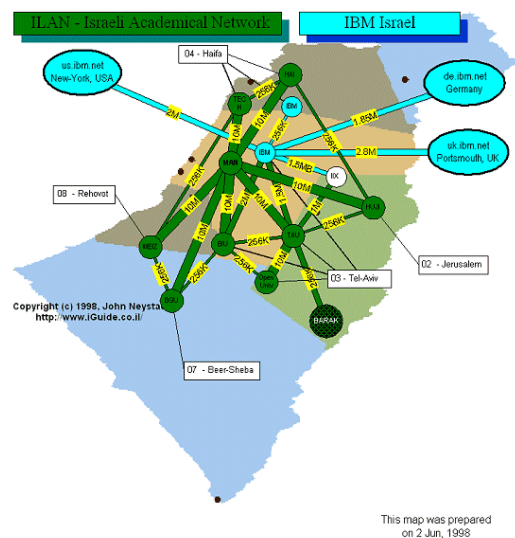


Figure 2.43: Israeli Internet infrastructure (Dodge, Kitchen).

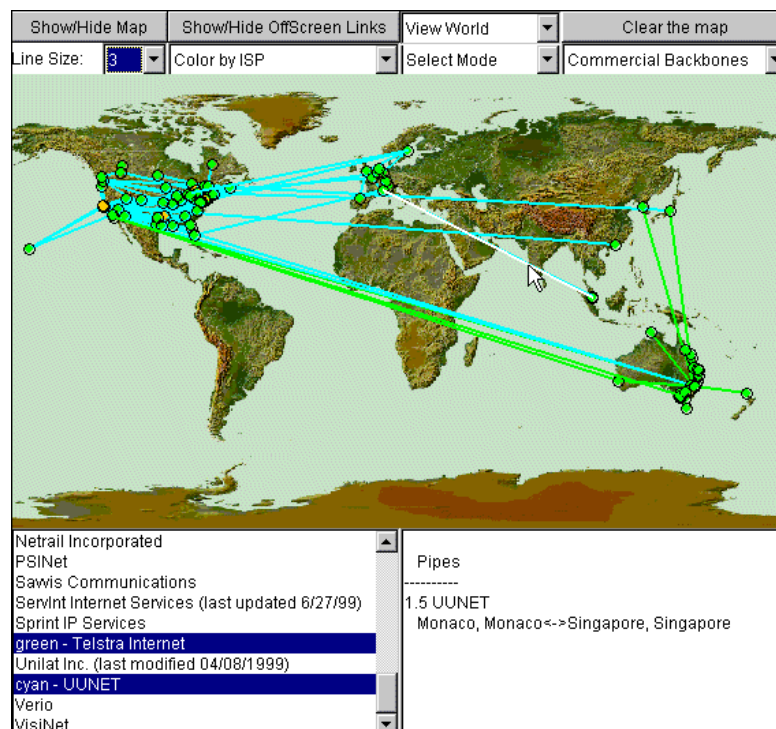


Figure 2.44: Internet infrastructure (Dodge, Kitchen).

The opportunity of information has proliferated immensely by the formation of World Wide Web. WWW consists of multi media data that are mostly texts, graphics, animations, sound and stored as hyper media documents. As the street networks and grids connect certain locations in cities, maintaining transportation; World Wide Web connects all informational nodes and parts on the virtual space and provides a powerful medium to explore, to search, to have fun and to interact. The information can be accessed through using an Internet browser program. Just like doors are used to step inside a home, homepages are thresholds leading into brand new sites to be explored. The challenge is not just to get information but also to expand strategies to access information in a short period of time.

Cyberspace of Internet, which is a visually oriented zone of experience, may flourish the ideals of democracy, egalitarianism and freedom by providing a platform where people meet only with their ideas and thoughts without their physical appearance. Participants of the virtual world can simultaneously collaborate the medium thus become one of the creators. They experience a different unity of the world. Yet, on the other hand, the concept of freedom may reach to questionable limits in promoting thoughts of racism, pornography and various sorts of criminality in the virtual realm of Internet, thus cyberspace (Figure 2.45).

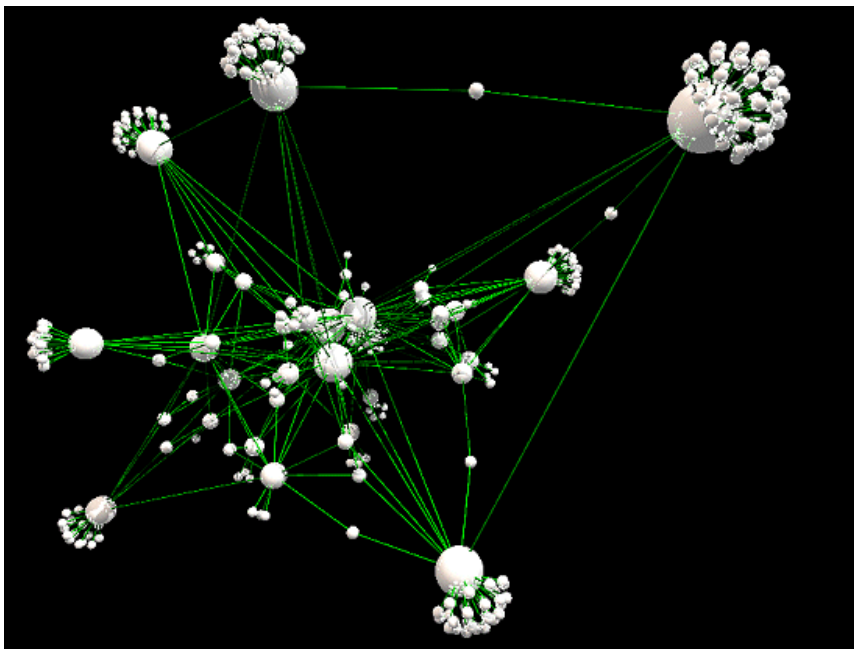


Figure 2.45: Three-dimensional graph visualization Cyber Space (Dodge, Kitchin).

Recently, surfing in the informational computer network has become more essential than driving on a highway network, covering long physical distances. Internet does not just provide electronic shortcuts over long distances by creating certain nodes, but it establishes a whole new simulated world by imploding all concepts of distance, spacing and separation into one point. Baudrillard noted in his comments on computer network technology that, ‘*Telecomputer Man*’ experiences ‘*a very special kind of distance which can only be described as unbridgeable by the body. The screen is merely virtual - and hence unbridgeable*’ (Baudrillard, 1993). As he claims in further, the ‘net’ creates neither a counterfeit world, nor a reproduction. It is a model of a reproducible world limited only with our imagination. He fears that the growing number of simulacra, as with media images weakens our ability to tell genuine from fake.

As Nunes claims in his article, in the virtual world, everything is defined acutely by codes and arranged as an information network. Therefore, every time something is searched, it is only retraced or re-read through the paths organized in detail by special code writes. In fact, it is not possible to ‘discover’ something on the net since everything had been already explored and included in this virtual closed system long before. Baudrillard comments that the recent situation of telematics is a fulfillment of the telos of communication, essentially that of immediacy and transparency.

The image of free and increasing information only deters the realizations that the ‘Enlightenment’ has imploded. According to French philosopher and cultural analyst Baudrillard, ‘information’ gained a meaning which describes movies on demand, electronic malls and proliferating TV channels and increasing complexity in technology make up stronger simulations of information and more persuasive strategies of deterrence. He concludes that in an abundance of information, we have no time to pay attention that we have nothing to learn. Baudrillard implies that the great interest in virtual real is because of the desire to disappear inside the network rather than a quest for knowledge. In parallel with these ideas, Rheingold indicates that even though virtual communication facilitates society by concealing many social barriers such as age, race and sex, the same virtual realm allows for deception as well (Rheingold, 1993).

In spite of those pessimistic opinions, the emergence of the information spaces created concentrated intersection points for many different fields and established an

unprecedented symbiotic space for various actions including architecture and urban design (Figure 2.46, 2.47, 2.48). The specific physical, social and global affects of cyberspace and information spaces in general are studied in the third section in more detail.



Figure 2.46: Different virtual world interfaces: The Palace (<http://www.thepalace.com> retrieved at September, 2004)

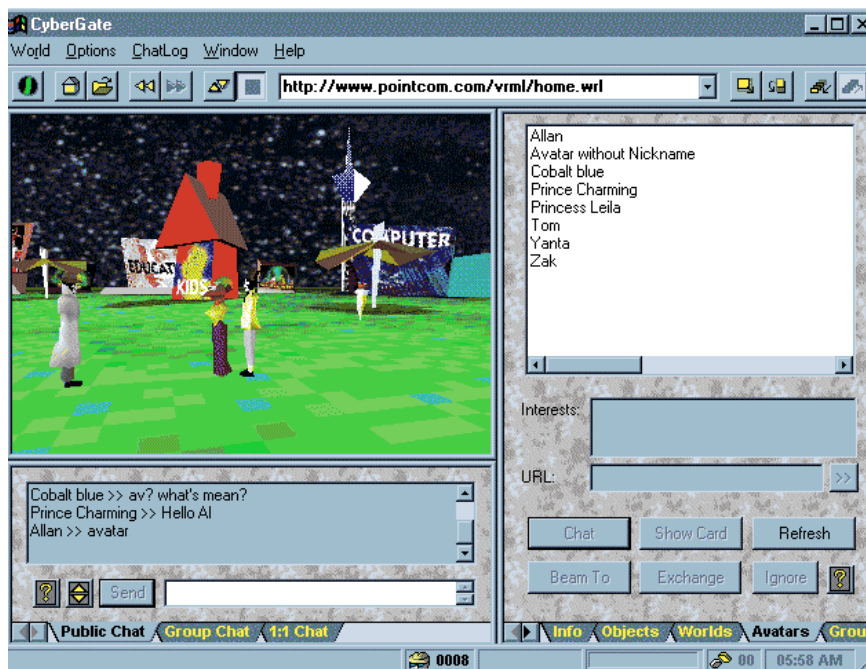


Figure 2.47: Blaxxun Cybergate interface (<http://www.blaxxun.com> retrieved at September 2004)

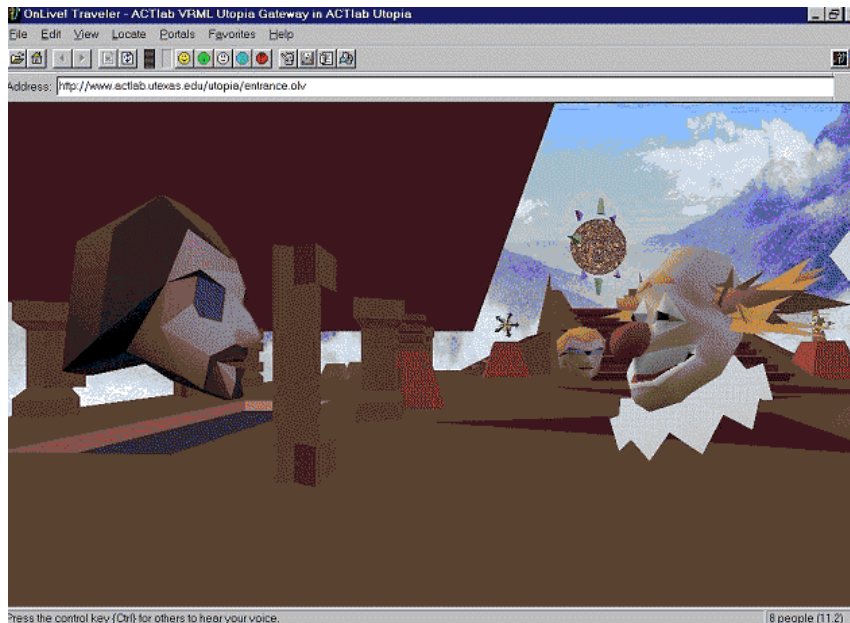


Figure 2.48: OnLive! Traveler interface (<http://www.onlive.com> retrieved at September 2004)

Simulation

A simulation, which is defined as the process of modeling or representing an activity, environment or a system on a computer, is generally used in a wide range of fields such as emergency response systems, air-traffic control, aircraft design, electronic research, entertainment, education, sports and design. Simulations aim to visualize the complex data systems and demonstrate the possible consequences as realistically as possible, providing power to control over the given data and situation. Robert Shannon claims in his book *'Systems Simulation: The Art and Science'* that, *'simulation is the process of designing a model of a real system and conducting experiments with this model for the purpose of either of understanding the behavior of a system or of evaluating various strategies for the operation of the system''*

Simulations play an essential role in the technology of the present century since they provide real-time, realistic visions of possible solutions, leading to the improvement of the problem solving strategies. By simulators, virtual reality and hypermedia, people are moving further and further towards a physically wrapping, multi-sensual illusion of informational control.

On the contrary of these positive opinions, Baudrillard claims in his essay, *'Simulacra and Simulations'* that, simulations, new technologies, and the hyper-reality that is produced by them displace the reality completely by generating manifold exact 'copies' of it and build a post-modern world, thus a post-modern

society. Virilio argues that the computer or telecommunications in general, acting as ‘*the last vehicle*’, aim to resolve all topographical concerns.

In spite of the presence of these pessimistic approaches, simulations certainly serve for great innovations and provide the society unprecedented experiences for the 21st century.

2.4.3 The General Reasons of the Fast Growth of Information Computer Technologies

Presently, the curiosity towards the virtual space, which is the creation of the informational technologies that rapidly surround us, increases constantly every other day. The main target of the recent investigations is to shape the created ‘non-existing’ worlds as realistically as possible. What is the source of the alacrity of the 21st century society about the virtual and ‘real-like’ if not ‘unreal’ in communication, life, games and in all other issues?

Virtual worlds allow people to escape from the social fears of the modern life by enabling them to interact with others virtually while being physically alone in their isolated worlds. Robbins and Sennett define this social fear as ‘the fear of physical contact’ and claim that the security lies only in the self-made world away from everyone else (Sennett, Robbins, 1996). Canetti claims that ‘*there is nothing more fearful than the contact with the unknown for the human beings*’ (Canetti). And Robbins concludes radically that the advanced technologies are developed to avoid direct contact with the world itself.

What are the fundamental reasons of avoiding personal relationships and social interaction? As the society incessantly goes forth on the path of civilization, the instinctive aggressions and sexual desires of humans, that are extensively studied by Freud, were repressed and all of these aggressive feelings have transformed into a rigid, severe conscience, focusing on the self. This severe conscience becomes harsher and the feelings of guilt augment as the civilized society recedes from the life style which is led by the natural drives. Consequently, the individual constantly becomes unhappy and uncomfortable in the society he belongs to.

The repressed aggression can be satisfied much more easily and smoothly in the virtual world away from the actual dangers. In such a sense that, the person stays away from pain and agony while satisfying his aggressiveness without thinking about the limits. Nothing harms him and his physical integrity never gets damaged. This ‘free’ and ‘secure’ world far away from the disappointment offers him a better alternative of the dangerous outer world.

While the ‘shelter’ of the society was the church in the 17th and 18th century, it was transferred into the homes with the influence of the alienation in modern era and the people anticipated to move away from the public space, isolating themselves in their secure dwellings. Now in the beginning of the 21st century another question arises: Is the secure ‘shelter’ now moving towards the individual virtual worlds leaving the physical homes in which the alienation also affects the families?

The fear of the unknown causes a person to escape from the outer world. A new solution for the discomfort, shyness and stress experienced because of the direct exposure of the social status to the other side in face-to-face relationships may be the virtual worlds in which only the words and the chosen physical image appear in the front scene.

In modern era, the separation of living and working spaces was accompanied by the division between home (private) and other spatial areas (public). Public spaces began to be privatized rapidly as it is observed in the movement of retail areas from public streets to private shopping malls. Followingly, surveillance methods which are improved recently by computer and information technologies are used to transform public space into a private one. Consequently, it is expressed that it is more difficult to continue everyday life without leaving a digital trace. Vision, sound and infrared monitoring facilities, security cameras trace us every moment. Paradoxically, while cyberspace becomes the main medium in which physical public space is monitored, it is claimed that it constitutes a new public medium as well. While Reinhold (1994) proclaims that cyberspace replaces quickly vanishing public space with new social spaces, there are others who question the implications of ICTs on emergence of a ‘surveillance society’.

Humans have always dreamed about a future ideal, a utopia which will free them from the current problems. New hyper technologies become more valuable as they

maintain variety of sources to visual invasion, manipulation and supervision the world. Roland Fischer claims that the new hyper technologies are developed to ‘*actualize*’ the transcendent order. Virtual reality is the last point that the utopia dream has arrived. This is the dream of a distant, untouchable, speculative and an attractive world which will ‘*improve*’ the condition of humanity.

The pleasure principle and pain avoiding principle-driven-life is reaching its upper most limit in the virtual world. The person becomes the person ‘he would like to be’, enjoys this new life and escapes the unsatisfactions of the real world. Every time he plays a video game, he enjoys the pleasure of resurrection after death. He attributes himself a godly feature that will satisfy his inner feelings of godliness by creating a world exclusively special only for himself. A world in which everything can be taken under control and in which everything is free to be done. Mitchell asserts that MUDs (Multi-User Dungeons), creates a new opportunity for online users to create a new personality of themselves in disguise of a brand new character in which they lose themselves. The manner of self-representation is a free choice and not compulsory on social order. As the actual relationships in the real world deteriorate, the individual becomes more fearful and he recedes the social life. As Freud claims, media satisfies humans’ desire of independence. Media evolves into a kind of opium. For Baudrillard, the constantly growing role of the present-day media will constitute a post modern society of simulation where all boundaries and distinctions are tried to be collapsed out of the modern world of production, capitalism and technology. One of the leading instruments of the post modernity is the new media technologies. Baudrillard claims that while in modern era, media was believed to represent the reality whereas in post modern era, it reinvents another ‘hyper reality’ which is ‘*more real than real*’ by the help of technology. Thus, according to him ‘*information is directly destructive of meaning and signification, or neutralizes it*’ (Baudrillard, 2003). Kevin Robins argues that, ‘*the cynical substitution of simulation for reality can only superficially overcome the alienation of our social existence, our pain will return to haunt us as night mares the more we seek refuge in the ‘dream’ of virtual reality*’ (Robins, 114).

According to Baudrillard, the society watches channels or ‘logs in’ various information networks that surround them and turning them into the controllers of a vast virtual world full of information, visuals, sounds and events. Thus, the media,

with the information network being an important component of it, manipulates individuals into objects of communication network terminals. Even the most private issues of the previous societies open up on screens in the houses. For Baudrillard, simulation has become a virtual reality, not a metaphor of change. The global media captures the hearts and the minds of audiences and produce homogeneous global consciousness and culture. The essential aim of the simulations in the real world is to reassure people that the 'real' world actually 'exists'. The revealed current issues are stories to encourage people that they still have a 'secure and decent' life of their own.

Can all of these be actualize with the advent of informational computer networks which is the most recent network that made up the city? How will this non-material network of unphysical substance influence the constantly evolving city made up from the functionally and constructively complex networks? Does the shift of the public space towards a virtual realm able to create a space in which all the repressed instincts be reflected out without physical damage? If so, where will the concept of real in our consciousness? Will the real world problems be solved in the unreal-virtual-world? And will not these solutions be just an illusory remedy?

Sennett argues that a place becomes a city only if it contains the diversity and integration (Sennett). Virilio compares two kinds of societies as follows: *“One is a society of cocoons, where people hide away at home, linked into communication networks, inert while the other is a society of the ultra-crowded megalopolis and of urban nomadism, some people, those in the virtual community, will live in the real time of the world-city, but others will live in a deferred time, in other words, in the actual city, in the streets”* (Virilio 1993, 75) Does a city where such a society lives, be considered as a 'real' city?

Techno culture welcomes the image technologies and believes that all of them without exception will maintain the real freedom. However according to Robbins, it is essential to be able to realize the difference between images which are freeing, facilitating our interaction with other people and the ones that are imprisoning and obstructing our communication.

New information and communication technologies are playing a powerful role in the emergence of new spatial structures, relations and orientations. Communication

networks formed a global space of electronic information flows. New technologies lead towards a new type of relationships between place and space since their capacity to go over frontiers and alter territories is much more advanced than the conventional ones. Global systems such as information networks, satellite systems form an abstract space over concrete territorial configurations. A new electronic cultural space, a 'placeless' geography of image and simulation is created. This new global arena of culture is a world of spontaneous and limitless communication, a world in which classical boundaries of space and time so of society have drastically changed. (Morkey, Robbins)

2.5 Interactions of networks in urban structure

With cities coming undone and losing their coherence, such points of interchange (nodes) constitute lively sites full of energy and new possibilities. Projects abound in the field, whether they involve train stations, subways, bus or airport terminals, or any combinations thereof. For cities, such interchange points provide an occasion for reflecting upon and modifying themselves, for devising new models of organization and new spaces.

Paul Andreu

All networks coincide and superimpose on each other and establish specific common nodes on different scales. Since networks function and are perceived on various scales, the superimpositions may also be on individual, urban or global scale according to their types, functions, positions and users.

Transportation and telecommunication networks, for example, globally connect to each other and form strategic nodes and distribution systems to facilitate urbanistic and consequently global flows. Such nodes, being either specific spaces or buildings facilitated with highly interlinked infrastructural networks combine various distributed functions on themselves and organize the economic, daily contemporary life of 21st century society.

The nodes in the metropolis formed by the superimposition of different networks may be buildings or areas which create their own links with the web or circuits capable of articulating mobility flows such as e-commerce spaces, passenger airports

and fast rail stations, export processing zones, etc within themselves (Figure 2.49). The contemporary environment may be understood as an infinite interior of imprecise boundaries, where inhabitants are located in the form of a flow converted into circulation which travels between these nodes.



Figure 2.49: Superposition of networks: Center International d'affaires, Lille, OMA, 1996

Graham argues that ‘*glocally*’ oriented network nodes in cities loose their connections with their surrounding, sometimes with even visual barriers while establishing strong global links. ‘To be global’, refers to local-scale establishments that function globally through information network. He further criticizes the negligence of the peripheral regions. Although he implies the danger of segregation and disintegration of the cities, he argues that cities can not be programmed like computers and the technical boundaries which are attempted to be established remain porous.

Airports for example are one of the most important and active nodes in the city. They are salient urban spaces where global and local connectivity is provided for internationally mobile people. Claiming that airports have evolved into global network nodes, Hans Iberlings highlights that, ‘*No where is the process of enclave formation stronger than in the world of airport architecture*’. All over the world, the

major airports have grown into complex and multifaceted mega structures that not only offer space for more terminals, piers, and hangars than ever before, but also accommodate a growing number of functions that have nothing whatever to do with aviation. In many cases, ‘*these other functions make a bigger contribution to airport turnover than activities directly related to air travel*’ (Iberlings, 78).

The transportation process can be very fast in some of the international airports, especially in the ones, which provide bypass transportation for highly affluent passengers by quick short cut connections between air and other transportation networks. Airports also supply fast and easy access to local areas and direct connection to the consumption and business locations. Iberlings points out that, ‘*Thanks to all the offices, banks, hotels, restaurants, conference facilities, casinos, and shopping centers in the immediate vicinity, the airport has developed into a significant economic center that is sometimes so large that it starts to compete with the very city it was intended to serve*’.

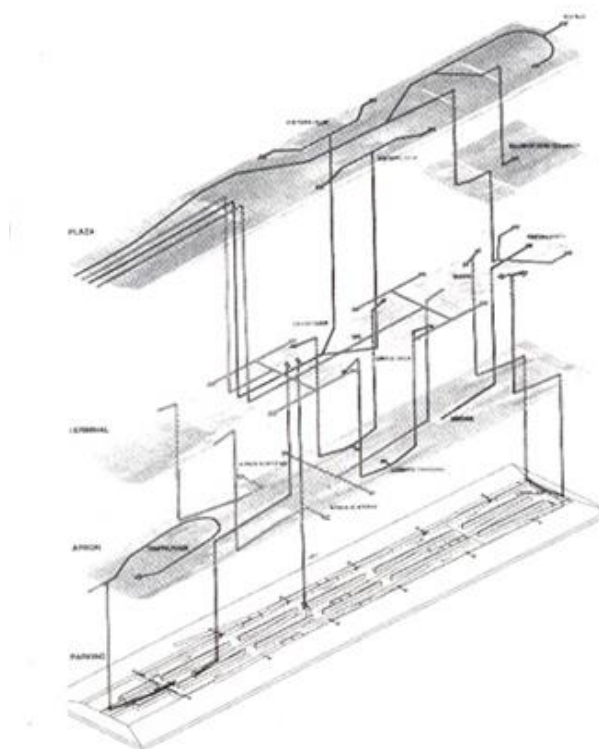


Figure 2. 50 FOA Different layers of flow at International Port Terminal, Yokohama 1995

In most of the European cities, such as Amsterdam and Paris the airport and the city center are directly linked with sufficient railway systems. Specific locations such as

housing, entertainment facilities and educational centers serve for high income population and such centers are usually located near airports. Recently, airports have more tendencies to be multi-functional global nodes. For example, Rem Koolhaas' Studio OMA has suggested building a new airport city in the western coast of Netherlands. Oriented especially toward business travelers, the proposed airport would constitute largest malls in Europe, beach resorts, a theme park, a technology park and high-quality residents. Graham suggests that the integration of airports with fast rail networks and other facilities is only a part of a wider project of selectively integrating Europe's 'glocal' infrastructures to support economic integration (Graham 2002). Just as airports, fast train stations or major seaports like the one in Rotterdam gradually detach from their close surrounding and become a global part linking global networks of road, rail and airways to the world sea or rail network (Figure 2 50, 2 51, 2 52, 2 53).

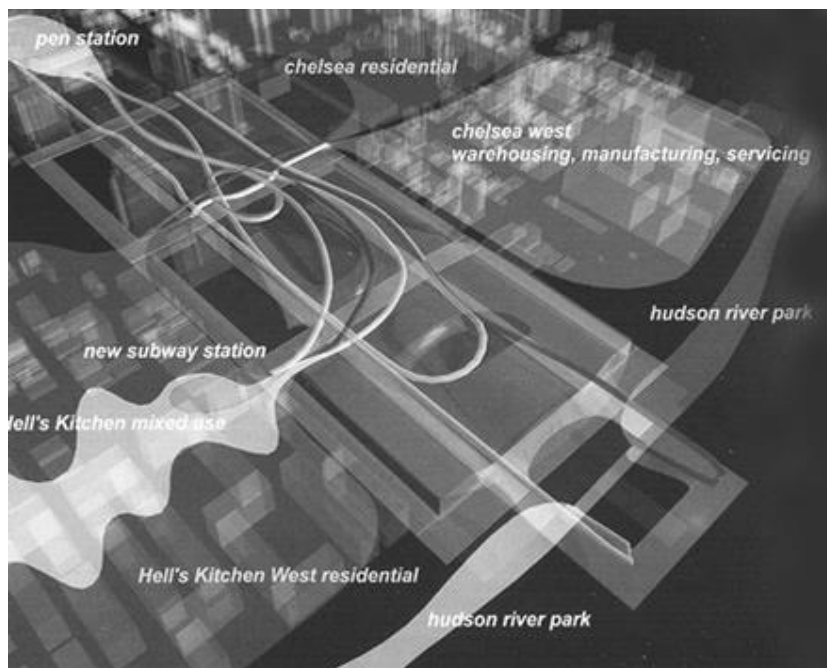
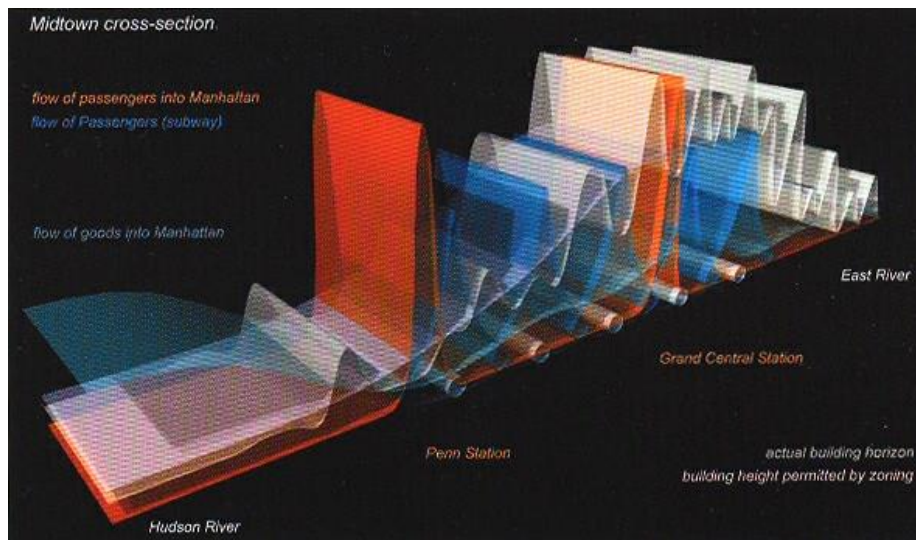


Figure 2 51 Representation of various flows in Penn Station, by UN STUDIO New York, 1999



2. 52 Flow of passengers into Manhattan, UN STUDY Q, Penn Station, New York, 1999

Another node formed by the integration of various networks is the recent concept of 'Global Transpark' developed in North Carolina, USA. This complex combines sea, road, rail and air networks within a single entity. Information systems, telecommunication grids, water and energy services are designed to meet the highest expectations of the global business operators and they are supported by electronic point of sale, advanced information and telecommunication technologies. The developers declare the aim of the transpark as 'to be connected to the world through state-of-the-art communications, utilities and transportation infrastructure.'

Additionally, technopoles that are also considered as such a node, are planned areas or buildings which host and encourage private initiatives to make investments in order to foster scientific researches and enrich the economic life in a region. Technopoles, also referred as technocities, technology parks, Science Parks or technopolises generally co-work with a university that helps to maintain necessary equipment and facilities for scientific studies. In technopoles, many firms are gathered creating an informational node by establishing complex electronic network connections with various parts of the globe. Technopoles are the innovative bases of business transactions and new command centers of economy and science.



Figure 2.53 NOX, a transurban scheme for the area west of La Defense, Paris, 2001

One of the small-scale nodes of a metropolis is the business center where infrastructures of telecommunication, communication, urban services, office space and educational institutions coincide (Figure 2.54). The dominant space of informational societies where the network of information flows focus on is systematized by the node of the space of flows. Such centers become nodes through connections to other similar transaction points and initiate to function as a unit of management, innovation and power. Information-based companies locate their headquarters, office operations, research and development centers across the globe, looking for ideal combinations of image, cost and local interactions in order to establish their network across the world.

Apart from these common global nodes, on urban level there are various networks of functions such as an educational network that links every educational institution or a cultural network that connects the cultural centers. All of these different networks constitute a complex web on the city. Additionally, every individual has his personal network that links the nodes he specifically choose for himself such as the restaurant or an exhibition center he frequently visits.

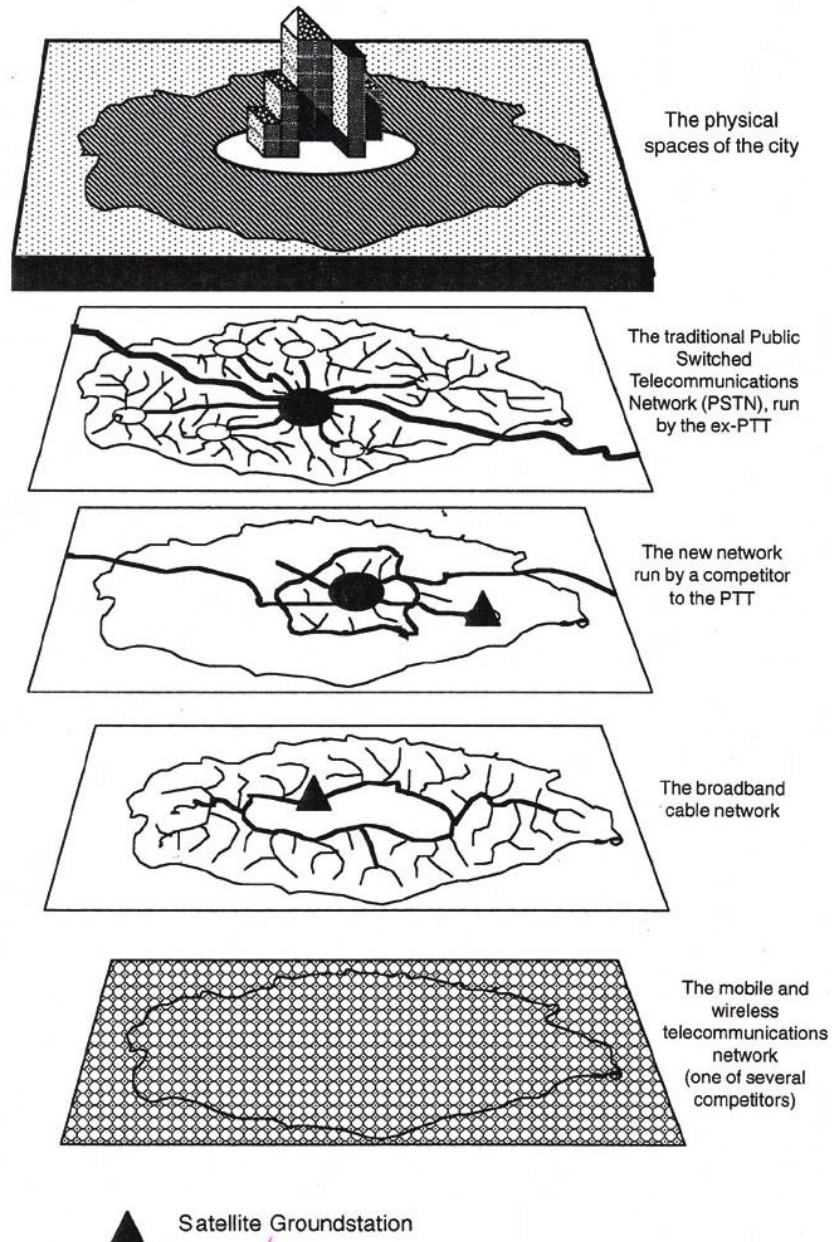


Figure 2.54 The superposition of different telecommunications infrastructures within a typical medium-sized western city.

In order to demonstrate these networks, Beyoğlu İstiklal Street is taken into consideration as an example and various urban networks through the streets were traced in order to reveal the superposition points. Figure 2.55 shows the short tram line connects two important points, Taksim Square and Tunnel square, going along the pedestrian path of İstiklal Street. It consists of a single line. Second network demonstrates the dense, interconnected web of traffic lines for more of the busiest and the most dominant network on the urban framework (Figure 2.56).

Alongside the long main arteries that connect the busier districts like Tarlabasi ,Sraselviler and Yeni Çarsi Avenue, there are also narrower streets maintaining access to smaller and less important destinations. The traffic network determines the basic route of the citizens in the city.



Figure 2.55 Tram line



Figure 2.56 Traffic Network



Figure 2.57 Cultural Network

Istanbul is full of specific points which attract people with their cultural facilities such as theatres, cinemas, bookstores, museums, exhibition centers and concert halls. Especially Beyoğlu Street, as being one of the most compact cultural centers of the city with various kinds of activity points, clearly demonstrates a cultural network as partly shown in Figure 2.57. The users choose their own nodes of interest on this network among many choices and establish the flows in between them. Some of the paths may be busier according to the others, but all nodes together, by serving an alternative to the citizens become a part of the general network.

Istiklal Street, like many streets in the district is packed with various kinds of retail shops. The area around Taksim Square and the area around Persembeye Bazaar are two of the heavily functioning commercial districts and are connected by Istiklal Street in between that links pedestrians and retailers together and consequently forms a dense commercial network (Figure 2.58). Tarlabası Avenue is also an important link in the commercial network as many shops, retailers are located there.

The rich historical background and multi-ethnic social heritage of the area reveals itself with the numerous religious buildings including mosques, churches and synagogues scattered throughout the district. Figure 2.59 demonstrates the present usage of the buildings and does not consider the original usage, meaning that the old churches converted into mosques are evaluated as mosques. It should be noted that

the religious net work, especially of churches may not be as interconnected as it seems, since the Christian population is not as much as it was in the past. But at least, it gives an idea about the historical situation of those net works. The mosques, churches and the synagogues are grouped separately since their relationship is unconnected



Figure 2 58 Commercial Net work



Figure 2 59 Religious net work



Figure 2. 60 Educational Network

Education, which is another network for its own webs according to different levels such as elementary, high school and university level. There are many educational institutions in the district and among them, the universities in particular are connected both internally and globally (Figure 2.60).



Figure 2. 61 Pedestrian Network

Pedestrian areas for a path that people may follow more comfortably in the busy city. Istiklal Street is one of the liveliest and the most active pedestrian zone in

Istanbul with various commercial and cultural nodes located along its path. Recently, another area, Taksimane has also been converted into a pedestrian zone. However, the area is still under development and there is not a dense use of the district since new nodes of attraction have not been placed yet. Two districts are separated by the busy Taksim Square which is a challenge for the pedestrians to pass through. If the link between these two nodes can be established successfully, the pedestrian path will be continuous and will form a stable network (Figure 2.61).

Everyone configures a mental network of his own by using her inimitable mental filters in the city to determine the specific nodes he chooses for himself. These mental networks are actually the individual social networks in which the person may establish another link by new personal relationships. Figure 2.62 demonstrates a personal social network formed by cultural, commercial, educational, religious and transportation nodes a person prefers to use. This map varies according to the different users and is unique for each of them since everyone reads and uses the city with a unique point of view. Accordingly, the special route of every citizen forms an alternative network to be superimposed with the rest of the networks.

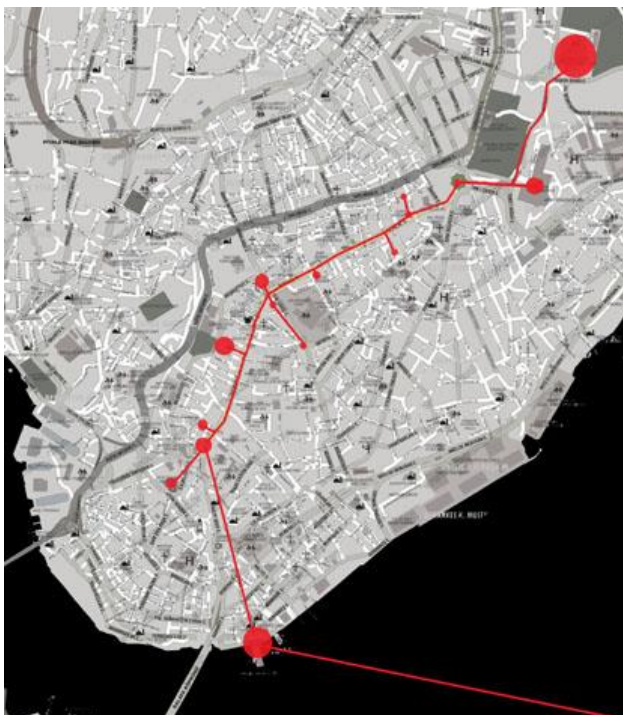


Figure 2.62 Social Network



Figure 2.63 Superposition of Networks



Figure 2.64 Common Nodes

If all these networks are superposed, the dense fabric of urban networks can be obtained (Figure 2.63). The complex nature of urban networks in total reveals the dense use of this specific region in Istanbul. If it is examined, the central nodes where many networks intersect are recognized (Figure 2.64). These central nodes are Taksim Square, Galatasaray Square, Odakule and Tunnel Square which frequent users may

also realize easily along the way. As it is seen on the figure, Taksim Square is an intersection point of transportation, cultural, commercial networks and a path of flows of many others not only of this region in particular, but of the whole city. Galatasaray Square is especially a cultural, educational, commercial, pedestrian common node where transportation network also passes through. Odakule, being a smaller common node links Galatasaray to Tunnel Square where tramway, cultural, commercial nodes coincide and establishes a lively pedestrian area. The social network that is also superimposed on this map reveals that a unique reading of the region may be displayed for each citizen. Since the paths, the nodes, the experiences and the relationships are different for everyone, the same web and the common flows are perceived differently and that's what makes a city unique for every citizen. Even though some people may have the same nodes in their personal social networks, the links and the flows would be totally different from each other and the consequence will again be divergent readings of the city.

2.6 Conclusion and evaluation of the section

Connectivity is a key term which defines the basic characteristic of 21st century order. It is evident that both physical and virtual connectivity is necessary in order to catch up with the speed of the complex affairs in our business, academic and domestic lives. In all realms of daily transactions, the connectivity is maintained by the complicated and comprehensive web of networks, either visibly or in a concealed state. All of the organizations in the contemporary life, whether they are physical, social global, financial or informational, are configured by sets of visible or concealed networks. So does the complex urban structure that is made up of several interconnected layers. Physical utility networks, social networks and information network are three main groups that were taken into account. And these networks actually designate our path both through the actual streets of the city we live in and also through virtual tracks of time, relationships and virtual reality. It is possible to trace the development of urban networks and their affects on the structure through the urban history. Nearly all of the basic changes were initiated by the advancing and consequently evolving networks.

Recently, information computer technology network has brought brand new sets of flows and created a different order in urban life, just like it did in many other fields directly related to the daily life. It did not only manipulate the functioning of the existing traditional networks, it also created many new nodes which constitute an important real mould of the physical boundaries. Information highways, cyberspace, the Internet and simulations are some of the new concepts that information networks had introduced. Each of them had different opportunities of progression hidden within them since they change some of the basic definitions we have about space, place and act.

If these layers of networks are examined and superimposed on each other, the obvious connections of certain nodes, the flows and the interactions in between will be revealed. These central nodes become kind of command spaces where a lot of transactions can be held simultaneously. They are usually multi functional places where people gather for manifold reasons and exchange between the networks. The organization, connections and the smoothness of the flows are important for the functioning and effectiveness of those points.

At a personal level, transportation systems, the bank, educational institution, specific exposition center and even the small cafe are nodes of particular networks which form by our mental network. The mutual relationship between these nodes and the flows in between assist us to structure our own personal social network. The social network depends both on the combination of networks and on the person himself. In a specific area, every person can draw his unique network since each person's spatial choice will be different in accordance with his character, life style, profession, age, gender, occupation etc. Consequently, a city may be read in a numerous ways, as much as the individuals who use it, live it and place their signatures to some of its back corners. Everyone lives in his own city and walks through in his own streets.

In consequence of recent innovations and generation of those central points, there may be significant interventions to urban conceptual and physical development. These opportunities and developments, the innovations in urban design will be discussed in the next section.

3. THE EFFECTS OF INFORMATION NETWORK AND TECHNOLOGIES ON URBAN STRUCTURE

3.1.Types of Approaches in Information Computer Technologies - Urbanism Research

Today, the information technologies are widely accepted as an issue about metropolis. As the urban spaces throughout the world are connected to each other globally, these technologies are regarded as new complexity levels in the cities and urban systems. For a long time, new information technologies were perceived only as 'external' processes and their impacts on urban space were not contemplated widely enough to analyze its internal affects. Only 'collapse of distance' was partly mentioned.

The focus in this part is to present the various viewpoints that can be possessed to analyze the relationship between urban places and electronic spaces. In literature we can discern four dominant approaches that study the correlation between new technologies and the city, which are 'technological determinism', 'futuristic utopianism', 'dystopian political and economic approach' and 'social construction of technology' (SCOT) approaches.

Technological Determinism

In the first approach which is regarded as the mainstream of social research on technology, new telecommunications technology is regarded as the direct cause of social, cultural, political and economic urban alterations because of its significant aspects that overcome the question of proximity. Electronic spaces mostly impinge upon physical and socio-economic structure of urban spaces.

Technological determinism is based on the linear notion that innovation leads to new technologies which are then applied, used, and continue to make technological impacts of society. It attests that technological change has a stunning importance on directly reforming the society. Therefore while technology is active and independent, the society is passive and dependent (Morley, Robbins).

Technological determinism stresses context intensive consequence of technical product rather than the social processes of innovation and deployment. For technological determinists, the main question is how the society adapts to the effects

of information technologies rather than how the society can use them for its benefit (Graham Marvin, 1996).

Futuristic Utopianism

The second perspective investigates not the current effects of telecommunication, computing and information technologies but the future effects of them upon the cities of tomorrow. It is generally theoretical and empiricist so it is a simple presentation of facts in their search of how technological innovations will affect the future societies. It theorizes about the future, 'information society' or 'information age' and the outcomes usually present the positive effects both on physical and social aspects of urban life which will remedy all kinds of problems of the society by providing all information at all times and places to all people.

It is mostly believed that utopianism which is a quest for radically better forms of social life, will solve the negative consequences of the industrial cities. It "tends to see new telecommunications and telematics technologies as being solutions to the social, environmental, economic and physical problems." (Graham Marvin 1996, p. 87).

Dystopianist Political and Economic Approach

This approach also emphasizes that technologies can not be separated from the society, but claims further that the relationship between them is tied up with capitalist modes of production and its products such as the economic, social structuring which tend to drag the society into a pessimistic, self-destructing context, exemplified in George Orwell's *1984*, Ridley Scott's *Blade Runner*, and William Gibson's *Neuromancer*. The political economists contend that the relationship between information technologies and the society can not be comprehended without analyzing the broader capitalist dynamics of the industrial society (Graham Marvin 1996). Accordingly, technologies are not neutral, but propagated in relation with the interest of industrial profits (Dodge, Kitchen). It is claimed that, telecommunication technologies neither can be accepted as quick solutions for the serious urban problems nor as neutral aspects which can be shaped differently according to the different social situations. It is asserted that the new technologies can support the negative aspects of capitalism by strengthening the control power over the society.

Social Construction of Technology (SCOT)

The fourth viewpoint which rejects the technological determinism presents how society manipulates technology and stresses that technology is an unbreakable part of the society itself. It also refuses the emphasis of capitalism and political-economic forces on the formation of telecommunication in cities.

SCOT approach aims to bring forth how technology is socially and politically established through intertwined interactions of people and institutions and depended on everyday life and social relations between people. "Micro-level processes of human agency are the focus of SCOT research. Individuals, social groups and institutions are seen to have some degree of choice in shaping the design, development and application of technologies" (Graham Marvin 1996, 105).

These theoretical approaches are characterized by a search for a unified theory of society and social knowledge and usually attributed to modern views. Oppositely, the post modern view opposes these modernist approaches claiming that such a unified ideas cannot achieve to fully comprise the complexity of contemporary society with all of its conditions.

Each approach has some weak and limited views. Utopianism for example, predicts how information technologies will drastically change the way the society lives without considering the wider social or economic factors about how the technologies are used by society or how they adapt to economic environment.

Technological determinism on the other hand, claims that technology is the main factor which shapes our lives and explains this argument in simple cause-effect relationships. It mainly focuses on how society adjusts according to technology rather than on how it may use it for its benefit. According to both approaches technology and society is separated and independent. However, it is commonly accepted that technologies do not occur by themselves but are the result of human undertaking

Conversely, social constructivism and political-economic viewpoints support that technology and the society is inseparable. However, social constructivists conceive information technologies only in relation with culture without considering the broader social and economic factors of capitalism and the influence of political-economic means. Oppositely, although political economists focus on those political

economic factors, they neglect to emphasize the social processes in verifying how technology is generated and improved.

In recent studies, after predicting the flaws of individual approaches, researchers combine some of the views which seems suitable for them and conduct their studies accordingly. Accordingly, technology and society have a mutual interaction and it is not right to diminish this relationship to a one-sided one by attributing a dominance to one of them. Since technological determinism and futuristic utopianism both disregard this mutuality, they are not comprehensive enough to consider all of the factors affecting this relationship. Social and economic-political factors should be considered together and should be used as supportive information for the arguments about technology and urban life.

Consequently, a political-economic approach which also considers specific social effects would be able to contemplate both local, individual, social outcomes and the global, communicational economic, political factors. It can differentiate disparate societies, cultures and political situations.

3.2 The relationship Between Information Networks and Urban Structure.

‘In the modern world, with its expanding and multiplying networks of relation and snowballing mass of bits of information produced and exchanged along these networks, the information services are fast becoming an essential component, indeed a cornerstone of transactional making and urban centrality.’

Jean Gottmann

‘Now we make our networks and our networks make us.’

William Mitchell

Mitchell suggests that just as the roads and aqueducts in the times of Romans, shipping and waterways in the eighteenth century, railroads in the nineteenth and the electricity grids in the twentieth century, today, informational network marks the

urban structure (1999). In every epoch the infrastructure has either modified the existing structure or produced a brand new one.

With the development of new technologies of communication and information networks, the urban site can no longer be considered primarily in terms of its geography. While modern cities have split and possessed irregular spatially, they are linked by vast invisible networks where information, images and money flow. As social philosopher Paul Virilio wrote, "The representation of the contemporary city is no longer determined by a ceremonial opening of gates, by a ritual procession or parades nor by a succession of streets and avenues. From now on architecture must deal with the advent of a 'technological space-time'."

The impact of these new technologies on our cities has been deep, contributing to a dismantling of the historic city and the reconstruction of urban life in entirely new free-floating forms. Our assessment about the city must face the fact that we live not simply in places, but in cities constructed as simulations and complex webs. Public life has moved from streets and shops to the hyper-environment of the shopping mall and the surface of the video screen.

Informational network is evolving into one of the basic milieu in which people wish to be present and redefine themselves. Although both are perceived as places of socialization in which similar orders are attempted to be created, the information network and the physical space differ greatly and these differences lead towards a new kind of urban structure and urban life. First of all, nobody 'inhabits' the real mode of network. People 'login' and after they push the enter button, they become a part of the flow. The users do not have an absolute identity or appearance which they are bounded in the real life and they can change themselves and choose to redefine their identity as they wish every time they are logged in. Whereas in real life visual representation of self and physical traits are the basics of everyday life, in the net, the intellect and pure ideas can be represented without any disruption of the access of visuals.

In the ordinary urban life, a specific time is set for most of the activities. The timetables of transportation, entertainment, eating is set and they all organize the social life, creating communal action sequences. However, on the net usually there is not a specific time and spontaneity is more common than organized actions.

Electronic mails, instant chat groups, spontaneous game adversaries, and instant messages can create unexpected forms of interaction between users.

Additionally, in cities certain spaces are defined for specific actions like market places, stadiums, shopping centers, concert halls etc. Although the rigid boundaries are commenced to merge into each other, the distinctive specifications remains visible. On the contrary, in informational networks, spaces are not defined by constructional elements of architecture but with logical connections. Each software which displaces the 'place' of the physical world creates environments of interaction.

With the information technologies, cities are going through a restructuring process. Castells defines 'restructuring' as 'the process by which modes of production transform their organizational means to achieve their unchanged structural principles of performance' (Castells, 1989, 11). Restructuring may be technological and social as well as cultural and political. Societies are developed around the concepts of production, modes of development, experience, power and culture. Capitalism as a mode of production and informationalism as a mode of development that focuses on technological development through accumulation and production of knowledge constitute the basic parameters of the 21st century society (Castells, 1989, 38). Use of knowledge has differentiated through the history according to the different modes of development of those particular ages. For instance, while in the pre industrial modes of development knowledge was used to arrange greater quantities of labor and tools of production, in the industrial age it was profited by to maintain alternative sources of energy and to rearrange a more efficient way of production. Thus, in the informational mode of development knowledge generates new knowledge as the basic source of production (Castells, 1989, 10).

In the vision of the network society, everyone would have access to libraries of digital books, museums of multimedia information, diplomas from universities of distant learning. Anyone anywhere can be called, in any moment from the digital cell phones. Satellite channels deliver news for 24 hours from all around the world. We can check our electronic mails whenever we want it. Money is always ready to be picked up from the ATM machines. Domestic devices require network connections as well as conventional ones. Community links are formed in unfamiliar ways with new informational connections. Digital infrastructure may be connected with homes and offices and create a new organization of urban relationships which will lead the

society in the 21st century. Today telecommunications networks and intelligent buildings fuse with other utilities and form a globally interlinked world.

There are many differences, innovations and changes that telecommunication has brought at different scales. The physical, social and the global affects of the information network on cities and urban life will be examined in three sections in the second part of the third section.

3.2.1 Physical and Technical Effects

‘‘Space is an expression of society. Since our societies are undergoing structural transformations, it is a reasonable hypothesis to suggest that new spatial forms and processes are currently emerging’’

Manuel Castells

How do telecommunication infrastructures and applications relate with the restructuring and functioning of built environments? Will the progressing technology effect the operation of universities? How will the new technologies change the libraries? Will we download films or go to the theatre? Will we continue to commute to office or start to telecommute from home? These types of questions are directly in relation with the urban life.

The interesting aspects of the restructuring of the cities in the information age are the new possibilities and potentials they possess. The advances of information technologies such as telecommunication have effects on society's everyday life such as working, shopping, entertainment, healthcare, education, public services, governance, etc. Information network both manipulates the existing traditional city by altering the cultural, social and personal expressions of urban space and creates an alternative one beyond physical dimensions that is called a 'virtual city'. The ultimate aim is to gather new and old values together in order to produce new solutions in a world where the natural sources need to be consumed less.

To begin with, we can focus on the transformations of the traditional physical spaces of the urban structure:

Accessing Information: Libraries, Databases, Search Engines

“We are in a transition between the print revolution which is not yet over and the electronic revolution which is not quite under way. Librarians are caught in the middle.”

Giuliana Lavendel, speaking on virtual libraries

The basic function of the libraries is to collect knowledge and information, organize and shelter it and make it accessible for the whole community. Digital libraries consist of digital resources, databases and other archival information services in order to collect knowledge. These include reference volumes, books, journals, newspapers, national phone directories, sound and voice recordings, images, video clips, scientific data and private information services such as stock market reports and private newsletters. When these information resources are electronically connected together, universally accessible digital libraries emerge (Stefik, 6).

Libraries had once been the intellectual centers of the cities where millions of volumes rest and hundreds of researches study inside. Its structure must have been as capacious as to gather everyone, presenting the sources of information to the users in stacks of shelves. As the interaction with more complex information and data becomes essential, more efficient spaces to store and visualize this data is needed. The most elementary of these spaces, the libraries and databases should evolve into nodal points which can be accessible both locally and on the Internet. The giant temples of information may lose their physical integrity and still can be accessible more easily and faster. As libraries are ‘freed’ from the need of space, the building itself will maybe transform into a hall of computers. Digital works are massless, thus can be copied and transported instantly.

The world’s greatest libraries have a dream for a close future: Books once piled up on shelves will be digitalized by scanning and will be available to anyone anywhere on networks. Some libraries such as Bibliothèque de France, the French national library and Boston Spa have already initiated the digitalization of the hard copy of hundreds of books. European editor of ‘Wired’, John Browning indicated that, ‘Instead of fortress of knowledge, there will be an ocean of information’ (Stefik, 55). Although digital libraries have many advantages, certain quality losses may also

appear since they eliminate publishers, editor and librarians who capacitate the means to access information by their specialized training (Figure 3.1).

There are so many questions emerging out of information infrastructure about gathering storing or distributing information or protecting the intellectual property rights of creators, distributors and users of information. Reich and Weiser assert that the networked library should provide ‘‘distinctive’’ places, geographically local networked meeting rooms and a physical community presence in order to foster a community identity (Stefik, 85). Thus, community members can be preserved by a common linkage instead of globally scattering all around the world.

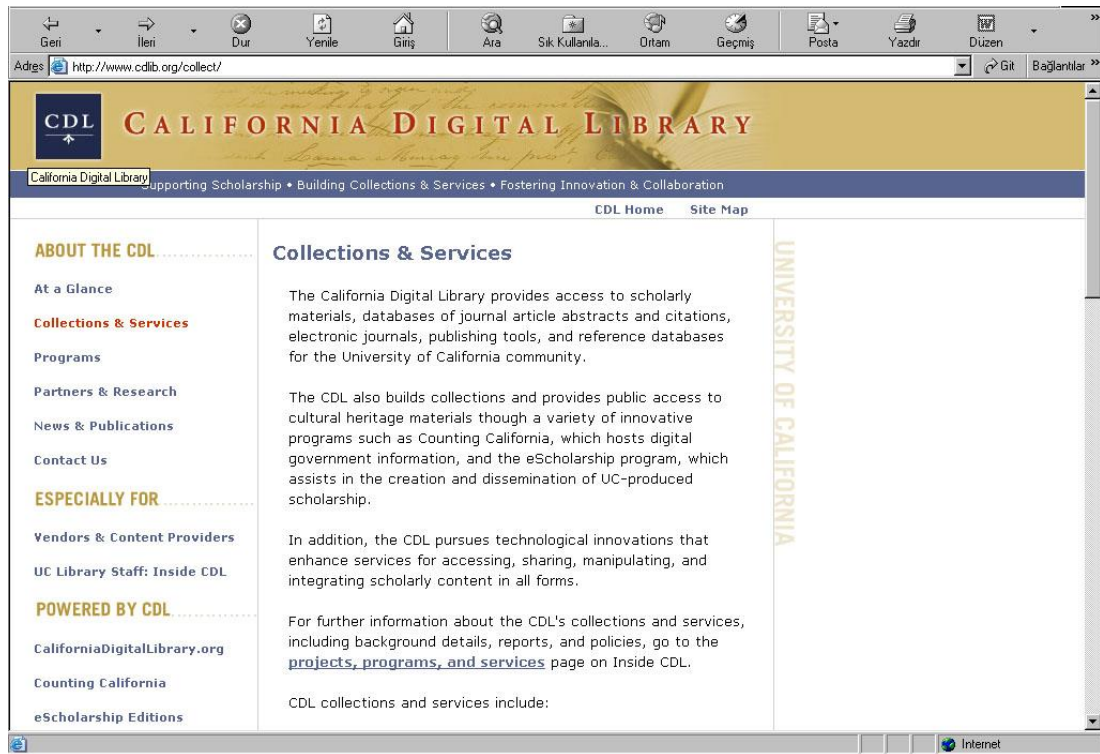
On the contrary, many people support the idea that it is useless to argue for the preservation of a local physical place, since Internet impresses people for this exact idea of independency of place. But a digital library, by appearing on various workstations such as schools universities, kiosks or homes will provide both a rich resource and a densely networked community.

The creation of a digital library has been a research subject for information architects. There are manifold ideas that plan to integrate the physical and the visual space. The library of the 21st century aims to evolve into a museum of knowledge, a center for research and communication, just like the ancient Greek Agora (Engeli).

The American Pacific Northwest National Laboratory, for instance, developed a system for information visualization and interaction called SPIRE, Spatial Paradigm for Information Retrieval and Exploration. Another institute that worked on this subject was Research Center for Information technologies in Darmstadt which prepared a network as a representation of information called Lyber Worlds, a library in cyber world (<http://www.darmstadt.gmd.de/IPSI/>) (Engeli).

Although in today’s urban life, bookstores and newspaper stands are among the most practical places that people come to access news or information, storage of digital information is replacing storage of physical information and decreasing the need for built space as a consequence. Electronic connectivity becomes essential to access to information rather than physical proximity to ‘libraries’ or other information resources. Today, digital books, personalized newspapers, downloaded information erases the difficulties of publishing and celebrate the easy though limited distribution. The search engines on the Internet like Google, Yahoo , etc, for

example, provide instant access to resources about all kinds of subjects in a short period of time. In May 1993, Blockbuster Entertainment and IBM announced the idea of storing records in digital format on a central server and to distribute them via a computer network to kiosks in record stores (Mitchell, 1996) and they thought this will eventually replace the daily newspapers.



3. 1 California Digital Library Home Page

Since we live in the information age, more and more easily accessible resources will be available in the future and connectivity will be the most essential facility in daily and business transactions. Although physical contact with actual resources and co-workers will relatively decrease, causing a more lonely and distant research environment, the speed and multiplicity of different resources will provide faster solutions and innovations.

Museums and Exhibitions: ‘Visiting’

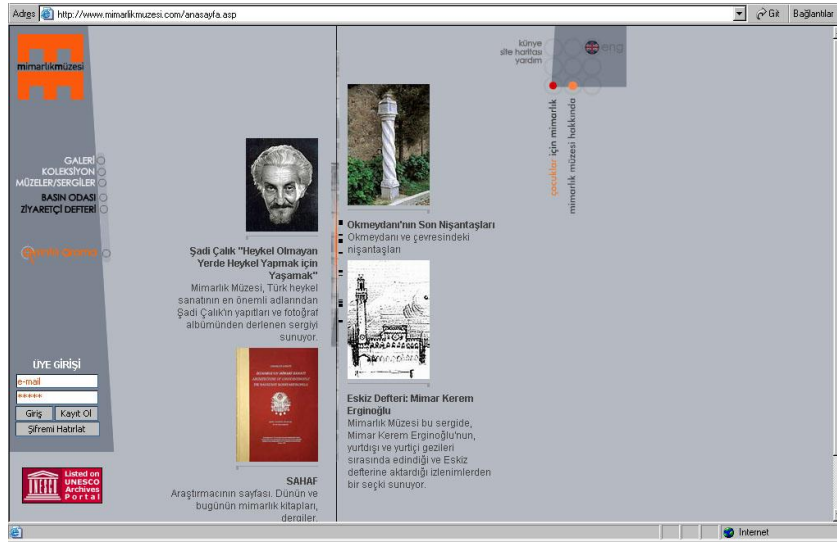
In museums, the main target was always to display the artifacts in a meaningful sequence which the visitors can follow easily and get the necessary information during their visits while experiencing the presented items. In virtual museums, the exhibition is not limited within the existing ‘physical’ space, but it is defined with the server capacity. The visitors may ‘walk through’ the virtual gallery through a desired path with all kinds of information accompanying to them.

Additionally, virtual exhibitions provide manifold different and interesting experiences for the visitors. Unlike most of the physical art exhibitions, in a virtual ones, the artifacts may not be ‘completed’ or reached their final state but be in a state of evolution. The visitors can contribute in this creation process and participate actively by altering the medium. With the advanced visual facilities of computer programming, the art has now different aesthetic criteria rather than the traditional visual criteria. It is claimed that the reason behind the production of a historical artifact in a virtual realm is to generate a copy with different effects than the original one. Simulation tries to produce the ultimate perfection and it invites the visitors as well in this process.

Alternatively, the visual medium may help to enhance the physical space. In London’s National Gallery, virtual space helps visitors to prepare their personalized routes according to the specific interests. The visitors mark the pieces of art they wish to see on the screen and then print out the personalized path on the ‘actual’ museum. Besides, carefully elaborated Internet sites or CDROMs of the museums also give enhanced information to visitors or anyone who’s interested around the world. Information is accessible for all and can be reviewed as much as needed. This provides an opportunity to retrace the material and store it conveniently. Some of the virtual museums that provide facilities online. Some examples are: <http://www.sanalmuze.org>, <http://www.mimarlimuzesi.org>. Virtual architecture museum for instance, offers a database and an information bank for the users (Figure 3.2 3.3).



3. 2 Virtual Museum Sanal Müze Home Page



3. 3 Virtual Architecture Museum

Even though a virtual visit may not be equal to an actual one, it provides free and correct information about the artifact and also maintains appealing experiences. It will always be essential and necessary to provide a physical medium to preserve the original artifacts in order to perceive them in real with our five senses. Since the actual experience of the museum, the mutual contact between the artifact and the visitor is the valuable essence, the physical display is indispensable. The contribution of the virtual museums is to supply and organize the information which was once unreachable, for anyone for anyone who needs it.

Educational Facilities: Schools or Not?

Characteristic layout of a school building have differentiated and evolved many times in accordance with the education system basics and perception of the epoch. They usually aim to gather students together with a teacher in 'rooms' with necessary equipment and create an interactive medium where everyone shares his ideas. Modern educational institutes equipped this medium with specialized tools, libraries, and laboratories in order to create the most productive spaces for learning.

As the information network emerged, the institutions were eager to use its facilities in their systems by providing the necessary network. The universities lead the process and an educational network was created worldwide among primary

universities in a short period of time. The online learning in virtual classrooms started to displace the physical one and the students could have opportunity to 'meet' teachers in other parts of the world simultaneously by video conferencing. People sharing common intellectual interests initiated to form specialized 'groups' to facilitate their learning process and share their knowledge. Later on, virtual high school and universities emerged where the students do not have to leave their homes at all. Discussions are held in 'forums' and assignments are delivered by e-mails. In virtual classrooms students with various backgrounds meet and form an entity which would be impossible without the Net. However, the effect of face-to-face communication and interaction in education is never underestimated and it is always recommended to actually 'meet' physically in order to strengthen bonds and efficiency.

Ken Friedmann explains his experimental virtual classroom in which lots of students from all around the world come together to work and learn, to cooperate in different projects: "The class isn't perfect but it is a successful experiment that points the way to new opportunities in education. Children with one kind of expertise teach others. Teachers use software as well as direct supervision. This experimental world classroom can become an important resource for the future. It's clear that technology won't replace books or playgrounds or personal interaction. It's equally clear that used skillfully, information can be cultivated successfully with the aid of information tools that effectively supplement existing techniques and traditional classroom teaching."

As it is evident from the innovations, hypermedia, as a product of information technologies, creates innovative tools and programs, creating visual, audio interfaces in different mediums to deliver and share information. The rapid decline of this new education tool, leads to questions about the necessity of educators and education institutes. Some claims assert that, the hypermedia tools' encouragement of self-educative learning with students' own strategies may lead into an active and appealing way of learning than the formal education given by an instructor.

Information technologies could offer education institutes powerful means of enriching the educational experience of their students. But meanwhile, it is not possible to completely omit the physical interaction between the students and the teachers. Part of the primary education is to get prepared for a harmonious social life

and it is not possible to achieve this through online education alone. The interaction between the students, the relationship with the teacher, the mutual studies and group works are certainly necessary for a healthy education. Virtual education can be perfectly used to support and to facilitate the 'physical' education system and that is what many institutions do nowadays.

Commerce: Where Is The Market?

Historically, the market place had an important significance in social life, thus in city planning. Since Aristotle's proposal of a 'free' square where buying and selling are done, markets have evolved in Ancient Rome according to type of product and medieval market places were used both for barter and religious rituals. Modern cities have shopping centers and main streets where different stores are located strategically in service of customers.

Now we are witnessing a process in which electronic 'shopping centers' which are provided on computer networks bring all goods right to consumers' homes and display them on computer screens by replacing some of the physical shopping (Figure 3.4). Money is replaced by digital credit card numbers and mobility is not a requirement of shopping anymore. Showrooms can be visited online. Since customers and sales people do not have to meet each other anymore, alternative trading and marketing strategies are fastly developed. The shortening of the distance between the producer and the consumer in the online shopping is called 'disintermediation' (Cotton, Oliver). Just as the industrial age is a history of standardization and increase of intermediates between the producer and consumer, now it is the mass customization and disintermediation that characterizes the present age. Now all sorts of high quality products are sold directly by mail orders. Home shopping eventually proliferates but it also loses the unique advantages of personal relationships of face-to-face interactions which can create enjoyable social contact.



3. 4 Electronic commerce

The first steps of electronic shopping as bar code scanners, credit card terminals now reached a more sophisticated point through the lines of computer network. New information technologies have greatly reduced both the time and cost of communication information. Electronic markets' sense of place is an illusion created for the users' benefit. They can serve for very large regions and be open all the time. Some of the activities that carry out in electronic commerce are shopping and advertising, negotiating, ordering, billing, payment, distribution, accounting, customer service and information processing (Stefik, 1989). Companies are increasingly reorient their strategies towards a denser use of network systems to constantly update their information databases, product qualifications, prices and images. It is now possible to follow a cargo on network simultaneously or use the advantage of display strategies by watching somewhere online.

Groceries, concert tickets, automobiles, food, clothing and many others can be delivered customers' houses after giving a credit card number online on Internet. It's possible to enter a fashion store on Net, check out the latest catalogue of clothing and choose your favorite after entering the fitting size and even see the clothes on your virtual model ([www. MyVirtual Model.com](http://www.MyVirtualModel.com)) The same, fast personalized shopping is also available for food. For example some sites such as [www. Yemeksepeti.com](http://www.Yemeksepeti.com) gives online users the chance to go through the menus of several restaurants online and to order online the desired food. Likewise, www.tatilsepeti.com offers customers hundreds of vacation packages instantly presenting different alternatives of accommodation in various parts of Turkey (Figure 3.5, 3.6).

Therefore, it is possible to obtain almost most of the desired needs at home. All information is organized neatly and conveniently for customers' use. However, teleshopping seems likely to complement rather than replace the vast majority of face-to-face shopping in malls and city centers, because it is not realistic to assume that people will abandon totally the social interaction and physical contact which they enjoy during the shopping. Although online facilities help to save time and energy, the physical shopping, as one of the main activities of societies will not vanish completely. Societies also need mutual physical contact.



3. 5 Yemeksepeti.com Home page



3. 6 Tatilsepeti.com Ho mepage

Ga mes and Entertai nment: Let's Hay Together

Com petitive ga mes those used to be played physically in a social setting by people with common interests are moved into virtual rooms of Internet. Manifold hyper mediatic facilities of 'infotainment' - hyper media programs that present information in an entertaining method- provide innovative experiences to users and gather them on the same virtual realm. These include computer game simulations where the user has to conduct a situation in which appropriate decisions should be taken in order to survive. One does not have to leave wherever he is in order to play chess with someone who he has never met. It is enough for him to log in to participate a challenging football tournament in a team of worldwide players.

In role playing games the user adopts a character and fights against the antagonists. These tools which integrates visual, audio, textual, sensual hyper mediatic aspects to form an effective tool may be developed into useful devices that combine entertainment and education in a single product which is called "edutainment" products. Other infotainment facilities include educational games for children like coloring pages or small fun quizzes, cartoons and films.

Thus, it is claimed that architectural, spatial displacements are becoming un compulsory in order to be included in the activities. It is still discussed if the effects and the consequences will be the same especially for the social development of the children. Virtual entertainment facilities undoubtedly open up new doors and possibilities in people's lives. However, it is not imaginable to omit the importance and fun of the physical entertainment such as sport activities or face-to-face games. In consequence, virtual entertainment should only be regarded as a contributor rather than an alternative for the actual entertainment.

Cultural Activities: Movies On Demand?

Mitchell qualifies entertainment as information. Ancient Greek and Roman Theatres were compact and designed purely and practically for their function. In 18th century, La Scala in Milan, designed by Giuseppe Piermarini included small private boxes, enlarging the scales of theater. (Mitchell, 1991) Nowadays, television and radio manipulated the entertainment style providing performances privately to all households, scattering the audiences to their living rooms.

The performers and the audience were separated and the connection between two almost disappeared until a solution was found to create interactive television programmes which the audiences can call or connect online. Movie theaters were also moved into houses by the provision of rich video cable network that is used to choose the desired film or channel among hundreds. DVD video stores started to offer private film halls in a personalized setting of home.

Recently, someone may instantly become an audience on the Net as well as a performer. He can be disguised and choose his role in this new social realm and contribute actively in the creation process. Music, vision, art are now accessible in almost everywhere. As Mitchell claims, the whole Net has become a stage where the performers continuously change.

However, today, even though many facilities of leisure activities are present, theater halls still continue to function. People need actual spatial changes in order to live through the actual experience of a movie or a play. Therefore, although electronic opportunities provide numerous advantages, the actual spaces of entertainment will continue to function for the imperative social experiences.

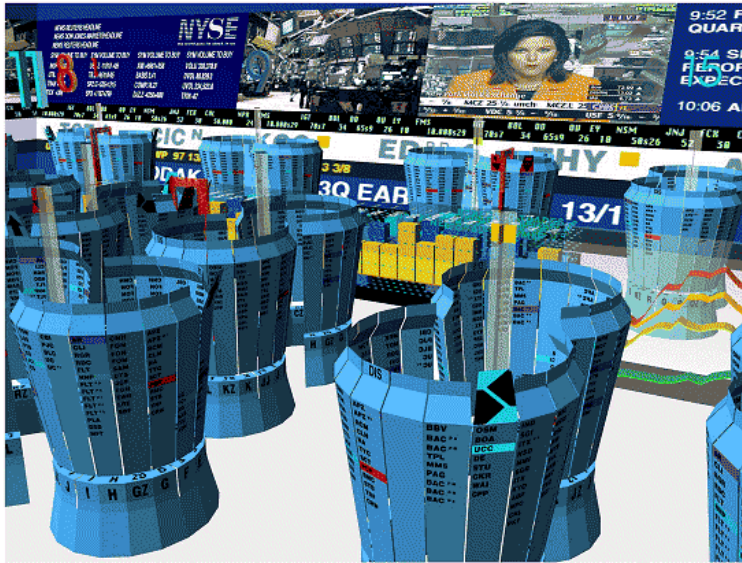
Working: Where Is The Office?

Offices and workspaces had been locations where firms display their potency and power outside. High-rise, imposing office buildings became the centers where information is collected and distributed according to the current needs. Business buildings are usually located in the liveliest districts in cities on the primary nodes of transportation and communication network. The information network initiated to establish new links in cities and business centers strive to become one of the notable nodes of this recent network.

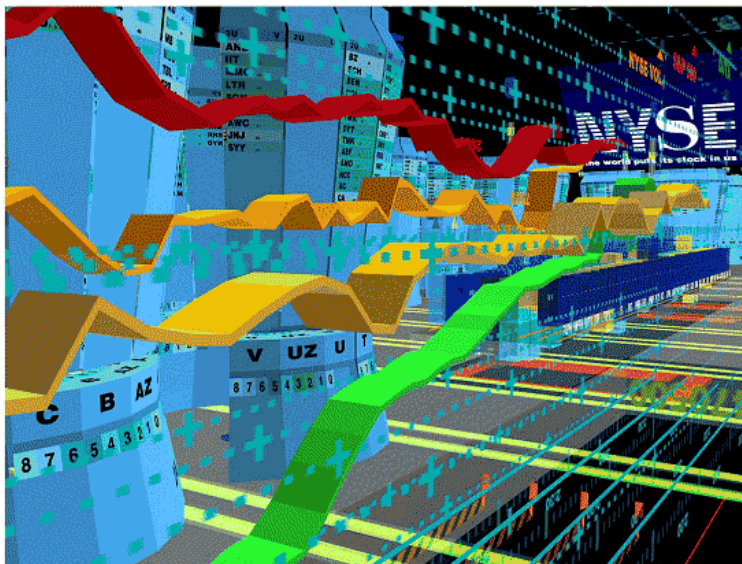
Mitchell asserts that humanity is entering the era of the temporary, recombinant, virtual organization of business arrangements that demand good computing and telecommunication rather than large, permanent home offices. In retailing the traditional store that consists of sales floor, storage and a small office for administration fragments and falls apart when electronic connections are maintained. The sales rooms can be placed on the net with the necessary catalogues and the orders may be taken online. Even the stock exchange can be followed through the net (Figure 3.7).

In offices, network connection enables business men to work together online without any need of an extra space for meetings, thus brings new alternatives for the spatial layouts. Meeting rooms and informal social spaces are augmented by virtual meeting places, but the need for face-to-face meeting space remains. Digital net working increases the flow of the information that brings enterprises together and allows transactions to continue at much higher speeds. As banking evolves into telebanking on Internet and old trading halls are turning into electronic trading systems, the alternative meeting arena becomes the Net.

Followingly, telecommuting also gained importance and attention. Telecommuting, a term coined by Nilles et al. more than a quarter of a century ago, refers to the use of information technology to partially or completely substitute daily trips to and from the workplace. Telecommuting may involve working at home or at a 'telecenter.' While the replacement of telecommunications for physical transport has been a subject of interest since the early 1940s, telecommuting was never attempted to established seriously because of the inefficiency of the technologies and the ease of commutation.



A



B

3. 7 New York virtual Stock Exchange



3. 8 Teleworking

Because of energy supply problems interest in telecommuting grew again in the 1970s. It was thought that telecommunication can simply replace the air, rail way and road networks which generate serious environmental problems. There have been lots of researches which studied the potential conservation of energy of tele-working and its impacts on transportation means and it was revealed that, to the disappointment of the researchers that only 1-3% of national energy consumption would be saved (Nilles, 1988). The conclusion reports have also underlined the negative effects of tele-working such as the extra energy consumed at home, the shift towards more comfortable regions out of the cities and the augmentation of the total distance between home and workplace (Marvin, 1997). Again, however, computer hardware and software as well as telecommunications systems were inadequate to offer the necessary technical support. By the 1990s, improvements in information technology as well as concerns over traffic congestion, energy consumption, and air pollution lead to debates about telecommuting. Today, most tasks carried out by telecommuters are done with computers and communications systems that exchange information between the telecommuter and the main office.

Telecommuting has a potential to decrease traffic congestion, reduce greenhouse gasses and consequently to improve air quality in urban areas. At the scale of individuals, telecommuting gives opportunity for a better productivity, more flexibility and a lower cost of travel as well as less stress. In 1995, a U.S. Nationwide Personal Transportation Survey found that 4% of all workers were telecommuters. Telecommuting is also regarded as an important urban design factor. The Regional Municipality of Ottawa-Carleton in Ontario, Canada for example accepted telecommuting as a transportation management measure in its transportation master plan (Tayyaran, Khan).

The idea of teleworking has many advantages: Videoconference and advanced communication tools can save a lot of time and the commute time wasted for transportation can be used more effectively either as work or leisure time (Figure 3.8).

It fosters access for women with children or for workers with disabilities. However, negative consequences such as costs of isolation and disintegration within this 'virtual' workforce, and the potential loss of the social dimension of working life should also be taken into consideration.

Residents: Home Sweet Home

In the changing conditions of today, it becomes harder to define a space according to its function. Especially, the 'home' has turned into a working entertainment, banking shopping space as well as a domestic shelter. Information equipments such as telephone, television, fax, computer can evolve homes into electronic bases which have access to the outside world. Many homes are being fused into networks on largely global scales. Consequently, 'private' and 'public' starts to merge into each other. Putnam regards home as a 'terminal':

'The modern home is inconceivable except as a terminal, according the benefits of, but also providing legitimate support to a vast infrastructure facilitating flows of energy, goods, people and messages. The most obvious aspect has been a qualitative transformation of the technical specifications of houses and their redefinition as terminals of networks' (Graham, Marvin, 1996).

Although there are still debates about the practicality of these systems, there is a growing tendency towards the interposing of more work, travel and consumption via home-based telematics which may lead toward a home-centered order of urban society. Homes may be perpetually detach from their immediate environment and enclosed into electronic spaces. It is claimed that as networks and information tools deliver expanding kinds of services, there will be fewer occasions to 'go out' of home. Castells indicates that, 'Homes...are becoming equipped with a self sufficient world of images, sounds, news and information exchanges... Homes could become dissociated from neighborhoods and cities and still to be lonely, isolated places. They would be populated by voices, by images, by sounds, by ideas, by genres, by colors, by news.' (Castells, 1989)

But changing location needs will not make us 'placeless' nomads. Mitchell asserts that people will require permanent places as 'homes'. Although there will be much more functions available in 'homes' which may eventually turn into offices as well in parallel with the development of telecommuting, people will still need to belong somewhere in particular since it is a kind of an instinctive feeling

subject to be questioned since they can now exist everywhere by the means of contemporary communication facilities. Virtual cities provide all the detailed visual facilities of the cities, presenting different experiences and forming a new conception of space. All kinds of media like advertisements; touristic sites or booklets distributed by various networks provide packaged, ready-to-use information for 'consumers' about various cities of the 21st century. The virtual, electronic city is endlessly changeable. Its structure can grow and transform rates unimaginable in a material world; its appearance may be greatly subjective, individually customized according to the choices of every visitor.

A city is an experience and this experience can be defined by a complex fabric of situations. The worldwide computer network displaces radically our concept of gathering place, community and urban life. In this respect, there are several experiments and researches conducted on the subject of virtual and cyber cities.

In the last few years, several of them were committed to examine the interactions between natural systems, like a city and virtual systems, leading rapid developments in the area. There are several reasons for building a virtual city such as the needs of city planning tasks, touristic attractions and advertising offers. Architects will use virtual cities as perfect environments for building renderings used in client presentations and community approvals. Engineers can use city datasets for telecommunications studies and logistics. The entertainment industry will profit by virtual cities as the perfect "virtual sets" for movie or television production. The US firm Studios Planet 9 which is a 3D products and content company focused on providing real business solutions for the Internet, alone has created 40 cities in virtual environment such as Virtual NY, Chicago, London etc used by architects, engineers, researchers, movie-TV producers, game developers and others interested in using realistic city scenes in animations and real-time applications (Planet 9; <http://www.planet9.com/>) (Figure 3.10, 3.11, 3.12).

The department of Psychophysics in Tübingen created a 'virtual Tübingen' which is a realistic model of the old town of Tübingen (Virtual Tübingen; <http://www.kyb.tuebingen.npg.de/bu/projects/vrtueb/>). This project analyses behavioral and spatial recognition of people, navigation, spatial memory and also the applied speed in Tübingen. According to the Tübingen researchers cross-references exist between virtual and 'real world' experiences (Figure 3.13).

However, a virtual city, which may be regarded as a metaphor, can be a limited copy of a real urban living space. One of the foremost experimental social platforms in European cyberspace, the digital city of Amsterdam is a rewarding initiative of a city metaphor in cyberspace, which was established in 1994. A city, whether it is virtual or real can be as lively as its population. A two dimensional digital city from Holland De Digitale Stad (DDS) consists of different aspects of social life besides chat forums such as, the 'Central Station' that offers access to the entire Internet, a digital cafe, a digital kiosk, the digital house of culture and the arts, or a digital sex-shop. The manager of the project Marleen Stikker claims that, ‘‘All those ideas you had heard so often from the United States about the new information society, tele-democracy, electronic citizenship, suddenly became a reality on DDS’.



3. 10 Virtual Boston



3. 11 Virtual Chicago



3. 12 Virtual New York City



3. 13 Virtual Tübingen Webpage

DDS aimed to democratize the use of Net and to create a digital public domain and attract tens of thousands of users, becoming the largest, ‘free net’ in the world. It introduced the Internet to the general public in Netherlands and provided e-mail addresses, homepages and above all freedom from censorship and surveillance. It quickly developed into an international symbol of the public arena in cyberspace. The main interface provided a fully text-based environment and constructed around the terms of ‘squares’, ‘building’, ‘homes’ just as its name implied, thus generated the evolution of the community identity. The Amsterdam Digital City provided a

lively Internet culture with its nearly 70 thousand 'inhabitants' by mid 1998s. (www.dds.nl)

Another experimental research project Telezone (TeleZone; <http://telezone.aec.at/>) investigates the virtual communities and the connections between architecture and networks. The users or the virtual inhabitants of Telezone, incessantly construct online structures on the interface by using blocks. Some physical regulations exist for this virtual community and the inhabitants regularly decide on some changes about these regulations on democratic basis in special rooms or forums on the site.

An Online Autonomous Urban Process Field, 'Trace' is a real-time media installation which is prepared for the exhibition of 'The Archeology of the Future City', in Tokyo in 1996. Trace, reforms the city as a multilayered realm framed by the cultural activities of its inhabitants. These activities include surfing in the Internet and providing data into the database, which do not disappear afterwards. As the visitors of the system leave their traces behind and coincide other traces, they exchange data on the way and contribute in the environment itself, Trace incessantly evolves and reforms. The project was the first activity where human online activity led to the formation of three-dimensional virtual spaces.

So;

In consequence of these transformations, spaces will gradually be overly functioned to be specifically defined. Individual spaces will merge into each other forming complex and indefinable ones and temporal separations that consist of work time, leisure time will be reshaped. It is under discussion if it is desired to create a life style as such. The borders and separations may disappear, causing certain architectural and urban compositions to fall apart.

Once, they were the street networks, the hidden corners of wonder, the passages, the arcades that were explored. Now entering a web page offers the user the discovery of unimaginable size of information, presenting him various hyperlinks to connect to other parts of the information network. Images are shared, sites are linked, and virtual work teams across the world are formed, dissolved and reformed, redefining the economics and aesthetics of the new realm. These changes will certainly have complex affects on urban design and urban networking which will be discussed in Part 3.3

Information computer networks provide various virtual realms for different purposes such as commercial, entertainment, education, etc. The contributions to the physical realm are numerous. The easy access to information, the facilities of communication, flexibility and speed are just a few of them. Although they maintain many innovations and advantages for the users, it is not possible to think that virtual spaces and activities will completely replace the physical space. The city can be considered as a city with its lively, active and crowded environment. Humans are social beings who enjoy and need such an environment to live and to socialize. Even though people are getting physically more isolated in their homes while connecting to the whole globe in front of their monitors, they still need face-to-face relationships and activities since they are part of a 'physical' society. Therefore, instead of making the informational space the sole domain to 'live', researches are more interested in transferring the virtual space as a facilitator of the physical one.

3.2.2 Effects on Social Life and Emerging Concepts

Information technologies which developed computer-mediated communication, suggesting any form of communication between two or more individuals who interact via computers had created non-physical communities by forming informational 'spaces' for people to meet and interact. Computer mediated communication generally refers the collection of electronic mail, video, audio, text conferencing list servers, instant messaging and multi player video games.

Three main characteristics of these virtual communication mechanisms are synchronicity, persistence and anonymity which vary greatly for different kinds of communication. Although instant messaging for example is high in synchronicity, it is not persistent. On the other hand, bulletin boards are persistent but not synchronous. Instant messaging allows logged in users to communicate by typing in real-time conversations. Usually, both sides see texts right after it is typed and other users may also be invited to the 'chat rooms'. ICQ was the first instant messenger introduced in November 1996. Afterwards, they developed into real-time telephone conversations through the net and later on, web cams facilitated the conversations with real-time images.

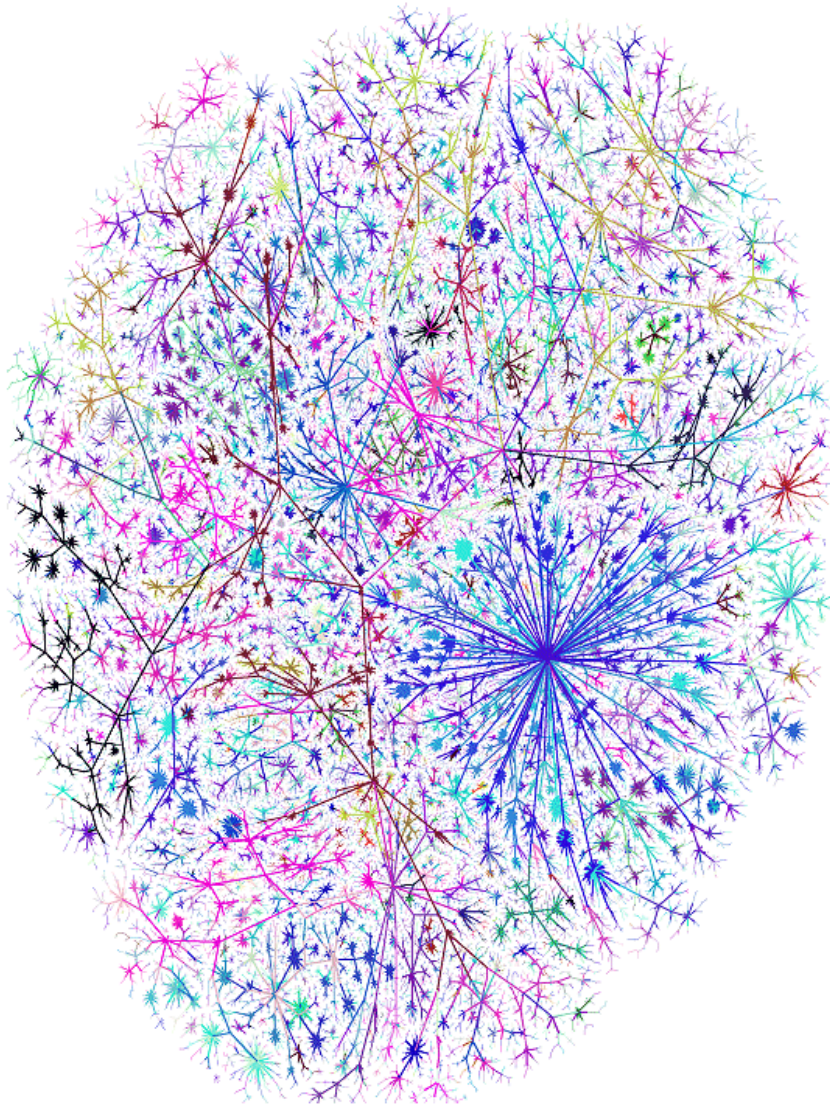
According to Castells, information society is a social structure where the source of economic productivity, cultural domination and political power depend on the capacity to store, process and generate information and knowledge. Since the world has now interconnected, information and technology is necessary to build up a social structure. It is claimed that local urban community networks can generate a new realm for cities. Information technologies which support interactive social discussions can bring together the scattered social, cultural and geographic parts and ultimately create a consistent social space. Some of the electronic social spaces which change the usual definitions of social interactions are mentioned below

Electronic Mail and Electronic Groups

Electronic mail is a very flexible medium which can be utilized for personal conversations, public newsletters and private discussion groups. When electronic mail is used for group conversations, the network borrows the character of place like office café.

Electronic mails provide access and connectivity between hundreds of people offering them means to share information or entertainment. News groups or electronic groups that are formed by people with common interests provide filtered information and form a direct link to people who would not have met otherwise. Communication has been reshaped and got faster. They maintain support and sense of community. The lifetime of a group depends on the relevance of the topic (Figure 3.14).

Electronic mails produce, send and make limitless copies of a simulated document. Mailing lists, newsgroups, information filters of various kinds provide efficient means for linking up similar minded people. Hence, they reinforce social, cultural boundaries and categorical identities. While online interactions fragment some established boundaries, online meeting places can simultaneously strengthen others and even create new ones. Electronic communication both augments our capacity for social interaction and changes the structure of relationships.



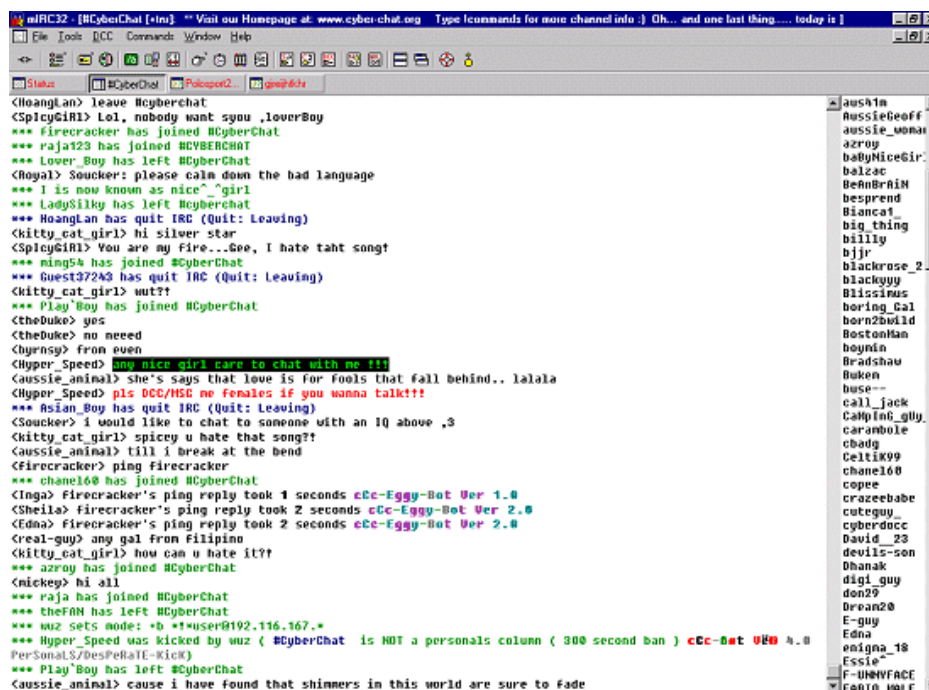
3. 14 Network connectivity map by Larry Landweber

An alternative to the mailing list is the bulletin board. Bulletin boards are centralized digital media that allow users to access a number of functions such as access to new lists, chat facilities and to connect to and download information from other boards.

Virtual Communities and Forums

Howard Rheingold who is a leading thinker on the cultural, social and political implications of modern communications media and the member of the WELL, ‘The Whole Earth Electronic Link’ which is an earlier example of a virtual community, describes a virtual community as ‘an electronic agora’. He defines it as ‘one of the public places where people can rebuild the aspects of community that were lost when the mall shop became a mall.’.

A virtual community is a group whose participants are linked by means of information technologies such as MUDs (Multi-User Dungeon) chat rooms and electronic mailing lists. It is a new type of non-governmental association set up by the community itself in order to promote Internet use among the society and may be coordinated regionally, nationally and globally providing users public or semi-public space. (Figure 3.15, 3.16). The virtual communities of network are defined by the members' common interests rather than their locations and they don't necessarily indicate a strong bond among the users. The communication that takes place may either a one-way (the owner makes the announcements) or merely informational where people ask questions and post answer on a topic of common interest. However these communities may include those reside in a certain area or institute.



3. 15 IRC Chat Interface

An example of these discussion groups is group called Design-L. The basic subject of this network of Pennsylvania University is design, architecture and urban issues. Hundreds of people from all around the world communicate each other through this network. Ideas are exchanged daily.

In the article about the current restructuring of the cities, Ken Friedmann, explains how he 'visited' virtual communities:

When I turn on my computer every morning at the Norwegian I log onto an email program. This program permits me to enter a sequence of virtual communities, one after the other. These communities are shaped around the type of interactive forum known as a discussion group. A discussion group or list is an e-mail network to which any interested party can subscribe. The members are linked by the mechanism of a list-server that is a computer that serves the list and list software. Some are limited to subscribers who meet certain professional, political or personal criteria.



3. 16 Messenger Interface

Friedmann continues to describe the group: ‘‘This is a virtual community. Members of this community don’t generally live with or work with anyone in this particular corner of cyberspace. It is a useful common space and we share it in the same way many different people may share a library or a city block, each going about their business, commenting, speaking, interacting’’

In the ‘‘Design Networking’’ exhibition organized in Istanbul in September 2004, certain online communities of network designers were introduced. Being one of them CORE 77, is an online community of industrial designers who create websites, interfaces and prototype products for the significant worldwide firms and runs the Core77.com community site (www.core77.com). Designers and design students gather from all around the world, searching for knowledge, connections, money, etc. (Figure 3.17).

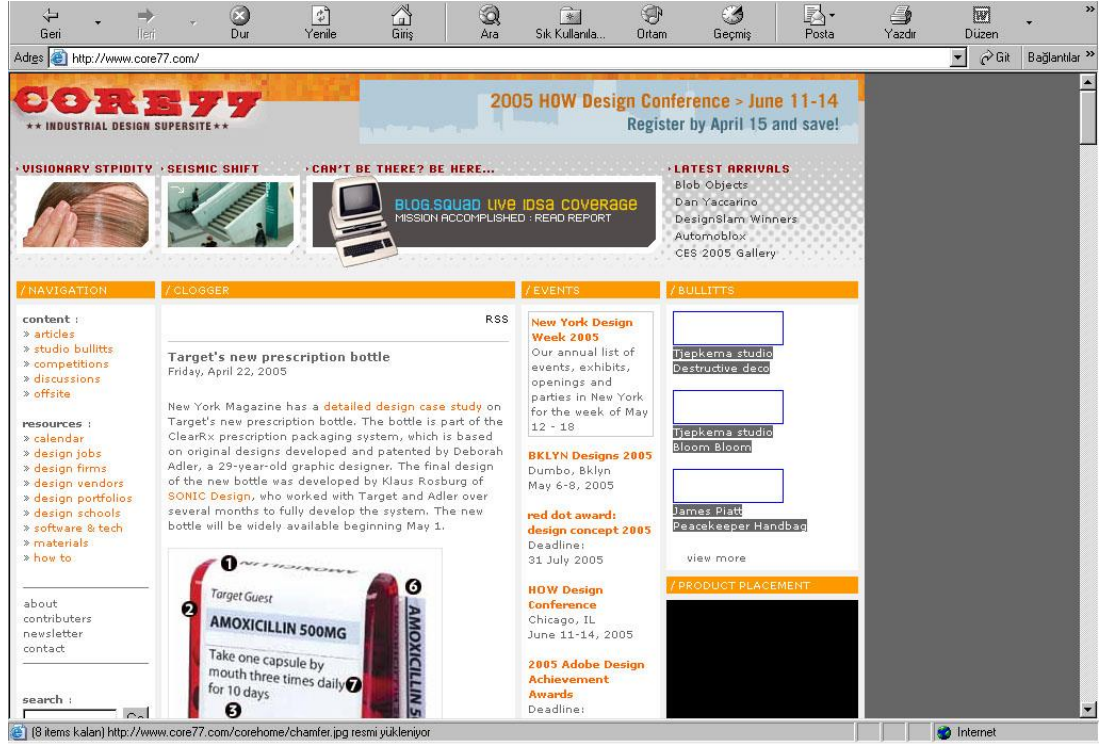
Another community is Doors of Perception, which is a global forum online examining new design issues as they relate to the environments, politics and technology. They generate new ideas to form innovative business models and becoming a platform of recent idea exchanges. (<http://www.doorsofperception.com>) (Figure 3.18). The network ‘Urban Probe’ (UP), connects the urban planning and architecture; real estate and governments; individuals and cities. It aims to form links between those with the tools, the ideas and resources to build urban environment. UP is currently building a multi-purpose gallery in New York’s Lower east Side.

There are conflicting views about the virtual communities. Mitch Kapor, the founder of a virtual community EEG (Electronic Frontier Foundation) claims that, ‘‘Life in cyberspace, at its best is more egalitarian than elitist and more decentered than hierarchical. Life in cyberspace: founded on the privacy of individual liberty and commitment of pluralism, diversity and community’’ (Kapor, 53)

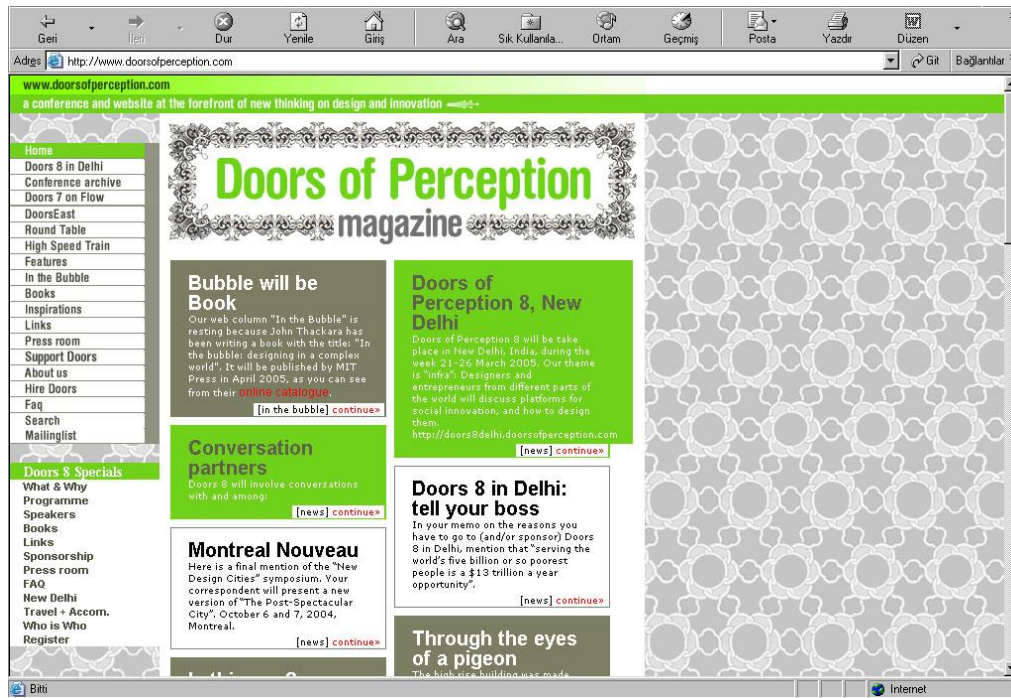
On the other hand, Baudrillard asserts that cyber community creates ‘an imaginary effect concealing that reality no more exists outside than inside the bounds of the artificial perimeter’. (Baudrillard 2003).

It is not possible to claim that virtual communities may replace the physical societies or groups. Indeed, Mitchell claims that there is growing evidence that electronic communication increases the overall capacity for social interactions. Virtual communities function best when they open up possibility of face-to-face interactions. It is observed that online relationships actually augment the demand for more face-to-face encounters. Stacy Horn, the founder of New York’s Echo states that, ‘If someone you talk to online is interesting you want to meet them in the flesh I don’t just want to talk about movies with people, I want to go to movies with people.’ (Mitchell, 1999)

Correspondingly, the increase in telecommunications during the 1980s and 1990s has been followed by a growing demand for meeting facilities and convention centers. Although most of these were the result of an augmented economic expansion, it also revealed that business relations founded and regulated by electronic telecommunication, still required personal contacts. And oppositely, face-to-face contacts at these encounters and meetings encourage successive telecommunication. The two transactions are correlated.



3 17 Core 77 Homepage

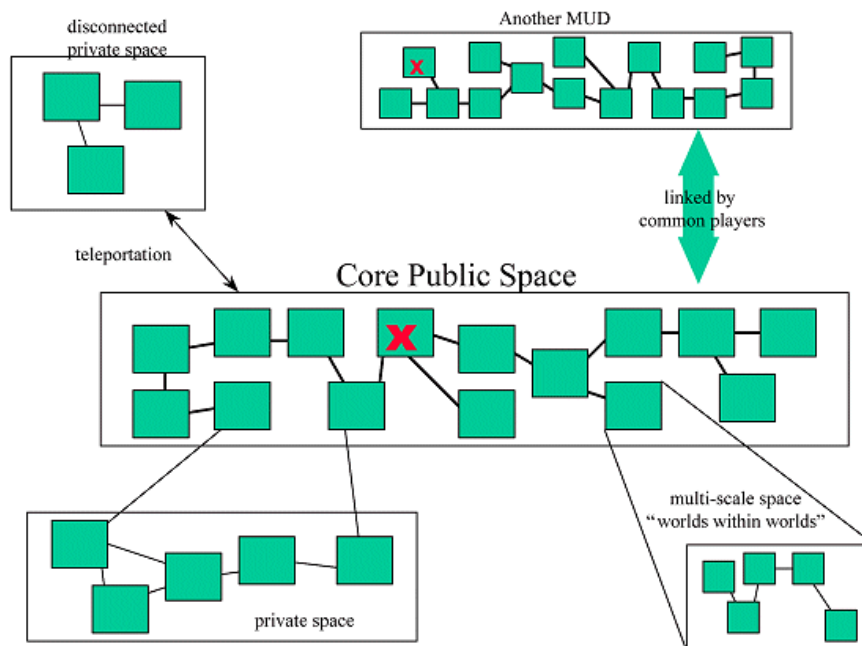


3. 18 Doors of Perception Homepage

Multi- User Dungeons, MUDs:

A 'Multi User Dungeon', MUD is a networked virtual reality software systems of interactive role-playing games whose user interface is entirely textual. They attract thousands of people all around the world and serve as experimental mediums in which users can build up their own personal identities and provides each user access to a shared database of 'rooms', 'exists' and other objects. Therefore, a MUD is a kind of a virtual reality, an electronically represented 'place' that the participants can visit. Being the equivalent of urban neighborhood, a MUD is normally a fictional environment where people agree to play roles in order to have fantastic adventures. Some MUDs are vast worlds consisting of many hyperlinks which are connected to other virtual realms and allowing users to roam around various settings. Mitchell resembles the World Wide Web, MUDs and Free-nets to Hippodamus' gridded layout for Miletos and Hausmann's radial patterning of Paris, in sense that they are large-scale structures of places and linkages designed to maintain the needs of their inhabitants (Mitchell, 131) (Figure 3.19). In games of MUDs, the users may do whatever they wish to do by protecting himself from the real life consequences. Users log into a MUD through their computers and by the verbal descriptions they

visualize the scene with their imagination. The text depicts an artificial place where each participant has a different character and forms social world, not solitary ones.



3. 19 Schematic of the generic spaces found in a MUD

A typical conversation is shown below (Stefik, 266)

>look

Corridor

The corridor from the west continues to the east here, but the way is blocked by a purple-velvet rope stretched across the hall. There are doorways leading to the north and south

You see a sign hanging from the middle of the rope here.

>read sign

This point marks the end of the currently-occupied portion of the house. Guests proceed beyond this point at their own risk.

-the residents

>go east

You step disdainfully over the velvet rope and enter the dusty darkness of the unused portion of the house.

Unlike the typical computer games, a MUD is not goal-oriented and there is no 'winning', 'success' or 'score'. It is extensible from within since the users may add new objects to the database that can be depicted in detail. Additionally, multiple users can communicate real-time and that is the key point, which turns a MUD into a social area.

Participants can constitute a character by choosing a player name, a gender and depicting a self-description. MUD players generally spend their online time socializing with each other, exploring the various rooms and other items on database and adding one of their own designs.

One of the most significant social factors in MUD is the absolute anonymity provided to the players. Users do not feel limits they feel in their real lives such as their physical appearances, race, etc. According to Pavel Curtis who has established a MUD called Lambda MOO and made a research on MUDs and its users for a couple of years, many players have reported that they are much more willing to open up a conversation with strangers they encounter in the MUD than in real life (Sefik, 275).

This protective anonymity has also some negative consequences such as sexual harassment and deliberate offensiveness. In spite of the negative consequences, MUDs do become a real community after a period of time. The users ultimately constitute a common language, and agree on the appropriate standards of behavior.

Net work Society and A New Social Structure

Quantitative changes in information are leading to qualitative manipulations in social systems. Webster suggests that we have now entered a new era of a 'network society' that has come out from the integration of capitalism and the 'information revolution' (Webster, 102). Castells claims that, since in a 'network society' everything is about speed of response and adaptability in a global market, then the most important things are the networks. Wellman defines "community" as networks of interpersonal ties that provide sociability, support, information, a sense of belonging and social identity and asserts that in networked societies boundaries are permeable, interactions are diverse, connections switch between multiple networks.

Although social networks had always existed, the rapid appearance of computer technologies which link people, institutions and knowledge had certain affects made

them one of the major forms of social organizations. Physical closeness does not mean social closeness anymore. Broader bandwidth of the information networks provides means for faster access to network, enables larger files to be transferred in a short period of time and increases user's telepresence. Additionally, computing and computer-mediated communication and connection via mobile phones using wireless technology is widely available. Besides, e-mail discussion groups and chat rooms allow people with common interests to come together. Personalization of the network facilities such as electronic mail boxes gives users a kind of freedom and familiarity in the online world. Since community networks are commonly consist people who voluntarily join the network, users are mostly content about being a part of a group.

Telecommunications and cyberspace had also affected cultural state of the society. The cyberpunk culture has both utopian and dystopian strands. It points out to the intellectual and cultural possibilities of the emerging global 'non-space realm'. The virtual realm of the net has been subjugated by the enthusiasts, but has also attracted attention from a number of researchers. According to Webber's researches, specialized scientific communities provide the most effective evidence of global social networks (Webber). Cyberspace has transformed the household into a more important place where people can log into their social networks in which they can plan their regular visits without physically moving. On the other hand, it may cause some fragmentations in the family relations while tying people with common interests together. Online relationships have build up a deep sense of belonging and a collective identity. They also fostered individual independence by making everyone the operator of his own network. Wellman claims that this is a time for individuals and their networks, not for groups.

Computer-mediated social network modifies the way people contact and interact with each other. Neighborhoods, for example are losing their importance in terms of social relations since household has become the basic portal of networking and establishing relationships through the net. The structure of community networks influences people's dominance over their lives, and individuals' positions in the network characterize the resources to which they have access.

According to some, through the growing interactive media culture and the development of the Internet, individuals are becoming freer and stronger than the past. On the other hand, others stress that the process may cause the local values to

be lost and create polarization in the social access of information. In both views, whether pro or con, meaning of an urban culture will certainly transform. Contemporary culture is more heavily information loaded than any of the societies before. One may have access to information and interact anybody around the globe. According to Marshall McLuhan's vision, global communication will be used to overcome the differences between cultures and societies, to create a new global village where people will gather and struggles towards a mutual trust and understanding developing a world which is smaller and more democratic (Dodge, Kitchin).

However, Castells regards the Internet as a realm which plays a uniting role by creating an electronic community, because of its interactive characteristic. So, he proclaims that, 'Internet will expand as an electronic agora' (Castells, 1996, 357) to declare an 'interactive society'. (358) Some believes that a genuine sense of community which involves real space and real time interaction can not be acquired by the restricted communication of Internet. But according to Castells, nowadays it is an obligation to be included in the Internet in order to participate in today's society.

A major debate currently focuses on the question that if telematics can be used to support social liberation by overcoming the isolation of disadvantaged groups such as disabled people. While 'virtual communities' may be advantageous for certain groups, some commentators claim that such technologies may widen the gap between social groups even further. Accordingly, while affluent part of the population benefit the facilities of contemporary innovations, low income people hardly have access to transportation network. The disadvantage of deindustrialized cities augments by the lack of investment and necessary telecommunication infrastructure. A large group who tries to combat with poverty cannot obtain the devices for Internet access such as computer, modem telephone line, electric energy. This fact emphasizes the importance of the maintenance of facilities such as Internet based information technologies in public urban places.

Much recent policy has focused on the *digital divide* resulting from inequalities in access and indicates that if telecommunication facilities are effectively and strategically use to deliver sophisticated educational, medical and other vital services, the negative distinctions between the city and the rural areas would diminish. Marx and Engels had observed that the growth of great industrial cities had

‘rescued a considerable part of the population from the idiocy of rural life’ Mitchell, after pointing out that the ‘idiocy’ here refers to ‘narrow horizons’ or ‘isolation from the wider society as to something closer to the sense of the Greek *idiot*s, suggests that today the digital revolution is completing the job. For planners and politicians, the task is to find solutions for a social equity. For architects and urban designers, it is to create an urban fabric that provides opportunities for social groups to intersect rather than to become isolated. Community based electronic networks should certainly be used by a larger fraction of the society.

Today’s relations and community ties are combinations of face-to-face interactions, scheduled meetings, telephone calls, e-mails to one or several people and broader online discussions. Place-to-place contacts allow people to reach a community without being dependent their physical neighborhoods. No one is identified with a single group. Households now demand high-speed access to the Internet, express ways and airports to facilitate their connections with people in other places. The new society lives in a combined realm of physical space and cyberspace and goes through certain manipulations as a consequence.

3.2.3 Global Scale Effects

New information and communication technologies created dense, large-scale networks and territorial organizations in which many activities continue to function. Cities have always been important crossroads for trading economics and other worldwide events. However today the intensity, complexity and the ‘regional’ span of the networks, the time necessary for functioning and the number of cities that constitute the nodes are incomparable to the vast geographies of earlier, simple connections. Some of the networks connecting the cities worldwide are global networks of firms, cross-border organizations which maintain international growth corridors.

Following the progress of innovative services, the urban centers around the world become more interdependent, while forming a complex global network with various intensities and scales depending on the location on the network. Information networks facilitate the communications by their openness, decentralized and non-hierarchical attribute and possibility of expansion. Three properties of information networks which are speed, simultaneity and interconnectivity have lead to interesting

global outcomes by creating a dense space of flows. Space of flows is the dominant spatial manifestation of power and function in the society and kind of spatial physicality in selected localities such as a telecommunication system, an advanced transportation system that links the most major airports, high speed trains, etc. All the geographic distribution of activities, power and the new spatial processes are analyzed with this concept. Manuel Castells depicts several stages of space of flows including the basic electronic infrastructure and the world city network that constitutes one of the upper most stages of spatial organization (Figure 3 20).



3. 20 Complex urban networks

Globalization, by manipulating the strict notion of geography formed by country boundaries provides an alternative large-scale spatial frame, thus a ‘‘netageography’’ (Taylor et al.) Global space is a space of flows, an electronic, decentered space in which boundaries become permeable. Globalization is a matter of inserting the multiplicity of localities into overall picture of a new global system (Morkey, Robbins). It is about the compression of time and space limits and the creation of a world of instantaneity and depthlessness. In recent decades, globalization has transformed traditional power relationships in society by breaking apart geographic borders, challenging the sovereignty of the nation state and centralizing control of mass media on certain individuals (Figure 3 21).

Frank Webster defines the globalization process not merely as an ascending internationalization of transactions but as the growing interdependence and

interpenetration of human relations as well as the growing integration of the world's socio economic life (Webster, 68). It is an economic, social, political and a cultural process that is signaled in economics, international trade, banking, insurance, tourism and popular cultures in various ways.



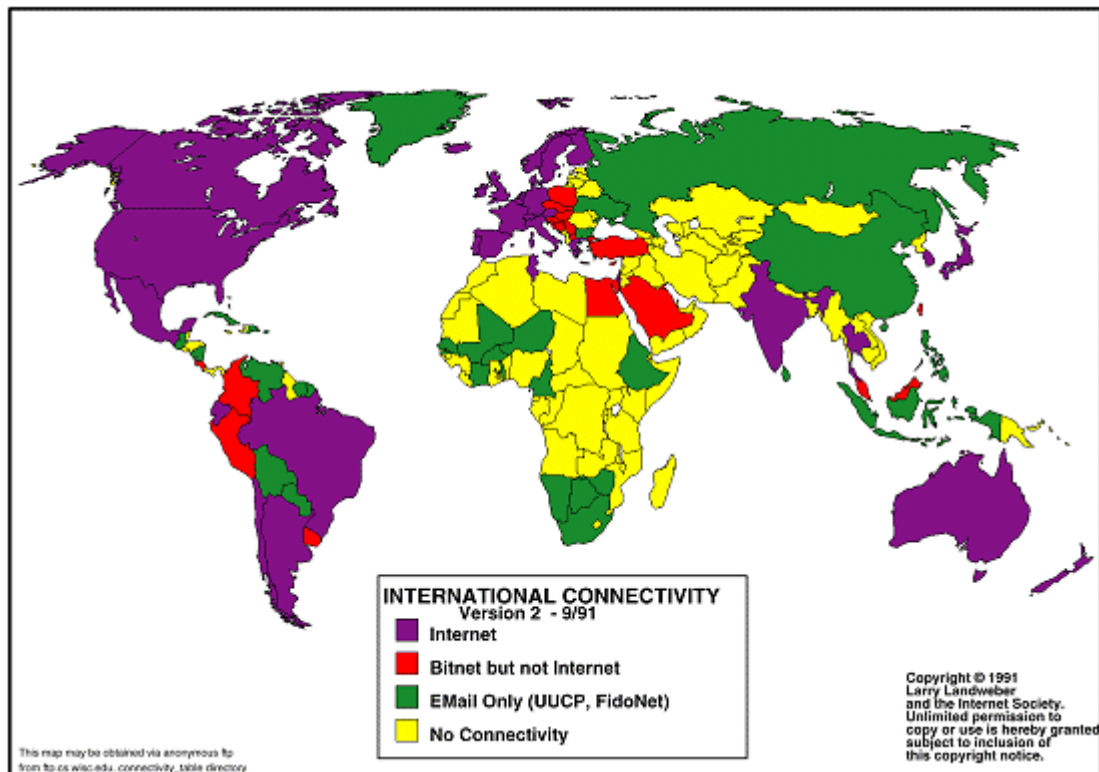
3. 21 Transpolis, Global Underground; Xavier Greus, 1999

Taylor argues that in future, it will be the city-centered net ageography rather than nation state-centric one that will dominate the world system. Globalization spreads throughout the world rapidly with extensive global information networks whose indispensable nodes are the world cities. (Sassen, 2002, 96). Countries will be dependent on the network system in order to remain commercially, culturally and economically a strong node. It will be critical to be able to provide access to all

citizens without exception, by taking the equality and democratic values in consideration.

Cities have always provided detailed, vast information of the latest developments and commercial regions for the citizens, thus established an idea of centrality for its inhabitants. However, new information technologies change the role of the cities in this sense. European metropolitan centers have various positions in the global network and they turn into a ‘‘world city’’ by establishing a strong node and being a part of this network. World cities are conceived as nodes in multiple networks of economic, social, demographic and information flows. Cities are connected through economic, political, cultural and social productive exchanges. Taylor claims that power of a city depends on its connectivity with the other cities (Taylor). Generally, the flows between the cities carry human, material or communication. Global cities expand by high-level service industries, global financial organizations, national governance institutions with adequate media, telecommunication, computer and transportation networks. The emergence of information, capital and power exchange system that organizes the basic developments of societies and states links these world cities together (Figure 3.22).

Castells explains as follows: ‘‘...from the perspective of the spatial logic of the new system what matters is the versatility of its networks. The global city is not a place, but a process. A process by which centers of production and consumption of advanced services, and their ancillary local societies, are connected in a global network, while simultaneously downplaying the linkages with their hinterlands, on the basis of information flows’’ (Castells 1996, p. 386). He argues that cities will have more obscurity in their transition from the industrial stage to the informational one and continue to possess a more traditional urban structure if their status in the recent information network is inferior than others.



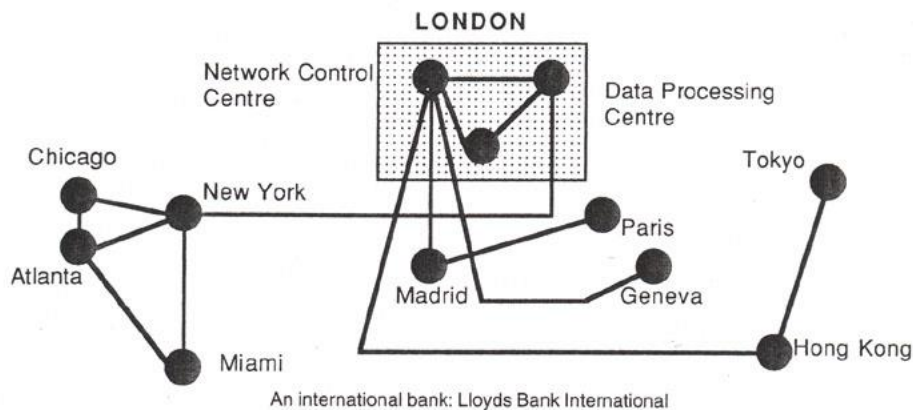
3. 22 International Network Connectivity

On the other hand, they may prosper and have a more sophisticated urban structure if they can enhance their role in the advanced services of the business field. All the spatial and structural changes in cities point out the emergence of a broader notion, that of the Informational City. For Castells, the Informational City is the urban expression of the whole matrix of determinations of the informational society, as the industrial city was the spatial expression of the industrial society.

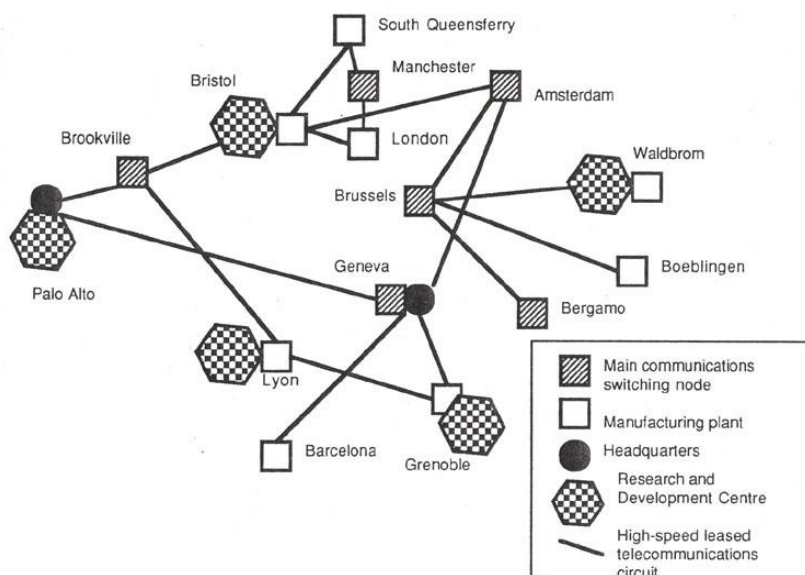
World city network has three levels: the network level, the world economy in which the network is constructed, the nodal level, the cities that are the multiple centers of the network and the sub-nodal level, the service firms that are the agents creating the network (Taylor et al). The latter is the main level at which the key process occur.

The global cities mostly direct all of the features of telecommunication innovations such as electronic commerce, advance phone services, digital media networks. They provide Internet services by bringing together various financial, cultural, institutional, social, informational and infrastructure networks worldwide in a variety of organizations (Sassen, 2001). Telecommunication networks and services constitute the basic infrastructure of global cities providing the indispensable tools to serve as points of transaction. For Castells, world cities are not simply places,

they are processes through which flows are articulated with power existing in the flows themselves (Figure 3.23, 3.24).



3. 23 Linkage of cities into global net work; International Bank: Lloyds Bank International net work



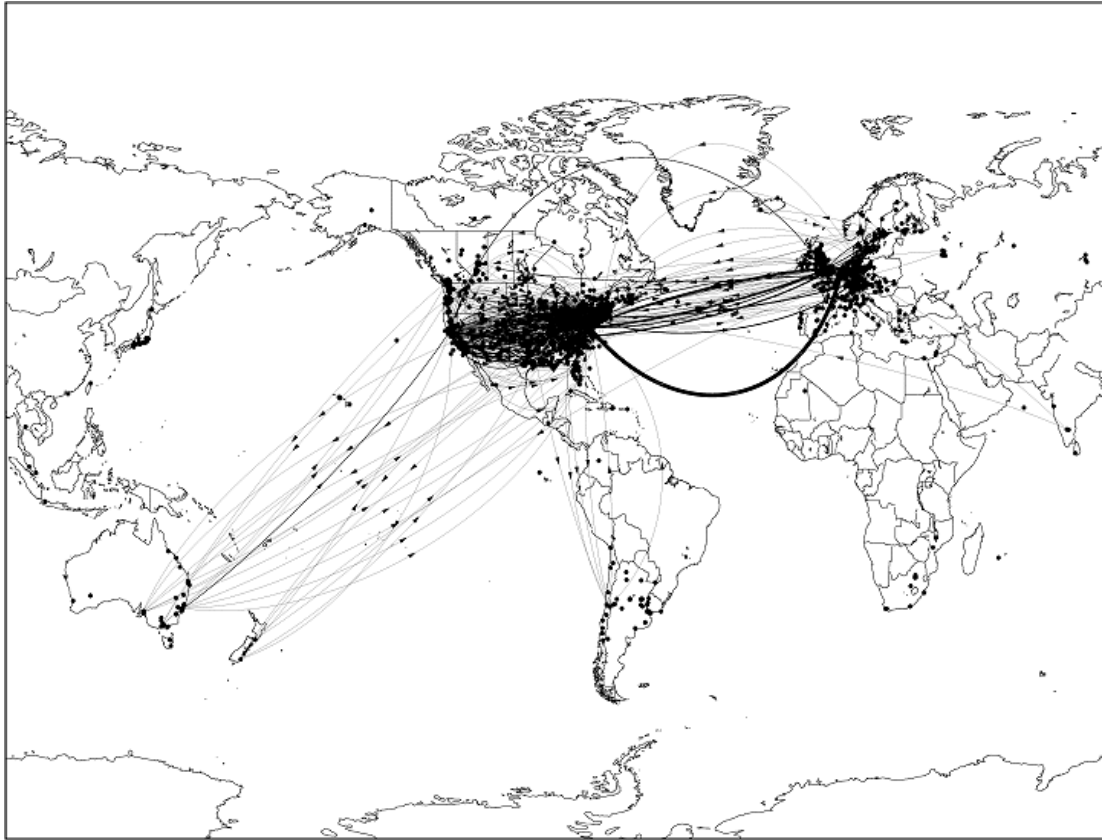
3. 24 A global manufacturer: Hewlett Packard

According to Sassen, global cities are command points in the organization of world economy, key locations and market places for the leading industries and sites for the production of innovations. The hierarchy in the global network is highly competitive and tends to change incessantly. The metropolitan nodes function as highly intensive control points in the coordination of world economy, as locations of production in primary industries and as markets of the productions (Sassen). The most powerful of these are major international business centers such as New York, London, Tokyo, Paris and Frankfurt. For example as Sassen indicates that, more than 80 percent of international data flows are occupied by the communications, information flows and

transaction in the financial services (Sussman, 1997, 38). Also, most of the national telecommunication movements take place in global cities of London, Paris. Manhattan for example has more telephones than all 40 nations in sub-Saharan Africa put together (Sassen, 1997: 231). It also provides the highest Internet activity on Earth, since Internet and the information, communication provides support for all aspects of functioning city.

Cities are production sites and they contain infrastructures of activities, firms and jobs. Growing service intensity and globalization that relies on and are shaped by the new information technologies have both distinctive impacts on urban space (Sassen, 1997: 181). In globally networked economy, industrial cities of the past which were designed to generate mass production will decline. But, urbanization will continue and metropolitan regions will stretch out by including urban areas into their expanded global networks. Additionally, new industrial regions will be developed in areas that were not occupied before (Sassen, 2002, 61).

In the new order, the productivity and competitiveness of the cities is determined by their capability to unite information capacity, quality of life and connectivity to the network of major metropolitan centers at the national and international level. Thus, accessibility is a key concept because it determines each emerging world city's potential as a generator of goods, people and information (Figure 3.25). The emergence of 'informational city' also has deep impacts on the transformation of cities. Although until recently, centrality meant the downtown or central business districts, right now there is not a direct correlation between centrality and geographic locations such as 'downtowns'. It may also imply the new global grid of the cities. The center can be formed inside a metropolis as a grid of nodes formed by business activities connected by digital superhighways (Sassen, 2002, 13).



3. 25 International news flows

Graham asserts that the increasing centrality of key large urban regions, or ‘‘global cities’’ of economic, social, political and cultural dynamics of the world presents an example of a reconfiguration of space through telecommunication (Graham Sassen, 2002, 71). In these cities, the infrastructure compresses the barriers of time and space, forming a complicated network structure. They eventually build up their own international optic fiber networks, detaching themselves from closed, traditional urban independence and national infrastructural sovereignty. Through the city optic fiber networks, dominant media and financial actors can amplify their power and dominance over space, time and people. Castells and Hall mentions that if dropped by a parachute into the new world cities which market themselves as ‘wired’ such as Cambridge, UK or Massachusetts or California or Munich, Germany that we could not recognize the country since the universality of the cultural symbols and urban landscape could mean we were located in any place in the Western World.

Yet, this formation does not lead to disappearance of regions, on the contrary globalization stimulates regionalization (Randolph). For example, as the economic

activities become more internationalized in Europe, the regions become more dependent on these activities and initiate to struggle more to compete in global economy by developing cooperation networks between regional institutions and firms. Consequently, regions and locality become integrated in international networks. (Randolph). There is an important relationship between local and global spheres and new forms of localism is being developed that resist the process of globalization. Dodge and Kitchin assert that western cities seem to be developing in two directions simultaneously. At one level, they become less distinct, more global and homogeneous, at another level, they try to market themselves as unique locales, apart from other places in order to attract consumption (Dodge, Kitchin).

The economic base of metropolitan areas in industrially advanced countries continues to shift from mass-production manufacturing to knowledge-based systems of production and services (Tayyara, Khan). Therefore, clustering firms and telecommunication critically influence the emerging global geographies of telecommunication infrastructure development. Accordingly, a mutual relationship between global geographies and telecommunication exist that leads to the mutual improvement of both. They become the basis of rapid technological change and high investment on telecommunication infrastructure. Advances in telecommunication are mostly steered by internationally dominant global metropolitan regions. The urban dynamics emerging in global city regions depend heavily on innovative telecommunication network for strengthening connectivity, both within and between the cities.

Firms which connect the cities globally to other parts of the world, endeavor to maintain a 'seamless' service for their global clients. The use of telematics allows multinational firms to function a wide variety of production units in various functional sites while integrating them together in real time. It's argued that by using integrated computer technologies, firms will be defined not by physical boundaries but by collaborative networks linking thousands of people together. The invisible electronic transmissions of information between offices are the essential component of the world city network. Each city on this network has different strengths, roles and positions. Today, the increasing formation of global communication empires such as Sony, Disney, Paramount, etc is the most remarkable process of globalization. Internationalization, although was always present, now enters a new stage since the

unities of economic, cultural production and consumption become transnational. In this new state, a dialectic of global versus local appears powerfully. ‘‘The informational/global economy is organized around command and control centers able to co-ordinate, innovate, and manage the intertwined activities of networks of firms. Advanced services, including finance, insurance, real estate, consulting, legal services, advertising, design, marketing, public relations, security, information gathering and management of information systems, but also research and development and scientific innovation, are at the core of all economic processes, be it in manufacturing, agriculture, energy or services of different kind. They all can be reduced to knowledge generation and information flows.’’ (Castells 1996, p.378.)

The wiring of the cities has both positive and negative consequences. Although central regions that have a strategic importance take advantage of complex optic fiber network systems that attract further investments, some other secluded zones are omitted out of the telecommunication investment plans. And weak relation with the global system of networks causes a local disconnection in the production of urban space (Sassen, 2002, 71).

Certain regions together with their population, institutions and buildings may be intensively woven together by global optic fiber networks, but at the same time be totally disconnected from their local environment. Therefore, the traditional notion of coherent cities, regions or nations with certain boundaries becomes debatable. Even in the global cities themselves, there is centrality and marginality geographies side by side.

Webster claims that information flows are necessary for globalized economy, especially for financial and service networks and it is centrally essential to the management and control of transnational organizations. Furthermore, information is decisive to the arising concept of global localism which coincides the international and local issues. He additionally declares that information plays an important role in work practices since computerization has an extensive effect (Webster, 96).

As Jean Gottmann suggests, ‘‘In the modern world, with its expanding and multiplying networks of relations and a snowballing mass of bits of information produced and exchanged along these networked, the information services are fast

becoming an essential component, indeed a cornerstone, of transactional decisions making and urban centrality (Gottman, 1990).

3.3 Impacts of Networks on Urban Design

3.3.1 Transformation of time and space notion

Our lives are configured according to the places we live in, the communities we dwell among and our socio-spatial relationships which continue on local and global scales. In a larger context, all events happen and characterize in a certain space.

Recent research has revealed that different kinds of telecommunication facilities such as telegraph, telephone and new information technologies like the Internet provide a potential to manipulate the notions of ‘everyday’ time and space. Indeed, technologies such as the telephone are especially spatial. Their basic function is to reinforce social communication at a distance, and their success in breaking down the limits of proximity has shaped the contemporary urban life. Marshall McLuhan (1964, 271) wrote, ‘‘The telephone is an irresistible intruder in time and space.’’ Current research on the concepts of everyday space, place, and time manifests that transforming geographical-spatial practices affect the social order and subjective experience of time. Adam and Giddens argue that time and space are always interlinked—changes in space provoke changes in time, and vice versa (Adam 1990; Giddens, 1990). The enthusiastically emerging Information communication technologies are redefining space-time relations and the meaning of material space, proximity, distance, presence and mobility in relation with people and ‘‘anytime, anywhere’’ connection through voice or data connectivity. They transcend the boundaries of distance and geography and also of time by the mobile technology devices, leading to a radical space-time compression which liberates social and capital relations from modernist spatial logic (Dodge, Kitchin).

In their book ‘Telecommunications and the City’, Graham and Marvin complain that the impact of telecommunication is not being properly taken into account by urban development researches (1996). They point out that since there has been a serious neglect of telecommunication in urban studies, research methodologies and scopes have to be improved in order to catch up with the current transformations.

It is crucial to conceive the notions of space and time in order to fully perceive impacts and critical positions of telecommunication network on urban structuring. As Bruno Latour argues: 'Most of the difficulties we have in understanding science and technology proceeds from our belief that space and time exist independently as an unshakable frame of reference inside which events and place would occur. This belief makes it impossible to understand how different times may be produced inside the networks built to mobilize, cumulate and recombine the world' (Latour, 1987)

Traditionally, in urban studies, time and space were merely taken as static 'environments' in which social life was contained in. As Edward Soja claims, until recently, '...Geography...treated space as the domain of the dead, the fixed, the undialectic, the immediate- a world of passivity and measurement rather than action and meaning' (Soja, 1989). Cities were just portions of space, separated from their surroundings. Meanwhile, since other 'visual' factors were more distinctive, the importance of telecommunications and information flows continued to be ignored.

Afterwards, with the emergence of new concepts in physics such as relativity and bigger sociological and philosophical debates, the perception of time and space transformed and began to be conceived not just as empty containers, but also as social constructions that are produced within the society (Graham Marvin, 1996). The developments in these notions lead toward a more serious look at the city-telecommunications relations.

The construction of modern urban space (including telecommunications infrastructures) had an important role in the transformation of time-bound social relationships by concentrating population and changing the busy interactions among infrastructures into fragmented spatial and temporal linkages. The city separates the private from the public. Followingly, according to Simmel, public social life becomes an experience of discontinuity, where activities became compartmentalized in a series of brief encounters and short impressions (Simmel, 1997). Private social life, by contrast, becomes that of co presence, continuity, and proximity. Social and organizational activities in the newly emerging city require new forms of coordination, and technologies to manage it.

Urbanization was historically developed by the need to overcome time with space and to make communication simpler through planned physical organizations. Before

electronic communications, all forms of communications needed physical movement. By clustering all activities within a small area, cities allowed 'time constraints to be overcome by minimizing distance constraints.' Recently, with the emergence of telecommunications, the cities are perceived as places where lots of webs between firms, institutions, social groups and individuals become superimposed. Telecommunication networks 'effectively have the opposite effect to clustering of cities in that they help to overcome distance constraints by minimizing time constraints' (Graham Marvin, 1996). Since they function near the speed of light, they surmount spatial barriers by minimizing temporal barriers.

In social studies, it is commonly accepted that the dominant technologies of a particular historical era determine the temporal organization and cultural understandings of it. The contemporary technology of mobile telecommunication devices brings forth the notion of flexibility and compression of activities into the everyday life. Virilio states that changing activities lead to a faster experimentation of subjective time. The fragmentation of communication increases the number of interactions going on in a certain period of time. He continues that the ways that the 'speed' of electronic communications involves an immediacy of action and consequently movement in physical space becomes no longer even necessary. For example, complex interactions and services such as banking which were once place-centered, are perpetually becoming telemediated.

Electronic highways that emphasize the flow of information lead to a fundamental change in the concepts of time and space. People no longer have to 'travel' in order to be somewhere since they can connect simultaneously wherever they wish through network. This, correspondingly led some thinkers such as Benedikt (1991) to question the 'significance of geographical location at all scales'. Additionally, the growing use of Information Computer Technologies to make the communication and social interaction faster, emphasizes the importance of time in people's lives. Some argues that time is becoming the essential dimension for people instead of the geographical dimension. So instead of getting affected by locational considerations, our access to others and resources are increasingly becoming depended on time.

Cyberspace declares the dematerialization of physical space and chronological time. Cyberspace as a production of informational technologies exists in various forms such as web pages, chat rooms, MUDs, virtual reality environments with 'their own

sense of place and space, their own geography' (Batty, 1997). In cyberspace, space is relational both geometrically and socially. There are many spaces that are constructions of their designers and they do not possess geographical qualities. Additionally, places are often virtual, objects do not have weight or mass. Spatial and architectural forms in cyberspace are dematerialized and they can be navigated by mind (Dodge and Kitchin). Telematics support 'new electronic spaces' and 'instantaneous times'.

It has been argued that electronic communications cause us to experience a loss of spatial boundaries, of spatial distinctions (Boyer, 236). All spaces start to resemble each other and 'implode' into an 'undifferentiated' continuum as time is diminished to a repetition. As a result, claims Boyer, we are unable to map our contemporary terrain, to envision space and representational forms and thus weave things together, to conclude, to act (Boyer)

Giddens (1990) takes into account how time and space 'distanciate' as well as 'compress.' Although time-space compression describes shortening the amount of time it takes to move from one location to another, 'time-space distanciation' describes 'the processes by which societies are 'stretched' over shorter or longer spans of time and space' (Lash & Urry, 1994). For example nowadays, because of their obsessive attachment to their 'virtual world' on the net, people may be very distant from their families although they live in the same house.

Doreen Massey points out that in the construction of space-time relations it is also essential to indicate *whose* mobility, *whose* times and spaces are under discussion. Since different social groups and different individuals have manifold life styles, altering time organizations and mobility flows the subject of the movement should also taken into consideration. She draws attention to both geographical space and social and cultural locality in studies of relations of time-space (1993, 62).

The changing notions of time and space also revolutionize how business is led by transforming patterns of work and conducting towards noteworthy levels of urban-regional restructuring. According to Townsend (2001), time becomes a commodity to buy, sell, and trade over the phone. The old schedule of minutes, hours, days, and weeks becomes shattered into a constant stream of negotiations, reconfigurations, and rescheduling. Individuals live in this phone space—they can never let it go,

because it is their primary link to the temporally, spatially fragmented network of friends and colleagues they have constructed for themselves. It has become their new umbilical cord (p. 70). For users, the always-availability served by mobile time and space affects the sequencing of life tasks, deadlines organized around work and home activities, the cycles of work, leisure, and family life- all of which have social implications. Individuals may thus organize their activities around flexible periods of time, rather than periods of time defined by particular geographical spaces.

‘‘Accessibility’’ is now defined by time-based organizations rather than space-based ones. According to Heim, the network holds out a promise of accessibility such as the technologies of networking through on-line communication, electronic mail or newsgroups. Even though new network communities are emerged, Heim indicates the dark side by pointing out the danger of losing our humanity or hiding our identity. According to Paul Virilio, immaterial electronic broadcast emissions decompose and eradicate the sense of place.

Conversely, Kitchen argues that although information technologies have significant consequences on spatial-temporal orders, they have not totally destroyed the geographical notions and thus physical geography cannot undisputedly be eliminated. He indicates that unless everyone has an equal opportunity of access to technology and unless they are liberated from the real world, physical dependence of wiring, the modern spatial logic will continue to matter. One must not omit the fact that physical, face-to-face relationships and material needs such as food and sheltering still continue. Kitchen continues that, although information technologies attempt to transform and even to destroy space-time relations, and to make social relations ‘spaceless’, other spatial practices and forms resist against this inclination. Consequently, a mutual interplay between local and global forces exists. As the localities try to endure their internal integrity and specifications, global unity is attempted to be established upon them. Morley and Robins state that the process of delocalisation, associated especially with the development of new information and communications networks, should not be seen as an absolute tendency. The particularly of place and culture can never be ignored, can never be transcended. Globalization is, in fact, also associated with new dynamics of re-localization. It is about the achievement of a new global-local nexus and the new and intricate relations between global space and local space. Globalization is like a jigsaw puzzle:

it is a matter of inserting a multiplicity of localities into the overall picture of a new global system (Morley, Robbins, 116).

Recently, the transformation of time and space through information and communication technologies is taken as a large theoretical question. The relationship between mobile space and time in contemporary life is not constant, but rather locally differentiated on a number of levels, from the personal, to the institutional levels.

3.3.2 Emerging Urban Design Strategies and Integrating Telecommunication into Urban design

Cities and urban regions must be regarded as unstable places where many separate and superimposed social, technological, institutional and economic networks link into wider social, economic and cultural dynamics (Graham Marvin, 1996). Complicated transactions between cities and networks bring intense mobility (telecommunications, infrastructure, transport, media flows) and reshape urban life and development. Although the trends leading towards an 'electronic city' make it more difficult to 'read' and understand the nature of urban landscapes; the relation between urban places and electronics must be conceived in order to understand the dynamics of the city,

Telecommunication vs. Urban Physical Form

Cities are partly developed to make communications easier. In the early industrial city of mid 1800s, communication was based on physical movement, thus proximity. The distances were short in order to reduce travel times spent for communications. In the beginning of the 20th century, it was the 'machine' that was used to represent the modern city. Machine age was idolized as the best era for urban development and its product; the metropolis was regarded as the creation of mathematics engineering. The development of various networks such as gas, electricity and the telephone lines allowed surmounting some of the physical limits.

After the invention of telephone, for example, physical proximity lost its indispensable importance in business life. The factories and workshops started to move outside the cities. Dispersal of settlements had actually begun even before the telephone since faster vehicles had provided easy access to downtowns. For the first fifty years, telephone facilitated the development of decentralized cities. Especially

from the early 1960's, both business and residents started to move away from city centers. There was an increasing separation between home and work. More efficient telephone communication encouraged big firms to search for new locations for production and retailing activities. (Graham, Marvin, 1996) Boyer claims that we moved from machines of production that required a disciplined labor force and planned and organized city, into a space of flows defined by worldwide networks of computers.

There is a complex relationship between telecommunication and urban physical form and basic affects of telecommunication can be studied in two major points. One of them is the decentralizing affect of telecommunication whereas the other one is the concentrating affect.

As Andy Gillespie expresses, 'in all utopian visions, the decentralizing impacts of communications technology are regarded as unproblematic and self evident' (Gillespie, 1992) Futurists point out that eventually, the geographical differences will disappear and cities will be redefined from the beginning. Accordingly, apart from replacing physical concentration, telenatics will also find solutions for the problems of crowded cities. Joseph Pelton claims that, 'our ability to shape information and knowledge is today creating a global trade and culture. He predicts that, 'cities will be increasingly freed from geography and defined not only by place but by intellect (Pelton, 1992) Dystopian views believe that communication technologies establish new spatial interrelationships and new forms of spatial organization by collapsing the relative distance between locations,

The traditional approaches emphasize the environmentally sensitive role of transportation-telecommunication interactions. It's commonly accepted that telecommunications which decrease the need to travel and reduce the environmental pollution and urban congestion without any problem may replace the physical transportation flows and movement. Early researches about the telecommunication-transportation relations had revealed the cheaper costs and lesser environmental interference of information technologies and fostered plans of displacing physical travel by electronic communication. The interactions between telecommunication and transportation lines have started by United States in 1970s as a preventive measure against energy crisis and the first results lead to an excitement. In 1970's, Jack Nilles used the term 'telecommuting' to express the home based or

neighborhood-based works generated by computer and telecommunication technologies (Niles, 1976). The concept of teleworking is emerged both by the new possibilities of working at a distance (or from home) and also by the economic and production context. There are urban or regional teleworking initiatives, especially in USA which deal with the concept of teleworking by a metropolitan approach to contribute in the struggle to ameliorate the environment, especially by reducing the traffic pollution. Various programs were established to generate economic solutions for the problem of air quality, to contribute in economic growth and to bring forth a regional approach to problem solving. Teleworking, telebanking and other telebased activities were regarded as solutions to problem of congestion in cities. It is claimed that without travel time and distance constraints, cities may be get fragmented. As e-mail, fax and telephone effectively raised the number and geographical scattering of participants in a business network, leading towards a new land-use patterns, telecommunication can cause an increase in separation of home and workplace so create a more fragmented form of settlement and longer travel time in consequence (Graham, Marvin, 1996).

On the other hand, telecommunication can have other affects on the city structure other than decentralization according to general and specific conditions and processes. The world cities, for example which are the nodes on the global network of cities, are the command points of economy, trade through the communication systems. Accordingly, advanced information technologies may act as a very powerful tool to restructure the centrality of the city.

The central issue about understanding the relation between the telecommunications and urban form is the control and power aspects of space-time compression. Contemporary cities are not just physical gatherings of buildings, crossroads of transportation networks or centers of economic, social life but also nodes of the electronic grids and telecommunication systems.

Digital telecommunications provided freedom from physical limits while encouraging the generation of strategic networks of relationships, both within and among organizations scattered across the globe. Castells observes ‘‘The networks have the flexibility and adaptability required by a global economy subjected to relentless technological innovation and stimulated by rapidly changing demand’’ (Castells, 2001, 67).

On the other hand, there are other views asserting that, physical and informational infrastructures, actually complement each other and generate an unison. Accordingly, electronics can cause changes in the physical environment rather than simply displacing it. For instance, telecommunications can enrich the effectiveness of physical transport by improving its reliability, capacity, and safety. Facilities such as traffic system control, travel booking and payment and airport landing systems are all increasing the quality of already existing network. As a result of this, more demands for physical travel may appear. Also, since telecommunications increase individual's conceptual spaces and personal contacts, travel demand can be increased in order to have a higher level of personal interactions. A professional who enters the world of Internet experiences an increase in physical as well as telematic mobility. The growing use of cheaper telecommunication services helps to raise the number of people in a network and knowledge about the accessibility of goods and services. Therefore, they can again increase the physical movement. Additionally, congested roads causes new demands for the use of telecommunications. The 'dead' time wasted in traffic now can turn into useful time with the mobile phones. In this way, the telecommunication means increase the tendency to use vehicles since real time information overpowers the difficulties of traffic congestion. The increase of mobile phones for example, is likely to augment the total volume of traffic on roads but reduce peak time congestion (Marsh, 1994).

Telematic technologies are widely used in utilities for various aims such as information collection and management, improved monitoring of distribution networks and advanced maintenance procedures. Telematics are applied and operated to cut costs, to ameliorate large organizations and to improve the organizations of networks. They can also be used to increase the effective capacity of infrastructure networks.

Therefore, telecommunications do not simply displace but create different purposes for travel, so they do not completely eliminate the need of a urban transportation structure. Electronic flows lead to a more flexible location of functions. But this in turn generates longer physical movement and the need for more energy and waste infrastructure. Consequently, telecommunication urban infrastructure relationship can be described as synergistic. This synergistic relationship between physical flows and electronic flows generates concentrations of activity. This intensifying network

of flows creates a feeling of omnipresence where people have the sensation of ‘‘being in all places while not really being anywhere’’

Page and Philips argue that telecommunications have enhanced both the physical and electronic flows within and through the city, strengthened inner-city boundaries. The traditional tools of urban designers and planners to understand and design the city are insufficient to respond to this contemporary re-structuring of the urban environment. New techniques for representing, planning and designing the city are imperative to stimulate more relevant design interventions.

Telecommunication and Urban Design

‘‘Why should we care about this new kind of architectural and urban design issue? It matters because the emerging civic structures and spatial arrangements of the digital era will profoundly affect our access to economic opportunities and public services, the character and content of public discourse, the forms of cultural activity, the enactment of power, and the experiences that give shape and texture to our daily routines.’’ (Mitchell, 1995).

The network innovation will eventually structure a new urban tissue and this will ultimately reshape the cities we live in. Mitchell emphasizes that, throughout the evolution of cities, the places in a city, the activities they have and the qualities they possess are shaped by the networks that serve them (Mitchell, 1999). For example, sophisticated water and sewer networks provided sanitary places for Roman cities. Gas and electricity networks of industrial revolution illuminated the city, thus enabled most activities to continue after daylight. Additionally utilities for steam and hot water created more comfortable conditions. And the invention of the telephone, connected everywhere to each other. Similarly, information networks will characterize the city of today. 21st century city will be an interlinked, smart, attentive and responsive (Mitchell, 1999) place in all scales.

Some thinkers contemplate about the strong appreciation towards the digital technologies and forecast about the future state of the city. Paul Virilio for example asks whether reliance on real-time digital interfaces could lead us to a ‘‘profound sense of being shut up in an environment deprived of both horizon and optical density’’ as future cities lose their physicality and dissolves into electronic realm without strong physical connections (Virilio 1997, 41). It is predicted that, soon, the

spaces will have to meet electronic needs as well as architectural or physical needs and be fully equipped with tools that will reshape the physical into a node of informational network. According to this view the parts of the city will gradually evolve into parts in cyberspace. So cyber forums and chat rooms will replace the physical urban meeting points.

Toffler presents a utopian vision of the home which is recently called the electronic cottage, recreating an intimate, lively family life which contrasts totally with Virilio's vision of an inert and passive society. Page and Phillips claim that, despite the predictions by some theorists of expected loss of place identity due to digital telecommunications that provide access to anything anywhere, at anytime, the spatial sense and perception of the city will never disappear. What might happen is not a separation but a unification of physical and electronic networks. In 'Telecity', Fathy writes: "Basic physical elements such as paths, edges, nodes, districts, and landmarks will not change with new information technologies" (1991, 80).

While physical elements will not vanish, their spatial power may be manipulated among the dense flow of networks. Telematics may redefine the traditional physical activities and spaces, they additionally may contribute to the city by constituting a distinct and enriching layer above. The combination of spatial and electronic linkages creates a combination of varying time-space relationships much more complicated than the traditional urban design structure formed of spatial elements.

Even though certain traditional face-to-face interactions like banking and shopping are being replaced by virtual transactions on web sites, many types of digital communication as e-mail and instant messaging increase connectivity, and enhance socialization and urbanization.

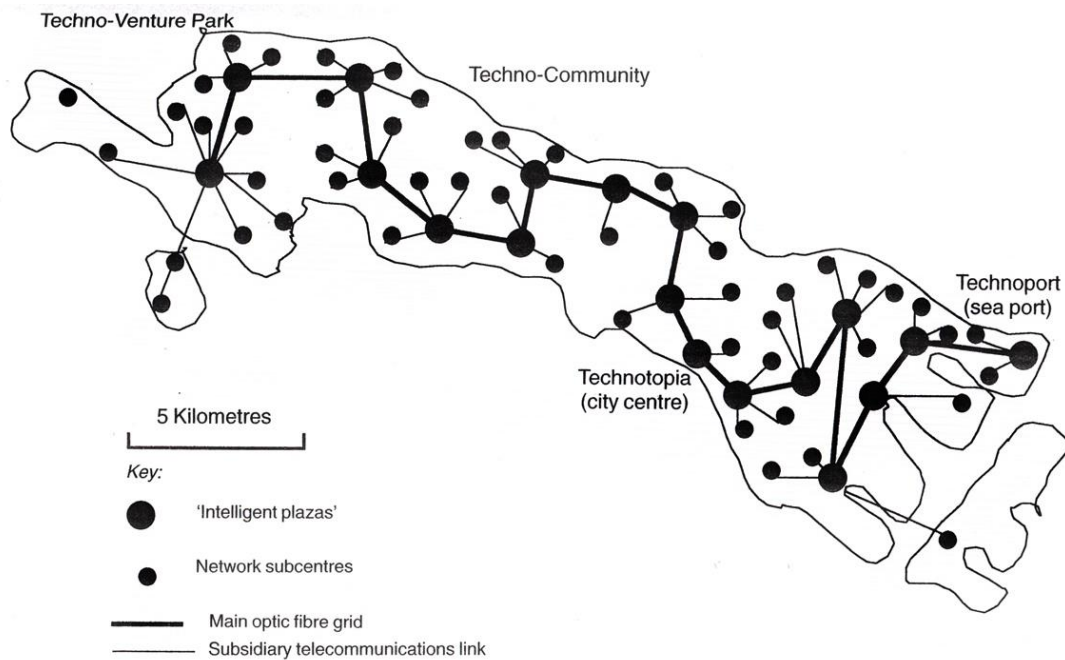
The urban strategies investigate how the built space can work in parallel with electronic interactions. These developments should support the initiatives which interrogate the new means for the combined use of new media and communication technologies in order to contemplate urban dimension, transportation, face-to-face interaction all together. Workstations and Internet kiosks, for example may be placed on public spaces in cities connecting the citizens into virtual realm anytime they wish. A meeting point may also be created in virtual realm where small communities gather and establish connections among themselves. Virtual public

spaces may support economically the needy areas, providing quick access and new solutions of communication with the other parts of the world. Electronic network can only be effective enough if the user-friendly interfaces can encourage the users to regard the network as a source to seek solutions.

“The old style planner talked about physical zoning, the balance of employment, housing, open space and traffic flows. The new style planner has to consider the configuration of electronic systems and Local Area networks (LAN) and the provision of bandwidth to each urban area. The town planner dealt with the stocks and flows of the vehicles. Today’s public authorities have to face the stocks and flows of information.” (Howkins, 1987)

The prevalent idea of post-urban shift might be a shift from traditional, monocentric cities towards complex, polycentric city regions composed of superimposed clusters, grids and internal, external connections. In Japan, for example, early studies in 1970s with wired cities lead to many futuristic urban telematics projects. A large, new town for public research and development was generated at Tsubaka near Tokyo. Over 255 towns and cities in some regions of Japan were designed as ‘Technopolis’ projects. These were nodes for the decentralization of high technology industry from Japan’s congested core. Local telecommunications, rail and airport infrastructures were improved to support this decentralization. Local Area Networks and on-line businesses support services were also developed.

Nationally supported urban telematics development assisted the construction of new communities focused on the latest information services and technologies. Individual cities which struggle to attain a distinctive position in world economy and global network try to establish a strong policy to improve its telecommunication strategies, since it is now the basic factor that links the city to world markets. In metropolitan level, cities which consist of nodes for innovative national and international telecommunication services connect to global networks. Kawasaki, for example, tries to integrate telecommunication logic to its renewal plans. It pursues a master plan of eighteen ‘Intelligent plazas’ in smart buildings connected via optic fiber and cable services and aimed towards advanced research and development organizations. They attempted to create the world’s first online city. (Graham Marvin, 1996) (Figure 3.26).



3. 26 Telenatics-based urban plan for the transformation of Kawasaki City, Japan into a network of 'Intelligent Plazas'

Additionally, there are also countries which pursue new media strategies at urban scale. Community networking and information technologies that are generated for economic growth and public services have been accelerated in UK and USA in the past ten years. Many Internet based community networks are established to encourage computerized communication, local initiatives and public volunteer activities (Graham Marvin, 1996). Recently, local governments are testing information distribution in public space by electronic kiosks and Intelligent Transportation Systems (ITS) at a larger urban scale.

Intelligent Transportation Systems (ITS) are combinations of microelectronics, mobile communications, computer informatics, and other advanced technologies used to improve mobility by reducing travel time and increasing reliability, safety, security, and productivity in the transportation sector (Tayyaran, Khan). Recently, these applications are put in use in most countries to obtain a more flexible and responsive traffic management and safety system. ITS can also help reduce energy consumption and greenhouse gas emissions, as well as increase transportation accessibility. The essential difference of this systems from other transportation improvement programs is the use of information technologies to enable different components of transportation systems to work together as an integrated system.

ITS has several user services such as travel and transportation management consisting of instantaneous driver information, route

guidance, traffic control, public transportation operations, electronic payment, automated highway systems, travel demand management (Tayyaran, Khan). Traffic condition broadcasting automatic vehicle control and location systems, incident detection systems and fully automated highways are the more sophisticated applications of informatics in transportation.

The telecommunication systems have been developed in response to physical congestion by overcoming physical constraints. It is claimed that these technologies offer considerable promise as new instruments of urban development policy. Tayyaran and Khan claim that ITS are capable of reducing travel times between an origin and a destination and of supplying real-time information to drivers and enabling them to find alternative routes in congested traffic. The result may either be the growth of satellite cities or an increase of demand of public transportation systems that would then be more comfortable.

The information technologies consequently affect the basic decisions of land use and site location of the project. Since networked societies increasingly use online facilities such as teleshopping and telecommuting, spatial structures in urban context tend to transform. It could be estimated that, innovations in information technology and improvements in transportation will make people more flexible in deciding on where to live, where to work and how to commute. These flexible decisions may transform the present urban spatial configuration. Some researchers insist that more people and businesses will move to outskirts of the cities, forming 'edge cities' or 'telecities' by using the facilities of information technologies and decentralized information.

In an earlier study on the effects of telecommunications on metropolitan areas, Dakin made a number of significant conclusions. In 1973, he accurately predicted that metropolitan areas would increasingly experience dispersion of population throughout their greater regions and claimed that information technologies would play the key role in multiplying the level of transactions throughout the region (Dakin).

Additionally, changing telecommunication facilities also affect the location choice for decisions for offices and residents. With innovations in transportation, many companies evaluate the distribution work and initiate telecommuting. More and more, the capability to transfer information by means of communication channels is turning into an important factor in the location of offices. It is estimated that these will lead to the dispersal of

information-based firms into various parts of the city, thus turning the city into a multi centric entity.

Firms may establish satellite branches in different areas and use telecommuting more intensively. Besides, the size and the functioning of certain commercial and retail facilities may go through changes. Because of the development of on-line, cheaper Internet shopping ‘physical’ stores try to resist and renew themselves by becoming larger and more specialized in order to compete with the prices and variety found in online stores. Niles asserts that massive superstores would not be possible without telecommunications and computers to manage account and collect credit/debit card money quickly at check out time (Table 3.1).

Although today, business towers still continue to stand erect in downtowns, network showed that there can be another option, even a virtual one. Since business districts are identifying factor in cities, it is predicted that the future cities will be reshaped as networks electronically connect more nodes together. Mitchell claims that the traditional approaches to land use zoning which presume that workplaces produce noise, traffic and pollution and thus must be separated from residential areas must be rethought. At urban scale, telecommunication based workplaces and homes are no longer need to kept apart in separate zones.

Table 3.1 Key Factors Affecting Land Use Decisions

Key Factors Affecting Location Choice Decisions in the Information Technology Era	
Residential Location	Office Location
Household Characteristics	Nature of business
Housing cost	Distributed work
Size of dwelling	Agglomeration economies
Availability of information technologies and services	Land cost
Telecommuting	Availability of human resources
Intelligent transportation systems	Availability of information technologies
Travel time to work and reliability	Telecommuting
Travel time to school	Transportation: Accessibility, travel time
Quality of life- outdoor recreational	Intelligent transportation systems
Based on the study done at Ottawa, Canada	

In a theoretical analysis, Lund and Mokhtarian developed an equilibrium model which states that households will find a location so as to minimize their commuting and housing costs. The model presents that telecommuting would result in a relocation further away from city centers. The extent of that relocation would depend upon the level of telecommuting and the rate of change in land prices as one moves away from the city center.

It is a challenge for urban designers and planners to direct decentralized development towards the generation of multi-centered, efficient urban regions. Appropriate adjustments should be made in order to use the advantages of information technologies to create intelligent and interactive spaces, economic growth, and to improve the total quality of life.

3.4 Evaluation and Conclusion of the Section

‘The network is the urban site before us, an invitation to design and construct the ‘City of Bits’. This will be a city unrooted to any definite spot on the surface of the earth, shaped by connectivity and bandwidth constraints rather than by accessibility and land use values, largely asynchronous in its operation. Its places will be constructed by logical linkages software instead of physically from streets and numbers, and will be connected by logical linkages rather than by doors, passageways and streets.’

Mitchell, 1995

It is essential to understand the dynamics of the urban development in order to analyze the impacts of telematics on urban structure and grasp all aspects of social, urban economic life related to telecommunication applications.

In the first part of this section, different theoretical approaches have been reviewed to fully understand the different views on the relationship between the city and the telecommunication. It was concluded that it is not efficient to reduce this correlation into a single attitude and it is necessary to combine different approaches in order to cover all of the aspects. In the second part, the effects of the information networks on urban structure were reviewed in three parts. The spatial and physical changes of different activities such as education, entertainment, commerce, business, residential dwellings and virtual cities presented the transforming contemporary urban life. The

formation of network societies, virtual communities gives clues about a new level of social relationships independent from physical spatial constraints. Finally the effects on global scale, the international transactions displayed the innovative communication possibilities and the growing importance of the global city network. In the third part, impacts of networks on urban design are studied and different levels of interactions are presented.

In the information age in which all social, technological, economic processes transform and improve rapidly, long-term plans would not possibly be sufficient for the future and would only block the progression. Likewise, long-term urban planning would mean to overlook the perpetually evolving alterations of the future.

Tele-matics should help to bring social innovations as well as technical innovations to urban life. As William Mitchell argues: 'the most crucial task before us is not one of putting in place the digital plumbing of broadband communications links but rather one of imagining and creating digitally mediated environments for the kinds of lives that we will want to lead' (Mitchell, 1995). The main focus should be on finding solutions to adapt the technological potential into efficient applications which meet daily needs and demands of an urban society.

Urban design process will acquire various worthwhile instruments to expedite the modern urban life with all of the electronic and informational devices. The cities will be more intelligent just like the individual households and spaces and be a base that will transmit the information of any kind to its citizens. It is not possible to contemplate that the virtual informational spaces will replace the actual physical urban spaces. Although there are virtual public domains, digital libraries, search engines, schools and even commercial sites, a city will always need physical interactive spaces to be a 'city'. Human beings will demand physical relationship and socialization despite of the numerous virtual contacts they have through the net. However, informational space will undoubtedly improve the physical one, providing lots of opportunities which will make life easier.

4. CONCLUSION

Today, it is claimed that people are connected electronically rather than by geographical proximity. Claus Roth argues that 'frontiers of a national, regional or cultural kind no longer count: What counts much more is the boundary of the territory of transmission, which increasingly bears little relationship to the geographical territory of any given nation state' (Roth, 1985, 202).

Fundamental transformations are occurring on cities as a collective consequence of technological revolution focused on information technologies, the transition to a new information society. As all major technological revolutions in the course of history, they are not limited to a particular field of science, but triggered production and consumption, management and work, culture, communication, education, notion of space and time. Castells claims that just as the industrial revolution based on energy, today's revolution is based on information technologies. This emerging upheaval manipulates the competitiveness and productivity of countries, produces a new communication world through a global network and creates societies that

depend on information processing in cultural, technological and economic innovations.

Mitchell states that humans are rapidly approaching a condition in which every last bit of computer memory in the world is electronically linked to every other, forming a vast grid. He emphasizes that: ‘‘ The Internet subverts, displaces and radically defines our received conceptions of gathering place, community and urban life. While it has a definite topology of computational nodes and radiating boulevard for bits, it is fundamentally antispatial. The net is ambient- nowhere in particular but everywhere at once.’’ (Mitchell, 1995).

There are claims which express that, with all of its implications, the network is the urban site of the future. Accordingly, this city of networks will be constructed by software, connectivity and flows rather than physical materials. Although walls once limited spaces, the net has become a worldwide, timeless entity. The architectures of physical space and cyberspace are superimposed, intertwined and hybridized in complex ways. It is evidently clear that the effects of this new world is started to reshape certain areas of the urban life. Researches argue that the geographic environments are becoming virtualized as computers are used increasingly to manage information about places. The city structure is becoming composed of and controlled by computers. In this process, the virtual spaces of city data and management and the real spaces of buildings and streets merge into each other (Dodge, Kitchin).

William Mitchell indicates, ‘‘ Today’s institutions are supported not only by buildings but by telecommunications and computer software’’ (1995; 126). This is what redefines the contemporary urban design. Mitchell continues: ‘‘ Constructed spaces will increasingly be seen as electronically-serviced sites where bits meet the body, where digital information is translated into visual, auditory, tactile or otherwise sensorial perceptible form and vice versa. Displays and sensors for presenting and capturing information will be as essential as doors’’ (Mitchell, 1994).

However, new information technologies do not make the construction of urban places redundant; they even support and facilitate the process of construction. The development and proliferation of information spaces is not leading to the dissolution of cities as futurists or utopians argues. It is not realistic to assume that urban functions will totally be replaced electronic flows. Since we live in a sophisticated

urban world, cities will stay as central places of our contemporary lives. Face-to-face contact and physical transactions could continue only in physical realm.

Therefore the main question is if it is possible to produce new positive synergies between urban place-based telecommunicational and electronic initiatives. The magnitude and the direction of the initiatives are essential. Electronic spaces that are largely independent from time-space constraints participate in urban life at different scales. In dense traffic, a lot of electronic conversations take place and rigid office blocks are actually 'intelligent building connected to the world'. Daily life is full of telematics such as surveillance cameras, electronic transaction systems, road transport informatics, etc.

Urban planners should struggle with the assumption that new technologies can be a 'quick solution' for urban problems and work hard to develop effective solutions. Intelligently planned, improving and egalitarian telecommunication and information technology policy that is adapted to urban strategies and focus on uniting the cities rather than separating them can successfully integrate the electronic based and space based milieus. This kind of initiatives can use new technologies as supportive elements instead of means for economic, social and cultural alienation. Since the same technologies can be applied to strengthen and help disadvantaged groups as well as to exploit them, telematics should be carefully and beneficially adapted in the urban level. It should be noted that unrealistic approaches to urban telecommunication policy often lead to unexpected failures. Mistakes in management and information can increase the existing social and spatial polarization. The most critical danger is excluding the border districts. Rich population is already a candidate to be the focus of information technologies. There might be forgotten, 'off line' or 'lag-time' spaces, just besides the areas where all kinds of facilities are present for a distinguished society. So it is essential to widen the plans, in respect to all levels in the society.

Urban designers should develop special solutions after carefully investigating the information need of the places. All planners should be aware of the symbolic power of the new media technologies that are the determinants of the 'high technological' modernity, and be careful about to whom this power serves. This symbolic power is probably more evident than the actual telecommunication application and use. To describe somewhere as 'cyber', 'tele' or 'silicon' is a symbolic initiative to qualify

it as a place connected to global, economic, cultural and social networks. Local planners should search ways to use this symbolic power cleverly and yet, not expect all the problems of environmental sustainability, social polarization and economic will be solved easily.

Will we continue to commute to office or start to telecommute from home? Will we go to the local libraries or read e-books or use online catalogues to search what we need? Will we establish more intimate relationships with our distant, electronically connected friends or with our neighbors? Can the annihilation of distance and time constraints undermine the main reason of the existence of the city by dissolving the need for physical proximity?

This study leads to many questions as such. Further studies should seek ways to find answers for such questions and generate powerful and foresighted design plans for the future cities where both physical and electronic will mutually feed each other and create a synergistic space for the inhabitants.

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