# URBAN TOMOGRAPHY
# AND DIGITAL HUMANITIES
# IN VISUAL TRADITION OF URBAN DESIGN

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# ABSTRACT

## URBAN TOMOGRAPHY AND DIGITAL HUMANITIES IN VISUAL TRADITION OF URBAN DESIGN

Since the 1960s, the information obtaining methods used in urban design studies in the visual-perceptual dimension have been improved and renewed with the developing technology and internet facilities in the world of the 2000s, however the urban design techniques have lagged behind this. In the studies carried out until the 1990s, only hand drawings, observations, one-to-one interviews and questionnaires were used as a data gathering method, technology and digitalism were not used. Where technology is not used in urban studies, traditional methods requires large data processing as time and effort in large-scale areas therefore data gathering methods has to change.

In this study, the theoretical aspects of the methods used in the visual-perceptual tradition are discussed with the examination of especially the works of Kevin Lynch, Donald Appleyard and Gordon Cullen, who use traditional methods.

Since social media and digital multimedia tools are frequently used in today's societies, every movement related to the city is available in a digital environment. It is explained that with 'Digital Humanities' a digital library approach that has been used in today's technology; we can have a more practical, more up-to-date and developing information network. Taking into consideration the active use of social media in today's world, considering the major trends such as big data analysis, internet of things, visualization tools -photographs, video records- and social media platforms, we can discuss the urban design of the city and its places and we will be able to obtain information about the city from millions of different perspectives.

In this study, what urban designer can use the information technology and visualization methods in the accelerating new technological age and what are these methods theoretically adds to the field questions are discussed.

# ÖZET

## KENTSEL TASARIMIN GÖRSEL GELENEĞİNDE KENTSEL TOMOGRAFİ VE DİJİTAL BEŞERİ BİLİMLER

1960'lardan beri kentsel çalışmalarda görsel-algısal boyutta kullanılan bilgi toplama ve bilgiyi görselleştirme metotları, 2000'ler dünyasında gelişen teknoloji ve internet imkanları ile gelişmiş ve yenilenmiş ancak kentsel tasarım teknikleri bunun çok gerisinde kalmıştır. 1990'lı yıllara kadar yürütülen çalışmalarda, teknolojiden ve dijitallikten yararlanılmamış yalnızca el çizimleri, gözlem, görüşme ve anket gibi yöntemler kullanılmıştır. Bu durum günümüzde büyük ölçekli alanlarda zaman ve uğraş olarak büyük veri işleme gerektirdiğinden, veri toplama metotları değişmek zorunda kalmıştır. Bu tez çalışmasında geleneksel metotları kullanan Kevin Lynch, Donald Appleyard ve Gordon Cullen'ın çalışmaları başta olmak üzere görsel-algısal geleneğe dair kullanılan yöntemlerin teorik boyutu ele alınmıştır.

21. yüzyılda büyük caddelerde hareket eden yüzlerce insanın, gündelik hayatta kenti kullanımın şeklinin izi, dijital ortamda mevcuttur. Bu tezde, geleneksel metotların kentsel tasarım çalışmalarında eski, zahmetli ve yavaş kaldığı öne sürülmüş, günümüz teknolojisinde kullanılmaya başlanmış bir dijital kütüphanecilik yaklaşımı olan ve sosyal-mekânsal bilimlere gelişen kentsel teknolojilerin imkanları ile bakabilmeyi vaat eden 'Dijital Beşerî Bilimler' ile daha pratik, daha güncel ve gelişen bir bilgi ağına sahip olabileceğimiz açıklanmıştır. Büyük veri analizi, nesnelerin interneti, görselleştirme araçları -fotoğraf ve video- ve sosyal medya platformları gibi büyük trendler dikkate alınarak kente ve kentin mekanlarına dair kentsel tasarıma bilgi taşınabileceği ve milyonlarca farklı perspektiften kente dair bilgi edinebileceğimiz tartışılmaktadır.

Çalışmada, hızlanan yeni teknolojik çağda kentsel tasarımcının kullanabileceği bilgi teknolojileri ve görselleştirme yöntemlerinin ne olduğu ve alana teorik olarak neler katacağı tartışılmıştır.

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# CHAPTER 1

# INTRODUCTION

## 1.1. Background of The Study

The place of urban design for today's transforming cities is very important. The need for planning, order and architecture creates a continuous production cycle; at the same time increasing population triggers housing production. The space of the 'house', which emerged with the need for living and sheltering of people, has evolved with the wishes and desires of the people and has transformed into a big physical environment with many different concept buildings thus today's cities have formed. The adventures of urban change that began with architecture Works were called as 'civic design' until the 1960s, and after long academic discussions, the expression changed as 'urban design', which consists of urban and design concepts, then it entered the literature (Lang 1994).

Urban design is an area between architecture and urban planning. The reason for staying in the meantime is that urban design cannot be evaluated separately from architecture and city planning. Urban design, which is nourished by architecture and planning, takes advantage of the practice of many different fields such as landscape architecture and sociology. Francis Tibbalds defines urban design as: "The interface between architecture, town planning and related professionals." (Tibbalds 1984). In this way, the definition and study area of urban design, which is a common intersection, is still being discussed by academic circles.

Technological opportunities and innovations in the construction sector change the shape of architecture and constructions and in the design process, different phenomena are involved. At this stage, the designer must be aware of the opportunities offered by the era and be able to use them effectively in order to create a "good" project for human and environment. In today's world where everything is digitized, the concept of information technology and smart devices have become widespread. The encyclopedias, which were passed from a physical book to computers, have become a large archive along the wide web created on the internet and have been the digital data archive concepted by the field as "big data".

In order to understand the meaning of cities for people, the study of the fundamental works from the 1960s; basis of approaches and methods have been

emphasized. The representation way of information is the essence subject of this study. In the urban studies carried out from the date up to today, two-dimensional and one-man production results have been produced. The methods used in these studies were described in the study. Working with these methods nowadays is not preferred in the design process in terms of the application of methods; they replaced with digital data archives and quick information softwares.

## 1.2.    Aim of The Study

The aim of this study is to discuss how technological opportunities and computer softwares can participate the change of cities, what these opportunities can contribute to urban designer, and how information technology on large networks such as internet and social media can be used in urban studies. Thanks to the wide range of possibilities offered by technology, in the ever-changing digital age, new representation methods should be developed, and different visualization methods should be tried. With Krieger's definition, a new generation of visual representation can be created by producing works that have digital uses such as the city's tomography, and visual language. Every urban designer who use these third-generation methods, there is no doubt; as long as designer follows her/his day and age, will always be practical and have up-to-date information archive. In this study, what urban designer can use the information technology and visualization methods in the accelerating new technological age and what are these methods theoretically adds to the field questions are discussed.

Every movement of our daily life is found in a social environment. Every kind of information, from the drink-what we drink, a place where we spend a time and the concert which we went to is recorded with the shares made on social media applications. Individual sharing in the places where people are located can give information about many criteria such as their perception of the place, the way they use the place, the area they find attractive and the reasons for their preference. The 'location notification' feature is the most powerful resource for location information through the applications spreading through the places. While the photographs taken in the specific location can give information about the use of the place or the region, it can also be done to determine what people are focusing on where they are. It is explained how spatial information can be obtained through the social media practice, a tool of the digital humanities approach.

In our age, where technology is progressing every hour, computers and internet have become one of our basic needs. In this period, we can see and share everything about

knowledge, music, writing, art and education, and of course our cities are affected by this progress. Architects, urban designers, urban planners and many other professionals, who were exposed to thousands of visual attacks every day, began to reflect every affect they saw and experienced, on their personal works. Thus, in the digitalizing world, one-to-one communication has become a social media profile, and many of the images have been transformed into three-dimensional computer programs. At this stage, the correct use of technology and equipment is discussed, and new methods are being sought to integrate technology in the most appropriate way to daily life.

## 1.3.    Structure of The Study

Following introduction, **Chapter 2** examines the concept of urban design and the definition of the field, tried to be made and focuses on the working areas of urban design and especially on the visual dimension. Carmona says that urban design works in six different dimensions (Carmona M. 2013). The morphological dimension is concerned with, texture and location of the city; the social dimension is the relationship between, human, space and environment; the functional dimension is the use of space; the temporary dimension is physical state of the environment; the perceptual dimension is related to the relationship between human and space, and the visual dimension is concerned with environmental representation and image. The dimensions of urban design and the methods used in the field were explained.

In the study, with formed by a periodic separation, the visual dimension of urban design has been emphasized and information technologies, visualization and representation methods which have changed from 1960 to the present are discussed and practical and theoretical features of these methods are explained.

In the 1960s, design and planning professions turned to the fields of sociology and environmental psychology, which gained valuable data by working on the environment. Since then, experts who working on the human and environmental relations have focused on the perception of the environment, the use of place, and daily life movements. The perceptual dimension of urban design began in this period with the works of Kevin Lynch and Donald Appleyard, one of the cult names of the literature. And for the visual dimension, Gordon Cullen, who conducts his work by saying that 'every corner of the city is visible for each person', draws the built environment sketches that he sees at a certain points in the city, thinking that the best representation of the expression is a sketch.

The mental map method used by Lynch in his work The Image of The City (1960), observation and one-on-one interview by Appleyard using The Environmental Quality City Streets: The Resident's Viewpoint (1969) and Cullen's The Concise Townspace (1961) which was based on 'Serial Vision' sketches and observation, and which did not have a technological output and interacted one-on-one, Peter Bosselmann's, another researcher of the period, with his 4-minute walk; he developed a new method for the visual dimension of urban environment. These methods are traditional and they were accepted as *the first generation methods*.

Another method of the first generation is the photography. Charles Marville, who was specifically authorized in the period of Hausmann's Paris transformation plans, before the transformation in certain parts of the city, and after the transformation, taking photographs and thus he obtains a photo archive of Paris. Although Marville was the most backward in history to obtain visual data, Marville applied photography, the first visual method that could be looked after and told the audience the instant case. Even if it is one of the most simple, fast and best forms of representation with its snapshots and spatial information it records, it remains secondary to its current digital visual archive, since it may be outdated / lost after a while.

The change in visual tradition influences artists and painters during the development of the photography and its spread to the society thus creating new art movements. Each movement creates its own expression and different visual techniques. These periods were productive periods in which the different ways of expressing what appears in studies were sought. Impressionism, Cubism and Dadaism in which diversity in expression methods is studied; these are the subjects that should be included in this study in terms of the difference of visual expression techniques. In the chapter, these trends were mentioned, and examples were given.

In **Chapter 3**, visualization of urban is discussed and a new method for use in studies, computer-aided visualization methods are explained. Al-Kodmany divides information visualization methods into two: traditional and computer-aided (Al-Kodmany 2001). According to Kodmany, traditional methods are two-dimensional works such as mapping, sketches that can be produced with pen and paper. The place of photography in visual representation is in traditional methods according to Kodmany (Al-Kodmany 2001, 7). Due to the way of implementation; long-term, one-to-one dialogue, a large number of user information, land surveys, interviews and spatial observation techniques that require active work; they were accepted as traditionally in this thesis. Because the process of collecting information on these methods is difficult to implement

in large-scale studies such as neighborhoods, districts and even cities. Due to the time required by these methods, the designer's access to information will not be fast, and the actuality of the information may disappear with time.

Within the scope of the thesis, computer-aided visualization methods are considered as *second-generation methods*; simulations, large-scale 3D modeling, video animations, digital collages, augmented reality, VR and geographic information systems (GIS). Since the use of these methods has a higher visual appeal than traditional methods, the use of these methods in the design process raises participation. Every designer who wants to make a correct and successful project takes the best information about the application area and the user's request from the user himself. For this reason, the use of methods with high visual appeal, such as the virtual reality of the space designed by simulation, enables the user to experience the space. In this way, the user interacts with the design work actively participates throughout the process. Computer aided visualization methods, how to use, purpose and advantages are described in the chapter.

The big data archive, which is formed by digital information technologies, is an interactive environment with infinite width. In **Chapter 4**, it is claim that the traditional methods are old, laborious and slow in the urban design studies, and "Digital Humanities" which is a digital librarianship approach that has been used in today's technology and promises to be able to look at the social-spatial sciences with the opportunities of the developing urban technologies; we can have a developing information network. The study concludes with synthesis illustrating the interaction relationship between generations and recommendations on embracing new generation technologies on visual-perceptual tradition of urban design.

The most common and useful tool in the field is GIS and it is possible to find detailed maps and vector representations even for very large scales. The layer appearance of the maps used in GIS software and the operating principle of the tomography devices are similar. **Tomography** consists of images that contain details and information on different layers for the invisible areas of the body. In 2011, Martin Krieger, in his work Urban Tomographies, introduced the concept of 'urban tomography' (M. Krieger 2011). Urban tomography is a method in which versatile information can be expressed as a slice. The multifaceted perspective of digital data, the 'slices of city life' and the representation of these layers are the product of urban tomography.

Urban tomography is a technological framework that enables the collection and search of a large part of the audio-visual urban documentation; it used to define imaging cross-sectional. When audio-visual recordings created by inhabitants, and they share their

images on social networks instant analysis of the place becomes possible. In the study, application examples of tomography method in urban studies and the digital archiving/resources accepted as the ***third generation representation methods.***

# CHAPTER 2

# REPRESENTATION FORMS OF THE URBAN DESIGN

## 2.1.    The Emergence of Urban Design

Human beings need nutrition, shelter, and security since its existence. As long as hunting and gathering exist in everyday life, communities are settled within the restricted areas. These communes formed around water resources, fruit trees, and arable lands. Although the area they have is such small than in comparison to the proportion of the area in the definition of the city, it is possible to define these settled areas as the first examples of "city" by humanity. Resident life needed management in order to ensure order and continuity over the regions. Cities have formed in the world that has evolved over time. Structures, landscaping elements, and agricultural areas were differentiated and varied.

World Wars and The Industrial Revolution were the main factors shaping the cities of the world. As the developments that emerged in the 19th century with the Industrial Revolution led to great social and economic mobilization between the city and the rural; labor power, agriculture, production, and technology turned people into a "working society". The person who had to win to live began to migrate from the rural to work in the factories in the cities and thus a city population popped up and created supply-demand in housing and business areas. Thanks to mechanization from the Industrial Revolution "mass production" was made possible. The multiplicity, production, and speed provided in the factories were increased and accelerated the housing production.

The growing population also brought environmental problems and needs. In addition to basic human needs such as housing needs, social facilities, healthcare facilities, education needs, nutritional needs, there was also a need for good environmental conditions and satisfactory urban images. Physical damages of World Wars, diseases on societies, income difference and regional circumstances were affected urban life and order.

The European cities, which want to live in a healthier structured environment, combined the architecture and the landscape in these periods, took the first foundations of planning and design with the works that still admire in the 21st century. Architecture, construction, landscape, and design were the most used terms in the period. Architects, engineers, and designers have been working with each other since this period to control

urbanization, create more functional spaces, and be able to do the "good" in visual perception. These studies which were said to be "civic design" until 1960, received the label "urban design" which resulted in the urban concerns and work of the University of Liverpool School of Architecture in 1994 (Lang 1994). Urban design is a concept that is constantly being debated and its quality, scope and interdisciplinary position are not fully legally defined yet. And it is now seen that this concept is a tool that this method uses to solve various urban problems. Urban design includes not only building design but also the environment and perception dimension. With the rapid expansion of urbanization, urban design comes to the top of the list of jobs and invites professions to work together. It is a concept that works on the development of visual and perceptual satisfactory related to the quality of urban life as well as analytical work and synthesis of the environment.

Urban design is needed to re-establish the association lost in the cities, to fill the gap between urban architecture and city planning. Architecture needs city planning when the environmental design process after its professional field-making build designs (Schurch 1999). In a good architectural environment, the task of engineering is to develop robust and logical designs that are compatible with technical rules. Research on the area, the land, the region, and the city where the study is being carried out. At this stage, daily use data of the area is collected. There are several methods of obtaining information. The method can be determined according to the identity of the site, the status of the target group and the possibilities of communication. In order to understand daily life, to determine the places of daily use, to experience the place with the eyes of the user, the observer -similar to the Lefebvre's 'flaneur'- makes observations. In addition to observation technique, methods such as interviews, questionnaires, tracing, snapshots and mapping can also be used. These were the methods that provided easy, fast and clear results for the urban workers of the 20th century. Environment is representing differences and relations, so environmental images are observational. And observer chooses images for his/her own purpose by his/her personal ability then means it. Thus, the image could emphasize purposed thing and the same time it keeps its balance in changing the build environment. So, in the real realm images can be different for different observers.

## 2.2. Dimensions of Urban Design

There are a number of overarching contexts -local, global, regulatory and market- that provide a background for urban design action. Since urban design works as a field combining knowledge of different disciplines, the distinction here is based solely on

understanding and analyzing the subject. The combination of six different dimension makes it possible to solve problems in the design process and strategically feed each other. In this section, six dimensions of urban design social, morphological, functional, temporary, visual and perceptual will be mentioned. Visual and perceptual dimensions are the main issue of these study.
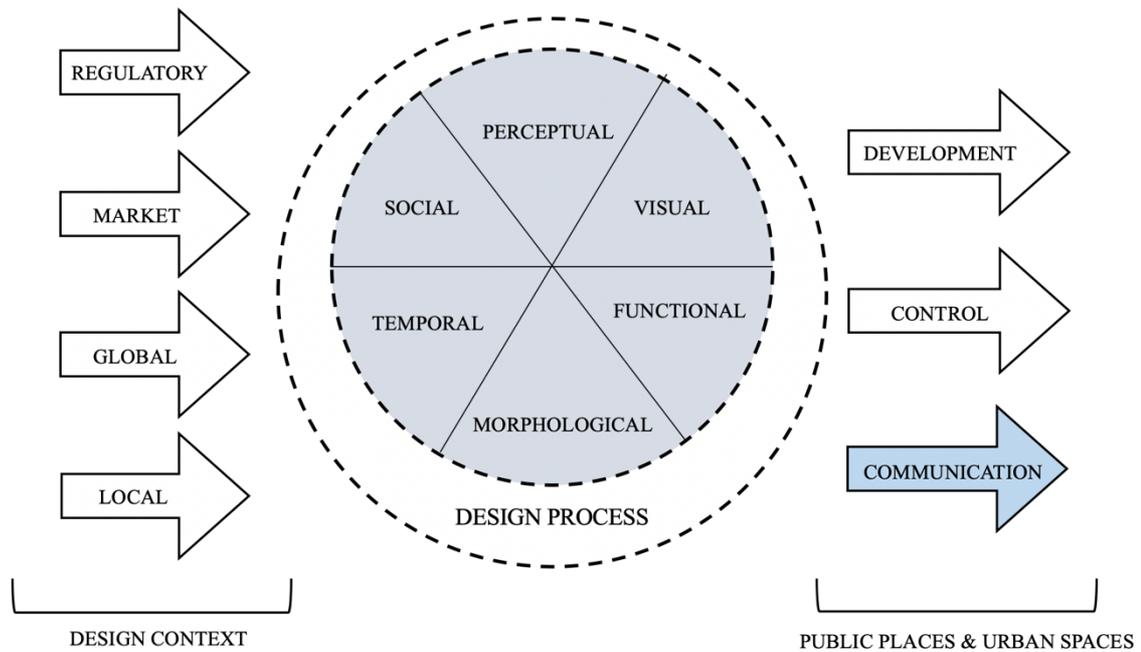


Figure 2.1: The place of urban design dimensions in the design process and communication concept. The graphic adapted from the chart in "Public Places Urban Spaces" book by Carmona et al., 2013.

The social dimension of urban design is focused on society, place and activity. Place is related to physical environment and its quality. It examines the psychological and behavioral effects of the physical environment on people and aims to provide the most effective environment to the user.

In his work, Life Between Buildings, Jan Gehl studied on understanding how design influences behavior. He examined the use of public spaces, what individual activities were and how long they lasted; used three types of outdoor activity categories: necessary, optional and social activities (Gehl 1996, first published 1971). In his study, Gehl states that the quality of the space affects the activities. In the low-quality public spaces only, compulsory needs and compulsory actions are made, and these areas are not preferred for social use. Many urban design researchers state that behaviors in certain environments are specific. Jane Jacobs and William H. Whyte emphasize that public

spaces address human nature and that social reinforcement areas are essential for a healthy society.

As the possibilities of the space diversity, preferability of the space and hence its quality increases. While urban designers create potential spaces for use, the main factor that makes the space effective is the user (Carmona M. 2013). The social dimension deals with the accessibility of space, disability access, social use and mobility.
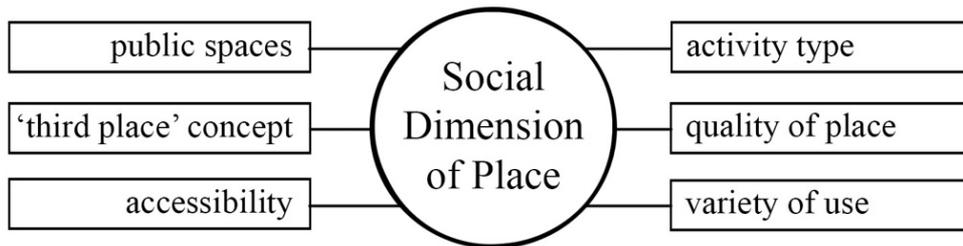


Figure 2.2: Focus points of social dimension of place.

**The functional dimension** of urban design, unlike its social dimension, focuses on how space works and how people use it. The 'human' concept is abstracted, and the technical and aesthetic values of the space are taken into consideration while the question of how people use the space. Major studies on the issues of the functional dimension of cities; Jan Gehl's Life Between Buildings in 1971; William H. Whyte's The Social Life of Small Urban Spaces in 1980, in New York; and Jane Jacobs's The Death and Life of Great American Cities in 1961.

The public space, public and private space distinction, psychological and spatial comfort, the belonging of space and the attractiveness of the space are the main subjects of the field. It is a study that includes examples and determinations on important issues such as the preference and orientation of women in public places, the tendency to act collectively or individually, the type of activity made depending on the duration of standing in the area and the spatial value of the space. Whyte used **observation** technique as a method in this study and took **photographs and recorded videos** in the field.
One of the methods for determining the use and function of space is the **snapshot analysis** which is one of the methods of space syntax approach. It is possible to detect uniform behaviors and movements that are concentrated at certain points with the data obtained at certain periods of the instant activities in the room. **Space syntax** is a knowledge about how people move in relation to urban structures is coded into the computer programs (Gehl and Svarre 2013). Hillier's work in the field, challenges urban designers to think critically about the relationship between space configuration, movement and land uses

(Hillier and J. 1984). In particular, it reminds urban designers of the importance of permeability, and of the overarching need to consider movement (especially pedestrian movement) in the design of urban areas (Carmona M. 2013).

In this dimension, which deals with the functionality of the space, the quality of the physical environment that appears along the level of the eye on the streets is studied. Technical aspects such as the surfaces situation of the facades, participation and experience to the street and the rate of intervention of the ground floors activities, the effective use or diversity of use of the ground floors and the guiding effect of the signs on the pedestrian are discussed (Gehl J. 2006). Privacy, indoor and outdoor segregation, crowd situation spatial lighting, mixed use, regional density and regional climate, settlement and order are the other issues for this dimension.

**The morphological dimension** of urban design refers to the structure, form and layout of the city. Land use concept shows the usage status and variety of the area or place. The building structure or building type is important and meaningful in urban texture (see Fig. 2.3). The buildings define and represent the space when they exist in an area for a long time. In this way, the structure becomes a powerful element of its environment with its position and shape. On the structures on the city and the surrounding areas many settlements order such as grid plan or organic evolving regular/irregular planning, adjacent building type and the orientation on the facades are the context of urban morphology (Carmona M. 2013). In terms of morphology, streets and buildings create interaction areas in the city. Walkable streets, which include both social space and movement area, connect buildings and movements throughout the place.

In the urban design process, taking into account public spaces, morphology studies the form of mobility of the city to reorganize the distribution of activities in space (ways of driving, cycling routes, pedestrian use, public transport routes, crossings, etc.).

**The temporal dimension** of urban design deals with the effects of time on space. In this dimension the urban designer examines three types of time and space relationship. First one is the progressive time cycle. Places are used differently at different times, so urban designer should produce design strategies based on these differences of activity at different hours. The second, although environments relentlessly change over time, a high value is often placed on some degree of continuity and stability (Carmona M. 2013). The urban designer tries to understand what effects the place changes, the physical dimension of this change, and what remains the same in societies social perception. The third is the irreversible and conscious change of the environment. In these environments there is a

conscious change when urban projects are produced and/or when transformation is needed.

The continuity of the space, the aging of the space -physical, social, perceptual- or not being used due to its location is one of the titles of the time and design relationship. In addition to these, restorations in buildings and reinforcements to increase robustness are included in the temporal dimension.
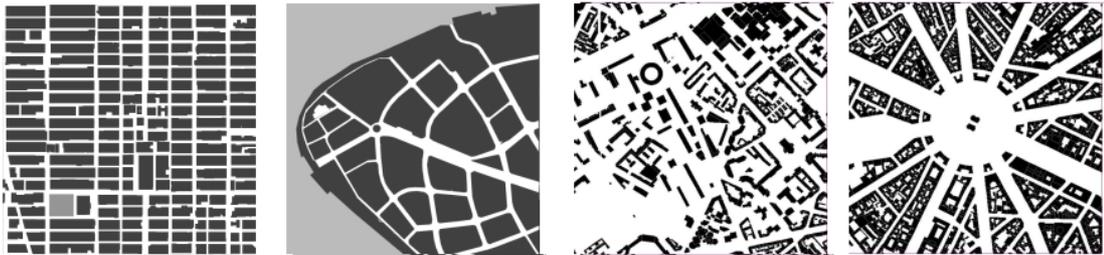


Figure 2.3: Urban morphology representations: figure-ground maps examples.

## 2.3. Perceptual and Visual Dimension of Urban Design

In research studies, the accuracy of the data, the way the methods are used and the process of introducing the thesis require a certain morality. Moudon used "ethos" concept, rather than "morality" word (Moudon 1992). In data gathering process, etic and emic, borrowed from anthropology; these terms were first popularized in design circles by Amos Rapoport (Rapoport 1977). Applied to studies of people and cultures, etic and emic relate to the nature of the source of the information gathered. In 'etic' situation, informant being the researcher itself, people who use the information; in 'emic' situation, informant being the person observed (Moudon 1992).

The academic environment and behavioral studies of the twentieth century show an 'emic' orientation. Design professions have acquired the knowledge of the built environment and the use of the social environment directly from the user without consulting the views of other design and planning professionals. Rapoport defined this perceptual approach that experts used in their research as "derived etic" thus he has blocked the informal evaluation of these studies (Rapoport 1977). In urban design literature, we can give an example of the main people who use traditional data gathering methods and conclude their studies with the data obtained from these methods.

In the 1960s, design and planning professions turned into sociology and environmental psychology as sources of valuable information in this new emic realm of

research on the environment. Since then, person environment relations have become a fundamental part of the architecture, covering research on how people use, like or simply behave in environments.

Environmental awareness, experience, and perception of place are the main points of urban design. In urban design studies that started after the second half of the 20th century, environmental perception is the primary data. Experiencing the place, being "inside", affect the perception of space (Relph 1976).

### 2.3.1. The Perceptual Dimension

In the person who has the impression of the place, the bodily senses works. Smell, sound, touch and sight senses transmit the information to the brain (Carmona M. 2013, 88). If the perception of space directs only the "sight", that is, only the "visible" is important for the image in the perception, the remaining sensors are insignificant (Bacon 1974, 20). Spatial perception is more than what is felt by senses or visible. It is a combination of them; experiences, what is seen and felt. The concept of place and perception develop with "belonging" and other emotions. As we know that personal experiences are different for each individual in every place, we can say that the environment is a mind map. Mental maps and images of places and environments, particularly shared images are central to studies of environmental perception in urban design (Carmona M. 2013, 88).

The key work in the field of urban imagery is **Kevin Lynch's The Image of the City** (1960), based on mental maps; one of the most fundamental works of the literature used individual perceptions and mental maps in order to analyze the perceived city.

Image of The City study is about concepts on how people perceive cities and how they imagine it. The study is applied three American cities; Boston, Jersey City, and Los Angeles. For each city, there was two analysis had done. First one is done by an educated observer, systematically study area research as a pedestrian. The observer noted the existence of various criteria, like visibility status and awake and strong sides of the environment. These notes are completely individual concerns. The second study is the main output of Lynch's idea. The following features are requested by people or groups interviewed at the same time or at different times: Create a quick sketch for the desired area; give the most interesting and important formations on this sketch; describe them as a foreigner can move without difficulty; show your travel routes on the map; identify sections, objects, structures or specific points of the city.

Although there is no scientific determination based on it, for years the academy circles, Lynch's five elements (nodes, districts, landmarks, edges, paths) have been accepted. Lynch argues that people perceive cities as consisting of underlying city form "elements".
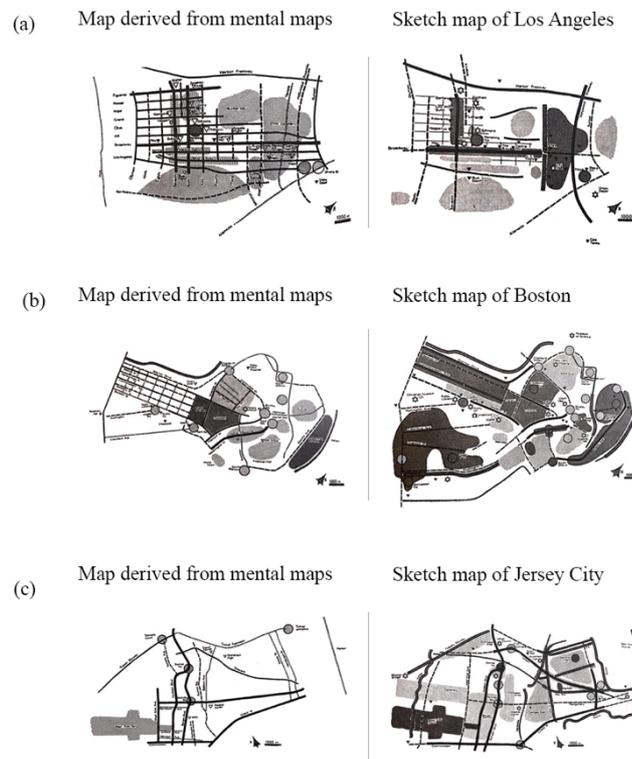


Figure 2.4: Result maps of the study. (a) Los Angeles, (b) Boston, (c) Jersey City.

(Source: Lynch 1960)

This field research and interviews give the relationship between the public image and the visual form and determine the strong and weak areas of the area. In the resulting maps, repeated drawings became the most important output of Lynch's study and they revealed five main elements in the city perception. Lynch says that 'the relationship between the image and the physical form creates our spatial perception' (Lynch 1960). Lynch examines how the spatial value of our perception affects movement in the city and how it orients us. A 'small' object in the city may have a 'big' place in mental perception. Lynch refers to this as "imageability"; an object with a high spatial meaning also creates a powerful image in the mind (Lynch 1960, 9).

Years after Lynch, Appleyard, who works to analyze the environmental quality and living space, conducts in-person interviews and observations; Appleyard in this

respect is also emic tendency. In studies conducted on 'what is perceived', it was tried to understand whether people with different backgrounds and experiences; common perceptions and how life culture, social class, and habits have affected their perception.

**Donald Appleyard's The Environmental Quality of City Streets: The Residents' Viewpoint** (1969) study is some kind of an investigation for identifying the environmental concerns of people who live in on city streets in San Francisco. It tries to find what effect traffic has on the living environment above people, how is the life on the street, what resident feel on his/her area and how it could be improved by the resident. To examine these issues, there are five criteria for pursuing study main idea: safety situation though traffic hazard, individual feelings for the environment; stress, noise, pollution etc., feeling of belonging for their home territory, communication and neighboring degree of street, awareness, and interest of residents for their environment.

People on the street with low-density traffic are more social. The differences to their environment are enhanced and their sense of ownership is high. Roadsides and sidewalks are safe for children and are suitable for use. They were able to define larger areas for themselves in the home/region description (see Fig. 2.5). On the street with medium traffic, people gave average answers. People on the street with high-intensity traffic live life faster. When defining their own area, they never own a balcony or sidewalks of their home, without touching the streets or sidewalks at all.

While on interviews, the answers are rated by the interviewers on a 5-point scale as environmental quality ratings. The research method for study is open response **interviews and observations.**

What the urban environment means to people and how people feel in this environment; affects the mental image. Appleyard mentioned the criteria of perception in his study. In an environment where buildings and other elements are known in urban environments, perception varies according to the imagination, the visibility of people moving around, the type of activity and the existence of structures that are important for the community. Lynch's and Appleyard's perception and image studies were included in the literature as **'image studies**. These studies generally focused on **how people visualize, conceptualize and eventually understand the city issues.** They were focused on how the urban environment is perceived visually and social dimensions of the environment as they are used and experienced by people. Unlike Lynch and Appleyard, Gordon Cullen emphasizes the visual dimension of the city, not its perceptual dimension.
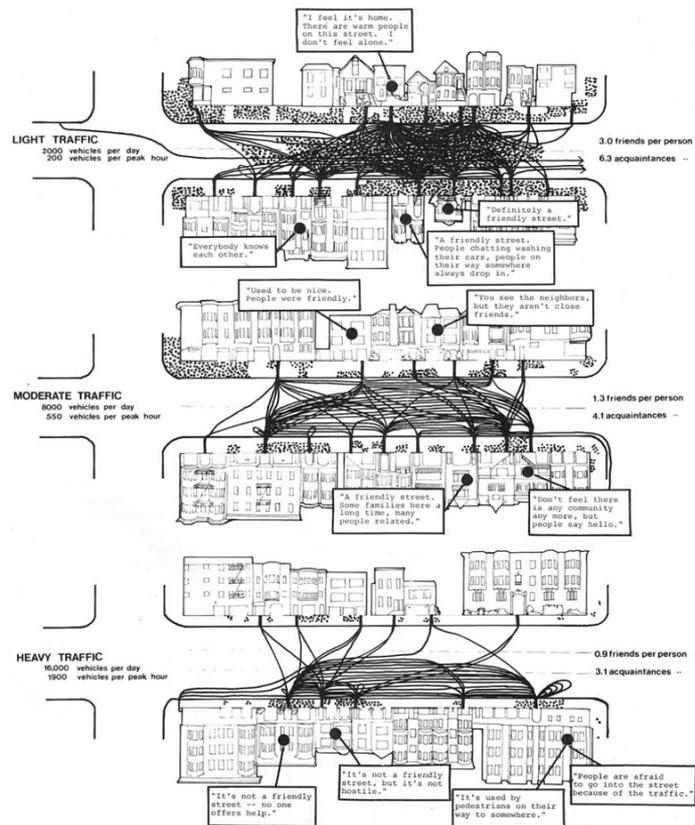
Figure 2.5: Appleyard's original social relation diagram, lines represent social connections; dots are where people gather. (Source: Appleyard, 1969)

## 2.3.2. The Visual Dimension

**Gordon Cullen's The Concise Townspace** (1961) study is about a city as a collective enterprise, where people use and live in the build environment, how they created spaces or move between them. He said, "one building is architecture but two building is town space" (Cullen 1961). The depth of the space examines the existence of physical objects, the coverage and the scale of the space. He describes three title for which our environment produces an emotional reaction for the urban designer. Optics; how we see it and how we understand it. We evaluate an existing landscape differently from the different angles, and this is the change of our view. Place; it refers to the question of how we are in a spatial situation. There is a difference between the situation in a large city square and the physical situation in a closed area. Karl Marx; said, "It is not their consciousness that determines the material life conditions of people, these material conditions determine their consciousness." (Marx 2016). Cullen's "place" term deals with

the effects of "here" and "there" on emotions. Content; the property of the place or the city. The colors, the style of construction, the symmetry, the harmony that occurs with balance is mentioned. Cullen makes observations and depicts his visual city with his drawings so reflect us visually attractive parts of the city (see Fig. 2.6). This illustratable situation conceptualized as "picturesque" (Moudon 1992). It has been used in an effort to capture the emphasis on the pictorial component of the environment.
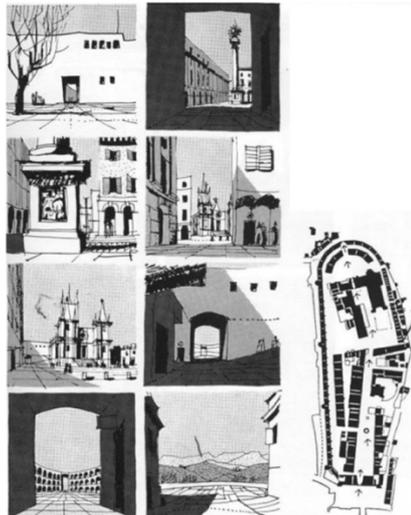


Figure 2.6: Cullen's own serial sketches for different visual point. (Source: Cullen, 1961)

In his study, Cullen walks in a city. During his walk, the image on the front and back, starts to change. He says that 'the landscape of the city appears to be in motion, on foot' (Cullen 1961). The existing view reveals new landscapes with changing images on the move and Cullen calls them 'emergence view'. Continuously changing images with motion creates a visual series and Cullen tells the concept of **"Serial Vision"** (Cullen 1961). The visual repetition of the series is a new way of expression. With sketches drawn through his movement, he produced "serial sketches". This visual representation technique, which is created with sketch drawings, also can be created by photographs, other than paper&pen. On a single image created with consecutive pictures, snapshots of the action are seen. When the photos taken for each second of the movement on the same scene are superimposed with special photography software, the flow of the movement appears as a single photo. This technique is called **'sequential photography'**.

Similar to Cullen's walk and drawings, **Peter Bosselmann** took a walk in Venice. Unlike Cullen, Bosselmann limits the distance and duration of his walk. The walk takes 4 minutes for a distance of 350 meters (Bosselmann 1998). On this walk, he crosses a

passage through the courtyard; a bridge through a narrow street and another square where trees are located. In the streets that follow, he comes across people and a bridge leads to the stairs. After then, he passes through narrow streets again and ends his walk in a street parallel to the canal.



Figure 2.7: Bosselmann's different figure-ground maps and routes.

(Source: Gehl and Svarre 2013, 116)

Bosselmann wanted to compare how long 4 minutes of walking feels in different urban design patterns (Bosselmann 1982-1989). After this 4-minute exploring walk in Venice; he continued this 4-minute walk in fourteen different urban environment such as Barcelona, Kyoto, Washington and California, on the 350-meter routes again. He looks at the walking distance of 4 minutes in these walks and he examines the walking movement in different urban textures in an environmental context. In most cities, the distance, which is equivalent to walking in Venice, is shorter, while in some cities the time required to walk 350 meters is almost the same as walking time in Venice (Gehl and Svarre 2013, 117). Throughout his work he uses figure / ground maps (see Fig. 2.7). In a city where urban elements are intense such as Venice, thirty-nine drawing are used to represent a four-minute walk with images. However, because the urban elements in the other cities is not so frequent and different, the perception of place is simpler, and it is

possible to express the visual representation of these cities with less drawings (Bosselmann 1998, 90). Depending on the visual variety of the place, perception and identification of the place affects the person's perception of time. This 4-minute walk can be acceptable as a tool for explore the pedestrian movement and the accessibility of the place.

Lynch produced mental maps in 1960, from who draw the individual free hand sketches, the local people; to learn the how they see and perceive their city. In 1961, Cullen was drawing sketches by his own from various points in the city, suggesting that everyone saw different things, and trying to understand the visible environment. Appleyard analyzes the relationship between street and traffic in 1969 by measuring one-to-one interviews with the neighborhood to measure the quality of life, social interaction and environmental awareness and Bosselmann studies pedestrian movements and urban environment accessibility. The pioneer names and their works about the urban design, are selected and their characteristics are formed for the specified titles.

Table 2.1: Researchers and their works.

| Researcher | Name of Study | Dimension | Year | Aim of Study | Method | Place | Focus Group |
|---|---|---|---|---|---|---|---|
| **Kevin Lynch** | Image of the City | Perceptual | 1960 | Determining image of the city | Drawing mental maps | Boston<br>Jersey City<br>Los Angeles | Native people |
| **Gordon Cullen** | The Concise Townspace | Visual | 1961 | The city as an "art of relationship"<br>Focus on city visual features | Drawing sketchs &<br>illustrations | England | — |
| **Donald Appleyard** | Environmental Quality of the City<br>Streets: The Residents Viewpoint | Perceptual | 1969 | Measuring the:<br>- Life quality<br>- Social Interaction<br>- Environmental Awareness | Mapping<br>Interviews | Franklin Street, Gough Street and Octavia Street<br>San Francisco, California | Native people |
| **Jan Gehl** | Life Between Buildings | Functional | 1971 | Documented the connection<br>between public life and public space | Narrative Photographs | Italy | Public |
| **William H. Whyte** | The Social Life of Small Urban Spaces | Functional | 1980 | Basic observational studies of people's<br>social activities in small public spaces. | Time-Lapse Photographs | New York | Public |
| **Peter Bosselmann** | Representation of Places | Visual | 1982-1989 | Compare the spatial characteristics of<br>environment | Four-Minute Walks | Various Locations | — |

### 2.4.    First Technological Method of Visual Tradition: Photography

Cinema and opera are the most common visual arts of World. Cinema exists through storytelling, different scenes, image compositions, and on-screen talk. In a similar way opera have music, voice, and action. However, the best tool for a visual source is a photograph. Because the photograph contains information about time, event, space, person and environment. The image recorded with the photograph becomes more functional. Documenting or photographing something allows to be more careful or to re-examine on the action. Photographing is an essential part of public life studies to document situations where urban life and form either interact or fail to interact after initiatives have been taken (Gehl and Svarre 2013).

When it is not enough to describe the action with words; pictures are essential for describe it. Moreover, if a multiple picture is taken, we can combine these photos to create a story and better understand the event, the situation or the object (Diderot 1993) in (M. Krieger 2011). Photography is the record of what is visible on a plane, and when looked after, it revives an event that happened in the past. The emphasis in photography is not on spatial design, but on interaction on place and human. (Gehl and Svarre 2013). Due to we cannot record and experience 'every' thing around us, we can only get these in "slice" form in everyday life. It is possible to work in many different areas with cameras and lenses in the photography sector. When we want to approach the width of the human eye or when we want to obtain panoramic images, we use wide angle lenses. While street photographs give clues about a city's build environment, nature photography allows us to imagine areas of greater measure.

Photography, which is one of the visual expressions, is a tool for obtaining urban data (Gehl and Svarre 2013). The images that we can save with the photo include all the clues about the place, the event or the subject. The limited area that we can see through a rectangle gives a more focused image and precision than the wide-angle human eye. The difference in expression between painting and photography, exhibition, look, also sheds light on the phenomenon. The picture is a work of art that is shaped by emotions from the hands of the human but in photography, a person who looks to a photo; just sees "shown". "Eye" is the response from the product on photography, while on painting, "hand" has all responsibility.

Working with photography is not just a machine for artists and a mechanical replication technology through this machine. Scientific studies such as optics, light, color, the quality of the image and how we see it were carried out in the field of photography.

In other words, photography has provided an environment for these scientific studies. Producing and processing images in computer environment is an important point reached as a result of this process. The scientific discoveries and the image of the camera caused a new visual understanding. During the XIX. century, photo production was a turning point in terms of world history. The technical possibility of image recording allows for fast visual resource and reproducible archives. The photograph shows people how their environment is with fit into a rectangle. Those who see their environment focused on a specific point in this way can say more clearly their wishes and thoughts about the field and make problem and solution-oriented determinations (Al-Kodmany 2001). When we are capture daily life actions or products by photograph and video-voice records, we call these studies as a **"document urban life"**.

Changes occurred in cities shaped by diseases, wars, migrations and natural disasters could be recorded with the photograph. Between 1858 and 1877, **Charles Marville** was assigned by Hausmann to photograph Paris before and after it was eviscerated and divided grand boulevards, so he took approximately 500 photographs of Paris's streets. His most accomplished work was the album of about 400 images of roads; re-planning and restructuring of Paris, Marville took photos on the streets of Paris, before and after the city's transformation by walking along the street up and down (Fig 2.8, 2.9). At the time of Marville's work, Eugene Atget does similar work for the city of Paris (see Fig. 2.10). Unlike Marville, Atget focuses not only on the facades of buildings but also on shops, parks, residential areas, monuments and workers of the period. He was interested with typologies of Paris and its environment. Instead of the single photos of Marville, Atget used wider-angle lenses and even records the space in a panoramic view (Benjamin 1993). In the first decades of the twentieth century, Atget photographed the outsides and the just-insides of stories in Paris as part of a larger project documenting ordinary life in the city and its suburbs. From this point, Atget documented the beginnings of a consumer society (M. Krieger 2011). Atget has also been one of the photographer, streets of Paris, which Marville took during the 1800's. The change over the years can be seen from his photographs.

Figure 2.8: Rue Saint Severin Street, Paris. (left) Marville's photo in

1866, (right) Google Maps Street View in 2018.



Figure 2.9: Rue de la Parcheminerie, Paris. (left) Marville's photo in 1866.

(right) Google Maps Street View, in 2018.



| (a) | (b) | (c) |
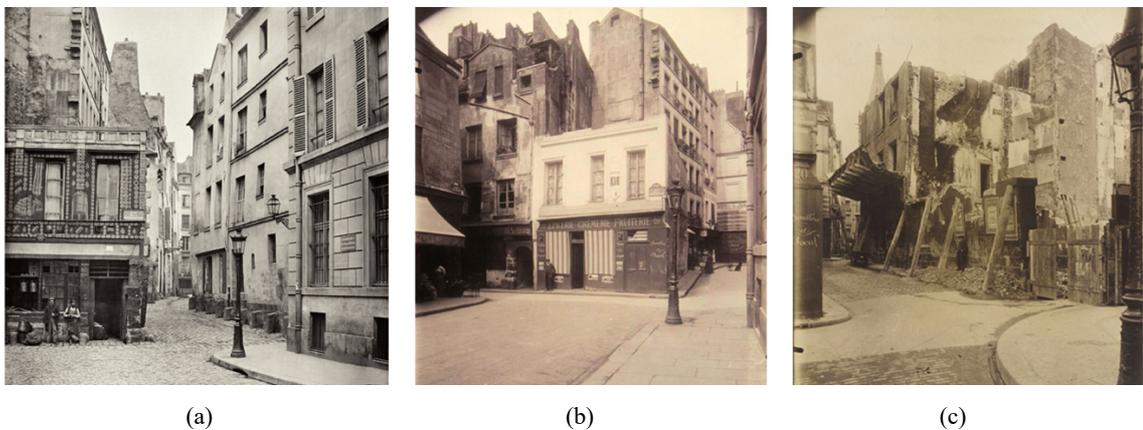
Figure 2.10: Rue des Prêtres Saint Séverin, Paris. (a) Charles Marville's photo 1866,

(b) Eugene Atget's photo 1912, (c) 1913.

## 2.5.    Visual Tradition in Art Movements

The techniques and expression methods of visual tradition are discussed in the art world before urban studies.  The meanings and expressions of the works in the theory on visual expression of the photograph have created different art movements. For photography and visuality, it is necessary to mention, firstly ***Impressionism.*** The artist Claude Monet (1840-1926), one of the first representatives of this movement, was interested in how the image of a subject that we saw before changed through light. Monet drew whatever he saw, how he saw it. As it is, as it sees. Monet painted twenty different paintings of the Rouen Cathedral, each with different light and color. In this way, the complex structure of the image as well as a fluid process has revealed through the pictures. For him the Cathedral of Rouen has never been the same, with no single appearance, and can be depicted in many ways. In this way, the art of seeing the idea that it should be a product of an unstable and changing thought has emerged. The members of impressionism that emerged in the late 19th century were directly concerned with the scientific findings of the period.



Figure 2.11: Rouen Cathedral paintings, 1892-94, Monet.
(Source: image from Wannart, "*wannart.com*", Web., access on 4 Nov. 2018.)

The new expansions of "the act of looking" at the turning point of *Cubism* have been the beginning of the 20th century. Cubist painters have portrayed objects from many different perspectives. According to them, the human eye should not have a single point of view, such as being mobile and not attached to a single point. In this sense, it is against the tradition. Cubists depict objects as if they were seeing from different angles. In this way, the relationship between image and reality has changed. In doing so, cubist painters are based on the human form of vision. Looking from a single point created by tradition is not a single and indispensable situation. As a cubist artist, Maurits Cornelis Escher (1898-1972) concentrates on graphic design and creates an illusion effect to the viewer with his visuals. He played with architecture, perspective and impossible spaces. He is most famous for his so-called impossible constructions, such as Relativity.
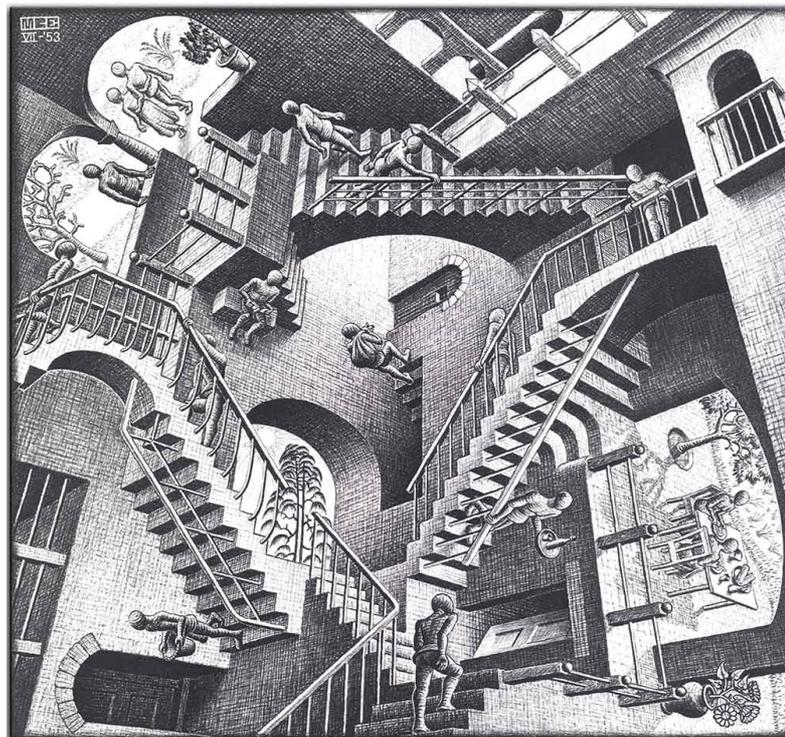


Figure 2.12: Relativiy, 1953.

While reconstruction of cities destroyed during World Wars and environmental renovation works had concept "order" and "rule", these concepts were not accepted for some researchers of the period. They argue that art is not for art, but for producer, for audience and society. The movement, *Dadaism* has been a protest against the barbarism of war, the intellectual artillery in the field of art and daily life. The Dadaists advocated a devastating and liberating approach, to art by elevating coincidence and absurdity,

creating shock, and using industrial or daily life materials. The Dadaists care about what is described, not the narrative form.

Marcel Duchamp, a leading figure in Dadaism (1887-1968), with his notion of "ready-made" and "found object", has made a harsh criticism against the original and unique works of traditional art. By mounting a bicycle wheel on a stool, he transforms the wheel into a remarkable sculpture like a portrait. He turned a series manufactured urinal upside down, then put it away from its context, sending it to an exhibition with the signature of "R.Mutt"  (see Fig. 2.13); to question the default rules that have been determined in order to qualify an object as art and underlining the role of institutions and audience in the formation of these rules. Duchamp abandoned the dependence on paints, brushes, pencils and similar tools used by traditional paintings and carried the art to a mental inquiry platform by focusing on the idea rather than on the form; with the ready-works that were created with the objects of industrial or ordinary daily life.

This critical attitude that Duchamp brought to art has deeply affected all the art movements that followed. Duchamp carries no aesthetic concern. The main question he wants to discuss is: Does art have to be done by the artist's hand? This placement application is expressed as an installation art in the field of visual arts.



Figure 2.13: Duchamp's The Bicycle Wheel (1913), The Urinal (1917).

**Jean Arp,** one of the other artists of the movement, used the collage method in his works. Arp defined new compositions formed on a plane with different materials as works of art (Arp 1948). This method of Arp's is called, **pasted paper collage** because it combines torn papers in different texture, color, thickness and size. He randomly "puts" two different colored papers of another size on a paper and says the resulting settlement

as a *chance*. According to Arp, the pieces are in the same order as the events of daily life, by chance or spontaneously  (Jolas 1932).

Another form of representation of the period is **assemblage**. It is a collage technique made with different materials on a surface, embossed, collapsed and visible in 3 dimensions. In contrast to the pasted paper technique, materials can be of a very wide variety and size. Collage and assemblage are also an installation art. However, Duchamp's works are different from collages cause its located in a place and they have a viewer.



Figure 2.14: Assemblage examples.

While applying these methods, the technological possibilities of the period do not directly participate in the study and there is no mention of creating a digital archive. However, it is possible to create visual documentation by recording the artworks, monuments, city squares or wider scale existence of the whole city. In the Chapter 3 and 4, information visualization methods, technological opportunities and participation situations will discussed.

# CHAPTER 3

# URBAN DATA VISUALIZATION REPRESENTATIONS IN URBAN DESIGN

The focus on planning and information technologies has changed over the years. In the planning practices of Kevin Lynch's period *1960's*, information was accepted as an already fundamental element of planning, while the method of obtaining this information was observations, mental encodings and hand drawings; technology has never been utilized in this period.

One of the representations of spatial knowledge, hand drawings, in Kevin Lynch's study; he makes drawings of the inhabitant people of the city, in the process of reaching the information he targeted, thus his method became a tool for public participation and production. Even then, Lynch, with his mental maps, severed his public representation after a while, taking his work to an abstract dimension and creating artistic drawings and five different elements. The type of representations can be considered a means of communication when it makes sense to the designer and the community in the works. The five elements created by Lynch were accepted by everyone and helped us to define the situation in the environment. Similarly, Gordon Cullen's notations presents concepts of perception of the environment. Cullen conceptualized the environment in four criteria such as humanity, artefacts, mood and space concepts (Cullen 1967).

Similarly, Appleyard's analysis of movement patterns works with observations and interviews, reveals the inhabitant's vicious participation in the process of collecting information, not the continuous participation of them. Figure-ground studies, space syntax analysis and analysis of the cross-sections of spaces are the study areas of urban morphology. During this period, **the technology hit** in the works and the resulting products **is low,** and there is no communication between the designer and the user. Hand sketches as a representation tool in the visualization, the photos at best. In the visual language used in photography, we can record the environment how we see with our eyes exactly, and even if we are sure of its accuracy, public participation is not seen in this method (Bosselmann 1998, 3). In the photograph, the inhabitants are an object that can only be seen with people.

In the *1970s*, information was edited, analyzed, and started to be used as meaningfully summarized. The effective use of knowledge nourished existing resources

and design ideas, and in the design process, information obtaining methods began to transform. In 1975, Kodak produced the first digital camera. In 1977, "Apple II" produced the first personal computers with color graphics capabilities. Two years later, the development of the modem led to the transmission of digital signals via telephone lines. With the introduction of personal computers such as "IBM" in the *1980s* and pixel-based image creation software such as "Adobe Systems", it became possible to create digital images and turn them into slides or paper prints.

The advent of microcomputers was a major break point in computer applications in urban planning. With the rapid spread of computer technology, many social sciences fields began to use computer-assisted visuals (Al-Kodmany 2001). When computers were included in daily life, the working environment on the table returned from paper to screen. Designer and academic groups who met computer technology started to give the first digital products of their actions and realized that the design sector was paved the way (Klosterman 1997, 46). The fact that computers can reach true color resolution has been realized with the launch of 24 bit color. *In 1990,* Adobe introduced "Photoshop" software, which became an industry standard in a short time in pixel-based image, picture and photo editing and processing. In 1992, "Hyper Text Markup Language" (HTML) was developed, which set the path for "World Wide Web". Terms such as technology, computer and multimedia were introduced in this period. Multimedia is a linear environment with visual and written documentation. Hypertext is a text written on the concepts of knowledge. Hypermedia is an environment where visual resources are added to this textual information. It is a collection of information including graphics, audio, video, text-only and animations, and it is more advanced version of hypertext. The difference between hypermedia and multimedia is that the hypermedia is more interactive meaning that users can upload and edit information on this environment (Al-Kodmany 2001, 18). Because it has a structure that can affect all emotions with its visual information, and combines multimedia with presentation diversity (video, photograph, animation, sound, music), it facilitates the attention of participants in design and planning activities (Al-Kodmany 2001, 19). In such systems where access is possible with digital and different inputs, the inclusion of participants in the study and their focal points should be considered.

The great revolution of 90's period in the world has turned from desktops to personal computers (PC), and the "www" has entered our lives. With the spread of the Internet, accessibility to the character and location of life in cities (GPS - Global Positioning System) increased. Founded at the end of the 90s, Google had become a

digital network with information about everything. The digital data archive, which starts to develop with the Internet, contains many different information from personal information to the streets of the city (Klosterman 1997, 46).

**The participatory approach**, which is a new dimension of urban design, recommends that experts from the profession and users work together throughout the process. The user, who can be active in every step, can share his / her wishes and ideas throughout the process. So, how can we add the inhabitants to the design process? In this section, I will explain the visual tradition of urban design, how we can continue with visualization tools and what these visualization tools are.
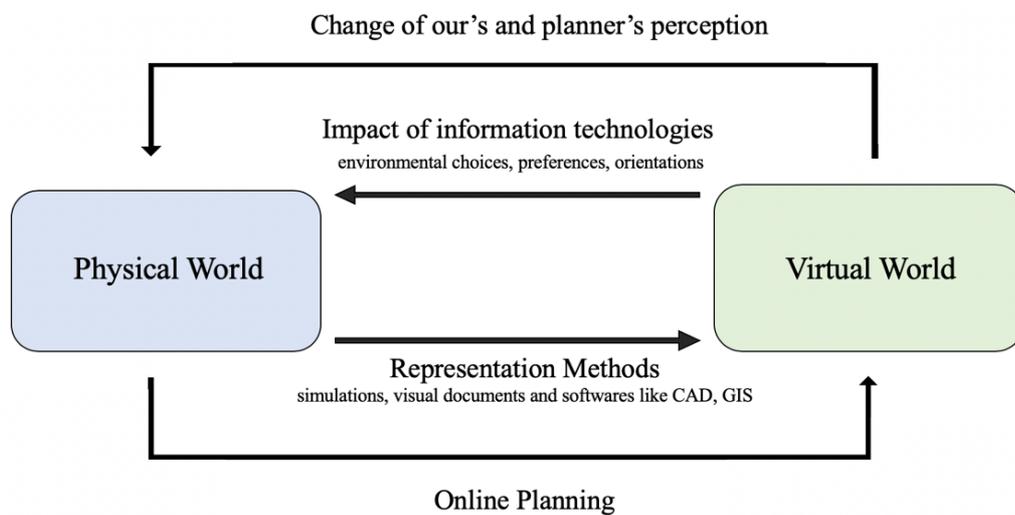
Figure 3.1: Conceptual schema on the interaction between information technologies and city planning.

(Source: The scheme is based on the work of Klosterman 1977 and Velibeyoğlu 2004.)

When discussed about photography, social development, technological relations, art and the artist's situation, Walter Benjamin's article is the best discussion product. In 1939 the article "Work Of Art In The Age Of Reproduction With the Possibilities Of Technique" of Benjamin, he dealt with the new form of vision that emerged through photography (Benjamin 1993). In the, "After Photography" period where the phenomenon of the end of photography is discussed, Benjamin's thoughts will still be effective; because the subject is still reproduced images. The new situation in which photography is included is the reproducing of photographic images through new digital technologies. On the other hand, these images are related to how they represent social life. On the denominator of these two basic issues, digital technologies, computer systems and internet networks are included.

The technologies developed in urban design and the way of representation of information vary during different periods. Bosselmann divides the representation form into two as conceptual and experiential (1993, 9). Conceptual methods focus on the physical and present their ideas of design with professional drawings. Studies such as sketches, technical drawings and cross-sections on two dimensions can only be understood by the people within their profession, while the public may not mean anything (Al-Kodmany 2001). In this case in the process of designing, participate to inhabitants in the study and experiencing the places with their perspective, comes to mind. It is necessary to transform, the images and visual documents used by the designers in the analysis process, for understandable to the public. Al-Kodmany says, "… the form of representing the information is as important as the information itself." (Al-Kodmany 2001). Because representation affects design thinking. The graphs and diagrams used in the projects can be produced in a way that the user of the space can understand, and at this stage, architecture uses computer technology. Using computer software, graphic design products and 3D visualization programs produce the visuals of the space in the best way.
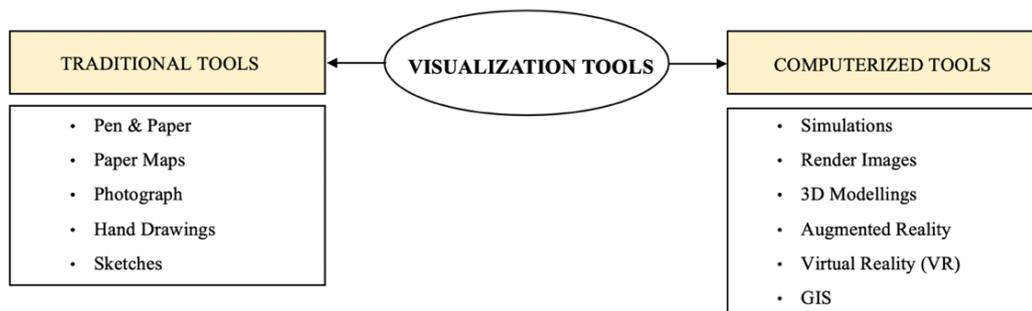
Figure 3.2: Visualization tools schema.

(Source: Scheme derived from classification of Al-Kodmany 2001.)

Al-Kodmany divides visualization into two: traditional and computerized. He says that traditional tools have social interaction and that they can be in the discussion environment of the designer and the user during the study with these tools (Al-Kodmany 2001). Inhabitants can contribute to the design process according to the information they understand from the expression of analysis, images and symbols. However, when using technological tools, people who do not know how to use digital tools or who are reluctant to use it, they can be left behind in the process. As well as, devices with a digital interface, such as information kiosks placed at certain points in the city, may not have any meaning

in the design dimension for persons without adequate knowledge and skills (Al-Kodmany 2001). In the visual digital language to be used, participation is an important value. For this purpose, the simplest interfaces on devices or media should be used and navigated to the user.
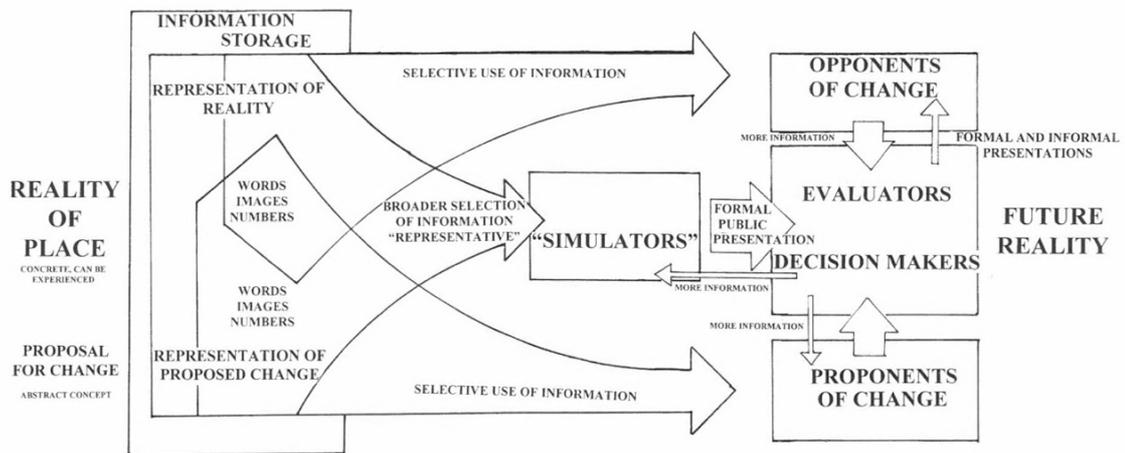


Figure 3.3: Design communication model. (Source: Bosselmann 1998, 202.)

Pop Art movement, which marks the end of the representative art and the concept of the artist who produces meaning, created a turning point in the history of art, representing the beginning of a new art form that French thinker Jean Baudrillard (1929-2007) called "**simulation**" (Baudrillard 2005). Baudrillard states that we are living in an age of simulation, and that "similacs" are produced, which means reproduction of objects or events in the simulation process. Baudrillard calls this world **hyper-realism**, because the media has become more real than reality, becoming hyperreal. The real, pure reality becomes increasingly secondary and eventually completely disappears. In this universe, where there is an infinite number of realities (simulacra) that have all the signs of the truth (not imitation or parody), it is now impossible to distinguish between reality and images (Baudrillard 2005).

Three-dimensional representation techniques are more understandable for everyone. However, it requires expertise and occupation for the way it is applied and performed. The virtual spaces we experience in 3D are actually the volume of the 2D drawings, created on the computer screen. Animations, computer aided models, digital images produced by the designer's own expression are much clearer than drawings and technical plans in conceptual expression. Endless detail and mobility of the built environment simulations should be made as close to reality as possible, information

should be given without distortion and it should be neutral (Bosselmann P. 1993, 18-19). According to Al-Kodmany, "The model converts two-dimensional aerial photographs to three dimensions using a digital elevation model and is dynamically linked to a GIS system." (Al-Kodmany 2001, 17). The **VR** allows us to see the space by means of the virtual environment and depth of field it offers to us, through the sensors that address our sense of sight and our sense of vision. Today, games and spaces are produced in virtual spaces with VR glasses. With these glasses and accompanying software available from many different manufacturers, you can switch to a virtual reality environment. Although this technology is currently being used rapidly in the gaming industry, it can be a very creative and experiential tool in the real estate sector. It is interesting to experience the interior and exterior of a house in a virtual environment for a client who is in the process of purchasing. Again, in this method that activates the sense of vision, bodily turns also move the user in the space. In this way, can transfer requests and ideas to the designer within the same timeframe, thus the active participation is possible.

Designing **a physical model** of a project that has been completed or is in the process of design maintains the designer's productivity. The pieces that are touched by the hand, or the materials they use, allow the designer to cross over her/his design and think over and over again. For example, a designer who modeled on the facade may be satisfied or make corrections when she/he sees her/his imagination revived and physically handled by what she/he drew.

Thanks to the **animation** videos produced by the three-dimensional architectural programs, we can see the air and land views of the spaces, and we can see every detail, from the illumination to the facade light transmission, the sun coming angles, the roof orientation, as well as the changing spatial changes with the change of in four seasons.

When we are not talking about a physical 3 dimension, **the perspective drawings**, **isometric and axonometric projections** allow us to perceive the space multidimensional with their drawing depth. **Render images** and **collages** produced by architectural programs such as Photoshop, SketchUp, ArchiCAD, Revit, and made a model by using various materials of design and the **video animations** are the other methods of this three-dimensional representation techniques.

The availability of geographic information systems over a network has become the largest resource for field workers. The use of **GIS** and many other computer software for collecting and storing land-related information has become a routine in the design process (Klosterman 1997, 51) and applications helped make land-use decisions in a time-efficient manner. GIS provides a model for the proposed future by producing alternative

maps based on past and future situations. But, as I have already mentioned before, participatory behavior is not seen as long as people who do not have sufficient authority and knowledge on digital resources cannot use such tools. Emphasizing that the use of GIS is important and successful in obtaining visual data, Al-Kodmany said "Its powerful mapping and visual display capabilities, its capacity to integrate many different layers of data, its user-friendly windows interface and speed make public information accessible and usable for neighborhood residents." (Al-Kodmany 2001, 12).

The processor speed of 1 GHz in *2000*, computers that can record DVDs in 2001, mobile phones that took photos in 2002, Skype in 2003, Facebook and Twitter in 2006, and Instagram in 2010; the opening of these social networking sites is only a part of the successive innovations in a short time. These developments heralded the era of electronic media.

The summit of geographic information for regions and cities is that, Google has launched an interactive map of the world with Google Maps and Google Earth that it launched in 2005, offering it to the world through the Internet and even taking it a step further with Street View service. Google Street View can obtain snapshots of built environment and daily life at eye level. Carmona claims the concept of participation in the design process associates with the concept of communication and says, 'Urban designers need to be aware of the most appropriate methods of communicating an urban design project.' (Carmona M. 2013, 271). In the studies based on participation and communication, architect's perspective, planner's perspective and user's perspective should be connected to each other. Experiential simulation tries to reproduce a concrete representation of what a place will be like when experienced (Appleyard 1977).

In the 2000s, even without the concept of "social media", in recent years, social media is an ordinary part of everyday life and it has been an addiction. As a more advanced version of this technology, the use and the increasing of smart phones, the contamination of electronic devices with the human mind and the robotics are discussed. When talking about technologies that can be used in visualization representations, it is necessary to know the relationship between industry and technology and what these numerical expressions such as Industry 4.0, are in the technological environment of our time.

Industry 1.0 represents the transformation of the industrial community with water and steam power, 2.0 electricity power and mass production, 3.0 information technologies and computer-aided manufacturing. **Industry 4.0** describes the new digital industrial revolution, including the Internet and network connections as a new dimension of all these

technological developments. Production in the Industry 4.0 system is compared to a system where machines offer services and share information in real time with products. The term Industry 4.0 was first used in Germany in 2011 at the Hannover Fair. Nowadays, the works of the field are still supported by Germany government support.

With 4.0, concepts such as robots, smart machines, simulations, augmented reality, cyber networks, cloud technology and large digital archives are introduced into our lives. The first of the technological products of Industry 4.0 is the robot devices supported by a concept called **"Internet of Things" (IoT)**. The idea that interconnected objects, devices and computer machines can communicate with each other has already been accepted in the industry; production of robot machines and autonomous vehicles has started. In this way, devices connected to each other through a network will transform our's daily life practices.
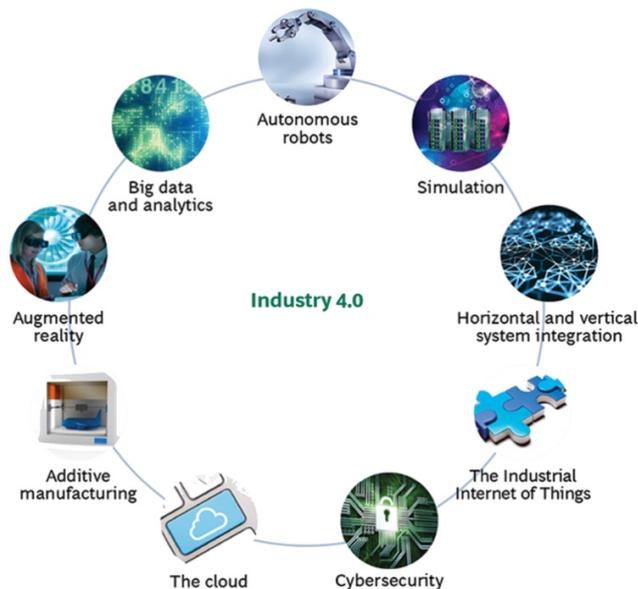


Figure 3.4: Relation diagram for Industry 4.0 technology.

Industry 4.0 is the vision of the industrial production of the future.  (Source: BCG.)

For instance, Apple has made it possible to transfer data from the Air Drop connection between devices without internet connection. Every information on your Mac can shared with your smartphone or smart watch at any time by Air Drop connection.

The new photography which equipped with the possibilities of digital technology is based on "smart" term rather than mind, intelligence and experience. Daily objects like white home goods, smart homes and smart cars. In today's world where the advantages

and disadvantages of how digital developments can affect human life are made into a series of films, driverless cars are being talked about. These cars can be redirected to the specific location determined by the user on the map. While waiting at a bus stop, the arrival time of the buses will not be seen on mobile phones, but perhaps on an active map as reflected in the stall board. Philips, another technology company, was launched smart led bulb in 2012 under the name with 'Hue: Personal Wireless Lighting'. This smart led bulb can be managed with applications downloaded to smartphones. Now it's not just phones that are smart, now devices will race their mind with each other!

IBM, created a model of the IoT that's useful for understanding the security threats at various data flor and control transition points.



"Things" can be remotely controlled or viewed, and they can send telemetry for analysis.

This may be a controller area network in connected cars, a local network in homes, etc.

Most "things" connect to the Internet, except for power grids or classified government systems.

Cloud services provide the repository and access control between the "thing" and its controller.

Smartphones, tablets and other smart devices can control all types of "things".

Figure 3.5: Human view of Internet of Things, IBM model.

(Source:  X-Force Research and Development & IBM, published date November 2014; on IBM web site.)

Table 3.1: Benefits and drawback of Visualization Tool. The table retrieved from Al-Kodmany article. (Al-Kodmany 2001, 23-28).

| TOOLS | BENEFITS | DRAWBACKS |
|---|---|---|
| **TRADITIONAL VISUALIZATION** (Low-Tech Methods)* | Participation is high. Face to face interaction. Efficient inputs and outputs. Does not require expertise. Everyone can join. Accessibility is high. The cost is low. | They tend to be inflexible. No possibility for zoom-in, zoom-out. Each scale needs separate work. Only effective in the design process; they may not be result oriented. Need an understanding of the complex relationships between different variables in the urban environment. Visual physical representation is not reachable. |
| **COMPUTERIZED VISUALIZATION** | Accurately represent and present complex contextual information. Quick and focus representation. Multiple scale of the same data. Flexible. User interaction. 3D views. Access to a big digital data. Zoom-in, zoom-out possibility. Technology provides more information to individuals and smaller organizations. Source of power for community organizations. | They tend to invite less user engagement. People who do not have the authority and skills about computer technology are not approaching these methods. Software studies require expertise and training. Advanced visualization technology is not widely accessible. It doesn't mean anything to people who deprived from technology and the Internet. Sometimes images can be misleading for people. In terms of their hardware, software, computer and digital equipments needs, these methods are expensive. |

# CHAPTER 4

# VISUAL REPRESENTATION TRADITION
# IN DIGITAL ERA

## 4.1.    Understanding Urban Tomography and Digital Humanities Concepts

The methods used in the process of data gathering about the study area in urban design studies have been repeated frequently in various studies of the field, so these methods have not changed. The traditional methods were diversified in their technical expressions, but they had failed to adapt to the developing technology. Every information and every movement need speed, nowadays the urban designer has to be fast and practical.

The digital era, which started in the 1990s, showed its products in the field of computing with most of the personal computer ownership data collection movements in the 90s. The emergence of the Internet, the digitalization of information access formed an unlimited public space for humanity. Every move made in the virtual environment and every information added constitutes a source for human beings, creating an area that continually growing and spreads. These inputs, which are derived from human beings, are not a physical or tangible entity but together with the understanding of today's and yesterday's society, its culture and knowledge.

The easiest way to access information today is internet and digital publishing. Moreover, the internet can increase **public participation**. Users who are aware of their environment more quickly and easily will be able to add, edit, and view information from any place at any time with the visuals they encounter. Unlike traditional methods of obtaining information, it is easier and more practical to access information from digital media. In this way, the designer gains a clear view of the objectivity and precision of knowledge, as well as time-consuming by using an ever-growing, up-to-date and accessible archive. For example, obtaining information to be used in urban studies for the city of Istanbul is an intensive and demanding task due to many factors such as the socio-economic structure of the city, its complex and irregular construction and it's consisted two physical regions. The analysis of the use of squares or parks in the urban scale of Istanbul requires a long time and wide working staff. At this point, the time and "crowd" (by the means of wide working staff) required by designers and working groups, are fed

by the practicality of digital knowledge. In this city, where every million people can access the Internet during the day, every movement has a digital sign. As the 'social network' which entered our lives with the internet became widespread among the societies, 'sharing' became a habit of hand and merged with us as a second shadow. In order to produce impressions, ideas, and thoughts of a place, it is necessary to **be there** and **experience** it (Relph 1976). At this point, the 'position' is the designer's first tool. The opportunity with "internet-access every moment" which enters a home by computers, has advanced in its field with smart mobile phones and its spread to society like a virus. The knowledge of our 'position' and 'movement' at every moment with GPS, present in the devices is like a newly formed atmospheric layer around the Earth.

In addition to the traditional methods used in the process of data gathering about the daily life, culture, art, language, visual and built environment of the humanity; every tool to be used within the possibilities of digitalization and technology, serves digital humanities. Digital humanities lead us to **a bridge** that will not break between the past and the future. On this bridge, we can find information about the culture, daily life and physical environment of the **societies** living in the past and we can create an archive which is constantly growing and developing with the inputs we make to our system, during our lives. This archive, which we will obtain with the digital humanities approach, enables us to discover, widespread, digitally protect, digitize and manage about daily life.

Digital Humanities is an intercultural study, so it's a community bridge or a space where people from different disciplines and backgrounds, come together to learn effectively combine skills to conduct joint and interdisciplinary research. It's a form of interpretation. It is a method, an approach or a compromise tool that transform a complicated situation or statement into an understandable /comprehensible form. In this case, digital humanities try to make people's place clearer and more informed against the "unknown" situation or topics. Digital humanities is all about the computing the humanities research via technology and technologic methods. Adams and Gunn (2012) described Digital Humanities is an emerging, interdisciplinary movement which looks to enhance and to redefine traditional humanities scholarship through digital means.

It is a growing, continuously renewable and permitting interdisciplinary flow of information; it aims to accumulate evidence of human existence through digital means other than traditional methods. The term, 'digital humanities' may be defined as the application of information technology to analyze humanities as well as many interdisciplinary subjects. Computer and technology-assisted urban works allows researchers to gather and analyze a large amount of data. These technological

opportunities are always useful in the context of spending time. Digital Humanities is a **"big data"** and it incorporates both perceptual, experiential and visual materials and combines the methodologies from traditional humanities disciplines and social sciences with tools provided by computing and digital publishing such as text mining, and digital mapping, text analysis, data mining, visualization, modeling and simulation, geospatial analysis and mapping, multi-media storytelling, information design, network analysis, interface design, and markup.



Figure 4.1: Components of big data.

(Source: Graphic of user 'Trueffelpix' on ShutterStock Photo archive.)

| METHODS | | WORKING TOPIC | | APPLICATION AREA |
|---|---|---|---|---|
| Data-Mining | ⟶ | Cultural analytical studies. | ⟶ | All kind humanities study. |
| Computer Aided Visualization | ⟶ | Digital image. | ⟶ | Architecture, planning, construction, engineering, education. |
| GIS | ⟶ | Multi-layer visual maps. | ⟶ | Architecture, planning, construction, engineering. |
| Interactive Archive | ⟶ | Data for digital environments that can be intercepted by users, add-drop, update etc. | ⟶ | All kind humanities study. |
| Simulation | ⟶ | To produce participatory, collaborative and experience-oriented approaches. | ⟶ | Architecture, planning, construction, engineering, education. |
| Software and Coding | ⟶ | Involve softwares and produce new codes for computer technology | ⟶ | All kind humanities study. |
| Digital Content | ⟶ | Multimedia, Hypermedia sources | ⟶ | All kind humanities study. |

Figure 4.2: Digital Humanities approach.

As a result of technological changes in the relationship between art and technology, a new visual structure emerges. This structure is "digital image". Starting from the 1980s and developing in the 2000s, the digital image changed the meaning of the image. XXI. century visual culture is developed in digital environments. The daily

life which can be recorded with photography and/or cinema; through the images obtained movements, orientations, use of space, built environment, city squares, traffic information, building facades, the pedestrian-street relationship provides many details. Photography, the most common tool of visual documentation, is that we can store the data with the photo in a digital environment rather than physically storing it. Thus, we obtain an accessible, expandable, add-on, removable, extensible, debatable archive. These created archives created by us and so we can be referred this digital archiving as "digital humanities". When it comes to visual resources, digitality and details, not only art but science also uses this data. Photography technique, which is one of the most important works of "imaging", leaves its place in medicine to tomography devices. Things that are present but not always visible can be seen by tomography. With the tomography method used in medicine, images are obtained by digital methods for specific regions of the human body. Details, textures, and shapes can be seen in these images. The condition of **"seeing the invisible"** with tomography devices is important and interesting.

**Tomography** is a method of exploring a phenomenon through a large number of examples or perspectives. In medical tomography two-dimensional slices or images of a three-dimensional organ are used to envision the organ itself. Tomography refers to imaging by sections or sectioning. Urban tomography applies the same approach to the study of city life. To appreciate different aspects of a community, from infrastructure to work to worship. Thus, Martin Krieger compared the working principle of photography and tomography. In 2011, he introduced a new concept called **"urban tomography"**. Thanks to tomography method, visual documents of the city "can be drawn"; he said (M. Krieger 2011). Urban tomography allows one to imagine more adequate identities in that manifold presentation of profiles. The multifaceted perspective of digital data, **"slices of city life"** and its representation type make it a product of urban tomography (M. Krieger 2011). Urban tomography is used to see the invisible part of something, to get details and to get information about a whole city, district or else. For places where we can identify all or a particular identity, tomography allows us to descend into the existing one and view it in **layers**. Krieger said, "There is overlap, complexity, layering, and slices of life." and "… tomography as a technical term, you do not have to be an expert to read and appreciate multiple aspects, or slices, or tomograms. Tomography is the way we come to know the world ordinarily, every day." (M. Krieger 2011).

The technique of imaging/examination, which consists of multifaceted perspectives and slices in medical or geographic systems, is called tomography. This method is fed from digital applications and visual sources. When Krieger introduces the

concept of urban tomography, he accepts it as a method and chooses the photograph as the best tool of representation. In this respect, it is argued that the traditional recognition of the photograph, which is the fastest recording of the spatial situation and which always allows viewing. If we proceed through different imaging outcomes, it is possible to see the work of Marville and Atget in the 19th century. With the photographs taken, visual documents of the city are obtained. Terms such as subject, place and action described in the photographs give information about the period. In this way, many periodical features can be determined after years. The most important factor in the application of the tomography to a city is that the images obtained are visible from different angles of the previously unseen places. Using the tomography method in urban studies serves to see the city in layers, to strengthen the 3 dimensional expression and to better understand the city. It is important here is that tomography provides information in multiple layers and in different layers. This is the main point to focus on.

Tomography and geographic imaging methods show similarities in terms of layers they use (see Fig. 4.3). GIS contains maps that can be seen in layers and even the smallest detail, allows us to examine the city by dividing it into different layers. The way where we can distinguish the slices, layers or tissues is similar to the way of tomography shows the invisible. In this way, we can say that the first tool to be used in visualization of urban tomography is GIS.

However, the visual representation of geographical conditions can be shown on 2 and 3 dimensions, while the use of tomography in urban studies makes it possible for the 4th dimension. 4th dimension is mass-oriented public's visual expressions. In today's technology, working only the 2D of the photo is shallow and lagging. Because now the work is not only against the person who produces it, but also to the society it is in. The ideal approach in the process of creating urban documents should pay attention to participation and cooperation. Intensive environments with a high level of participation and knowledge, are ideal for obtaining urban data. In the age of technology these environments are expressed as a social and virtual rather than a physical environment. Therefore, the informations are digital, current and active. Tomography method uses spatial perception, spatial awareness, and different views from personal perspectives. The digital output of the movements during the day with the Internet, computers and smartphones is the easiest way to see the city from different angles. The data collected and analyzed on the city, which is analyzed or analyzed by tomography, is also a source for the digital humanities in terms of advantages and ease of use.
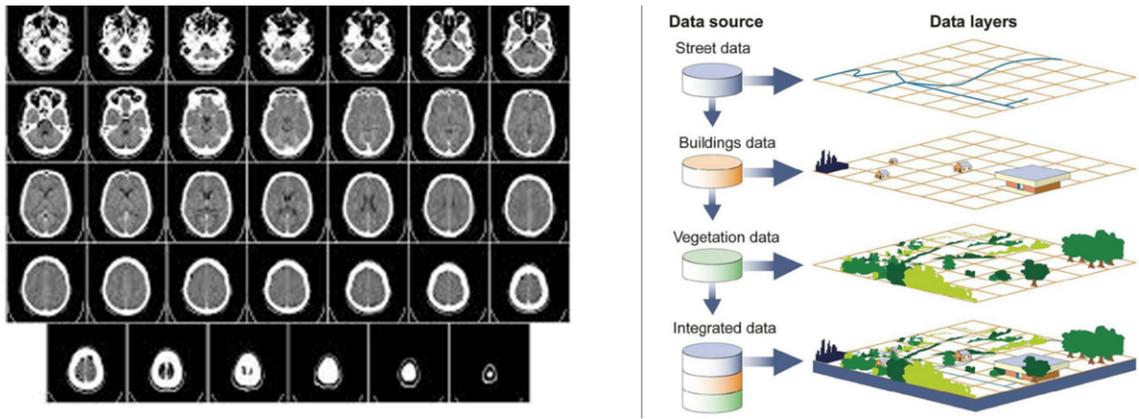
Figure 4.3: (left) Human brain tomography images, (right) GIS layers graphic.

## 4.2.    Areas of Tomography Usage in The City

Urban tomography is a technological framework that enables the collection and search of a large part of the audio-visual urban documentation. As used in a wide range of fields, including geology and medicine, used to define imaging cross-sectional (Krieger, et al. 2010). When audiovisual recordings created within the city are dropped over the network by anyone with access to the Internet, instant analysis of the place becomes possible.

We have a wide range of urban documentation with technological trends and this production process can be shown as in Figure 4.4.
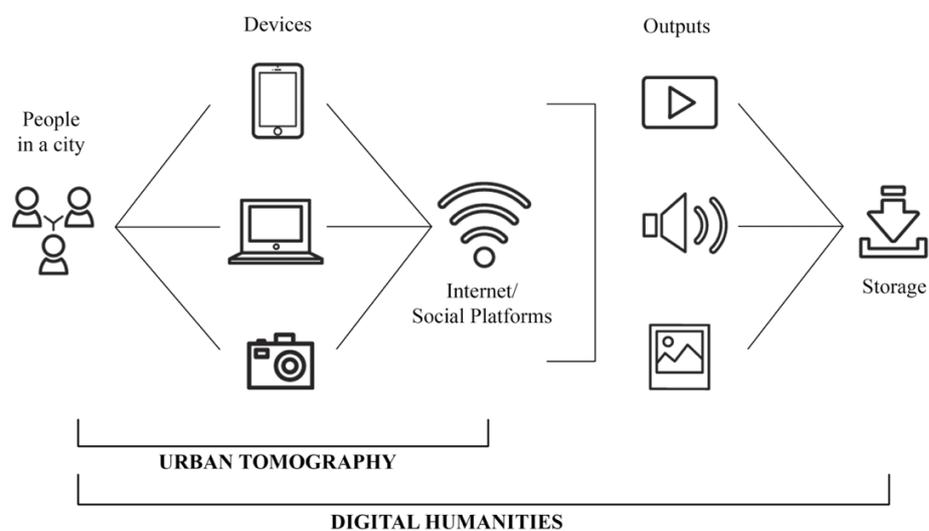


Figure 4.4: Process diagram.

Videos -which contain image and environmental sound, showing the daily life as objective, flows of people, movement types- are a tool that we obtained through tomography method in the process of collecting information about the city or a place. In 1988 William Whyte filmed his previous work The Social Life of Small Urban Spaces about the use of public spaces (Whyte 1988). The film examines the open spaces in urban areas around the Seagram Plaza in New York City and the reasons why they are suitable for public use, human movements, urban construction and landscape.

Tomography uses snapshots and image recordings. Photos or short-term recordings to be able to analyze instant status on specified locations are a snapshot tool. Aerial footage from buildings of different heights in the city; since it will contain different angles and different scales, it is a good tool for in analyzing and obtaining information process (see examples Fig. 4.5 and 4.6).



Figure 4.5: Üsküdar Square, Anadolu Ajansı, aerial photo on December 2015.



Figure 4.6: Üsküdar Square, Google Earth aerial view on July 2018.

Photographs or video recordings shows before and after situations on the place to see and analyze the social changes that occur with the change of physical structure; and then they can be used in spatial comparisons. As I said before, the works of Marville and Atget's are the first examples of this field. Similarly, Ara Güler's photographs of Istanbul are among the best examples of the city's social development.



Figure 4.7: Ara Güler's photos. Galata Bridge, İstanbul.
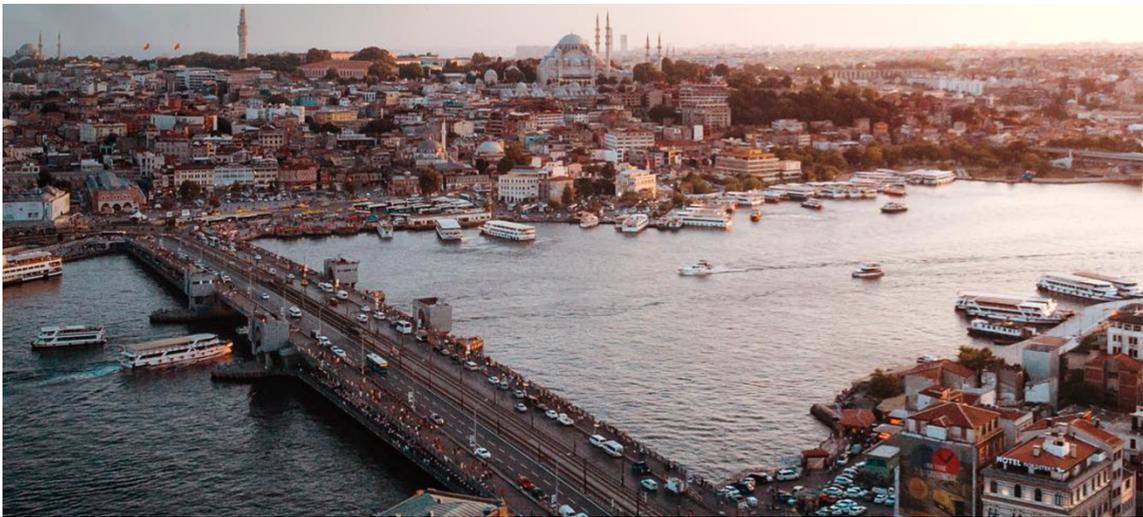


Figure 4.8: Galata Bridge, İstanbul. İlkin Karacan Karakuş's photo on July 2018.

It is possible to compare with tomographic imaging not only at urban scale but at smaller scales. In our country where urban transformation is widespread and inevitable with the constructions in every corner, every corner; old-new images at the human eye

level and the changes in the satellite image of the Google Earth are examples of urban tomography.

The "Scene Completion Using Millions of Photographs" program, which can be easily accessed via the Internet, allows its users to extract the elements they don't want in their photos from their frameworks. This software can be reach the images from different users at different times by taking pictures on the internet by reaching the equivalent of the desired area automatically performs a complete.



original image          input          output          matched images
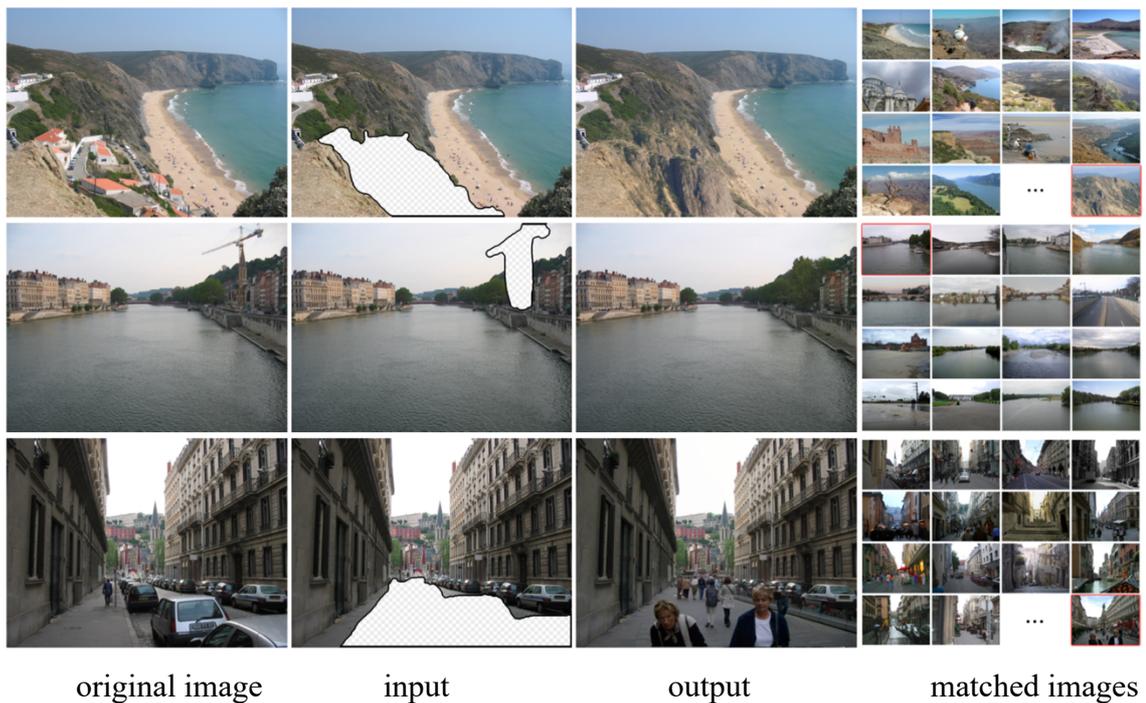
Figure 4.9: Scene Completion program, examples.

(Source: CMU Graphics, Computer Graphics Proceedings, Annual Conference Series, 2007.)

As one of the more specialized workspaces, archives can be created with photographs or videos in order to see the details for object-oriented investigations such as urban furniture, signs or pavements in daily life. I photographed the pavements I came across in different streets of Kartal, the neighborhood I live in. In these photographs we can see that while parking entrance of a newly built building is visible there is no walkway for pedestrian on the street plane; two pavements are formed on different levels; pavements are often cut with garbage containers and cars occupy pavements. These photographs can be used as data in urban studies by the details they contain and the

subject matter. This type of imaging study is one of the ways of using the urban tomography method and used as a tool.
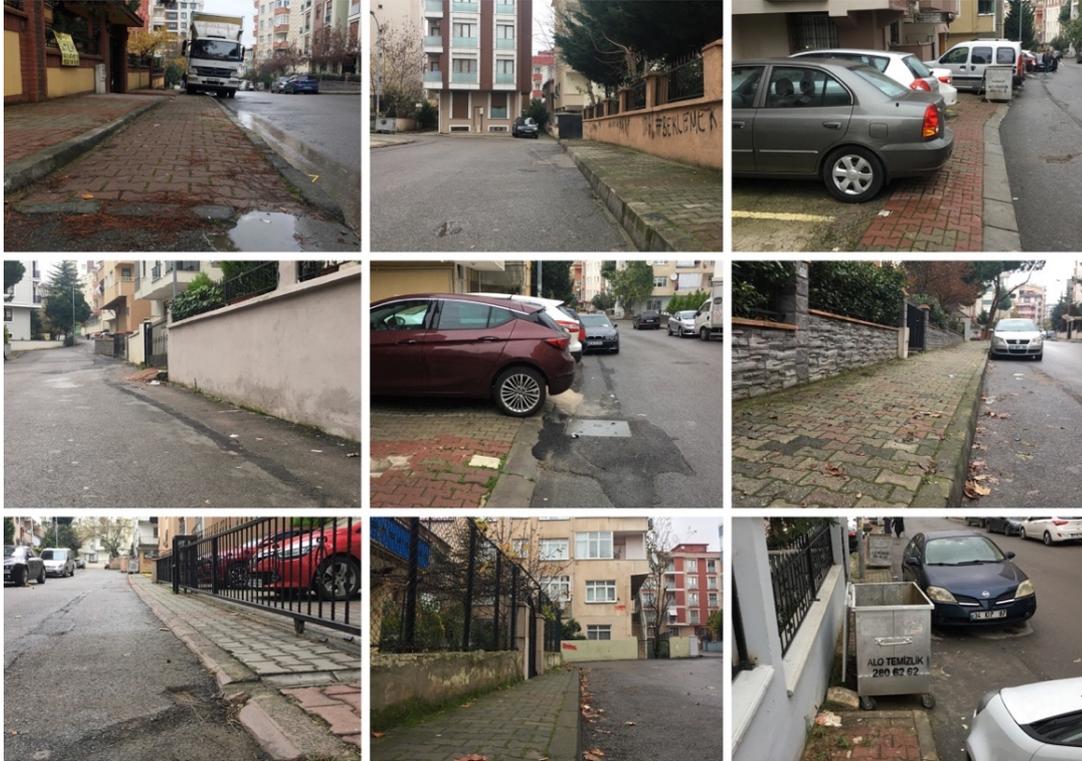


Figure 4.10: Pavements. From different alleys in İstanbul, Kartal district.

Canadian artist Jon Rafman created his first solo exhibition "The Nine Eyes of Google Streetview" in 2012 at the Angel Art Gallery in Toronto and later at the London Saatchi Gallery. Search engine Google's application of "Street View" that offered a free image to the user and it provides the user to image of a place on the World where user want to view. Rafman evaluated this application in an artistic context. Captured images taken by Google's street cameras, Rafman, who scans these images for hours at his computer, has chosen the strangest ones from countless shots, most of which are unaware of the world. In his exhibition, a baby crawling alone in a deserted place, an old man lying down on the curb on the road, a young man walking with a gun in his hand, women climbing out of the window in a lingerie, a burning van, etc. interesting photographs of the city and the countryside views have been showed. (See Figure 4.11 and 4.12) These haphazard moments that are recorded in everyday life and create a rather surreal impression reveal what it is like to be watched by a camera.

Figure 4.11: Jon Rafman's selection, Google Street View image.

(Source: Jon Rafman's own archive from his website.)
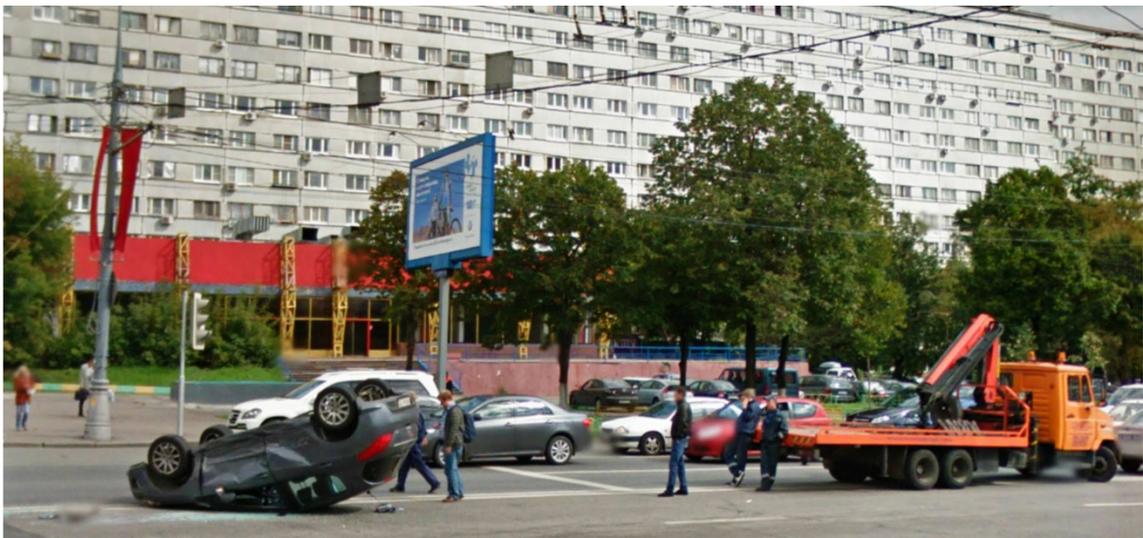


Figure 4.12: Jon Rafman's selection, Google Street View image.

(Source: Jon Rafman's own archive from his website.)

## 4.3.    Social Media as One of the Tool for Obtain Digital Data

While Digital Humanities is perceived as an approach, it is a method in terms of its working principle. The possibility of access to the knowledge of every digital thing that allows us to provide information on every subject on every day. Digital Humanities methods/applications are used on most computers. Mapping of cities, photo and collage production, documentary or video images showing spatial changes are methods. Unlike traditional data gathering methods, digital methods will always be more actual, more

practical and more unlimited. The situations in the city are different and varied at every point. In order to digitally record the daily life of a street, we need to obtain images from different eyes, from different locations, from inside and outside, from day and night.

At this point, with the second half of the 20th-century technology is giving us speed and opportunity and changing the size of face-to-face meetings; mobile/cell phones that will understand the interests and perspectives of the people come into play. Cause we tend to make video-record or photograph every object, event, scene; we see. In this case, we have a large number of data about perceptions, forms of vision and interest. Video-equipped cell phones from various users, provide us with each of his or her own perspective and interest. With digital data such as photos, videos, and applications location notifications, we start out what there is in a city and check them out and learn more. The photo shows us what's going on. With today's fast-paced video recordings, audio and motion picture features are started to push to photograph in the media background. This allows the action to a very forefront of the moment. Being animated and supported with sound provides a more comprehensive and more informative flow of information. Obtaining a lot of data from different perspectives of the same place is a part of the archive about the studied issue; and so, we call it digital humanities which leads us to store an image of place and activity.

The primary technological trend that drives Urban Tomography is the development of the smartphones, personal computers, professional cameras etc., a programmable digital communications device with onboard computation and memory, video-capture and positioning capabilities, and multiple networks (Krieger, et al. 2010). Today, just about everyone "wears" a device, all the time, everywhere. This device, usually a mobile phone, increasingly comes with two capabilities: a reasonable quality video camera and ubiquitous network connectivity (Krieger, et al. 2010).

Social media applications, which are used in conjunction with the spread of personal mobile phones, are rich in data content. There are various kinds of applications and software on every subject such as eating-drinking, hobby, culture-art, photography, media writing, and music. On these applications, some features of the entrants are recorded before they start using the program. While most mobile applications just require birth date and gender information at the registration interface; emotional relationship, educational status, and business-sector information can be entered via personal profile editing/creation options. So, our personal information is available in the virtual environment. Since the images recorded on different people on the same space reflect the viewpoint of each individual, it is possible to see many **"different ways of seeing"** on

the common object. Sometimes we can learn about the use of a café, sometimes we can get information for a region, even a city scale. The answers we can find in our questions, the titles we will use in the discussions, this digital formation for all the data we can add or remove; it is called with the name "digital humanities".

Although computer-aided visualization techniques are quite successful in their own lanes, digital humanities are internet-oriented; urban tomography is based on the visual casting record. In these examples, digital humanities possess the common product that is created using the skill of all fields of science. Increased recording and document data with smartphones are easy to use and produce. These data of telephone applications have also become available in social sciences research (Krieger, et al. 2010). The knowledge of everyday life was transferred from the street to the digital environment. Martin Krieger accepts mobile phones as tools in many examples of urban tomography (M. Krieger 2011). Images and videos recorded by different people give information about living by showing spatial fiction. This multimedia platforms outputs are also a kind of urban tomography.

We're talking about a digital archive of billions of visuals and photos available on the Internet. With the questions, what is the benefit of these visual archive to the researchers or how we can use this archive, a study on 3D modeling and visualization of cities and landscapes via internet images is beginning. With this approach called Photo Tourism, it is aimed to obtain the third dimension and successful visuals by working on hundreds of photos obtained as a result of searching for keyword-based photographs in social media photo sharing platforms (Snavely, Seitz ve Szeliski 2007).

**"Photo Tourism"** software has created a huge collection of photos from the photo sharing sites on the internet and the numerous photos it has obtained from personal uploads directly on its website. With the help of this collection, the program offers its users a detailed visual experience as though they were there, as if they had never been from all corners of the world (Snavely, Seitz ve Szeliski 2006).

**Foursquare**, one of the social media platforms, is an application where people share their location, reviews, and experiences. The person experiencing the space, records the most remarkable object, food, image or moment in the area; he/she saves them with photos, video and shares it on social media. This action is a tendency that has become our habit without knowing, evolves with the inclusion of social media in our lives. In this way, we can see the landmarks, edges, and usage of the area from the eyes of many different people about a place or whole city. This action of people is considered as a tomography study because it has spatial and daily life data obtained by different eyes.

In the Foursquare site, for Istanbul, the "most preferred destinations" category has been searched (see Fig. 4.13; Foursquare web site, October 2018 data). For example, when the detail is displayed for the Galata Tower with the highest number of ratings according to the digital rating, it is seen that 24329 people are scoring, 2104 users write their suggestions/comments and 105609 photos are taken in the field (see Fig. 4.14). At this point, we have the knowledge and experience of the tower about 105609 different reviews; with their own perspective and different ways of seeing.

When we apply the five elements of Lynch to Istanbul to understand the city through Foursquare data (which is a very simple example), we can describe the landmarks, edges, districts, nodes and paths: *Landmarks:* Ayasofya, Galata Tower, Maiden's Tower, Cemberlitas; *Districts:* Belgrad Forest, Sultanahmet Square, Grand Bazaar, Taksim Gezi Park; *Edges:* Caddebostan Coast, Kadıköy Coast; *Paths:* Marmara Sea waterway, D-100 Highway, Galata Bridge and *Nodes:* Taksim Square, Kadıköy 3rd metro exit, Zincirlikuyu Transfer Place. This information, which we can also get through experiences with the Istanbul trip, comes to us by staying up-to-date and interactive; thanks to the internet and digital data archive.
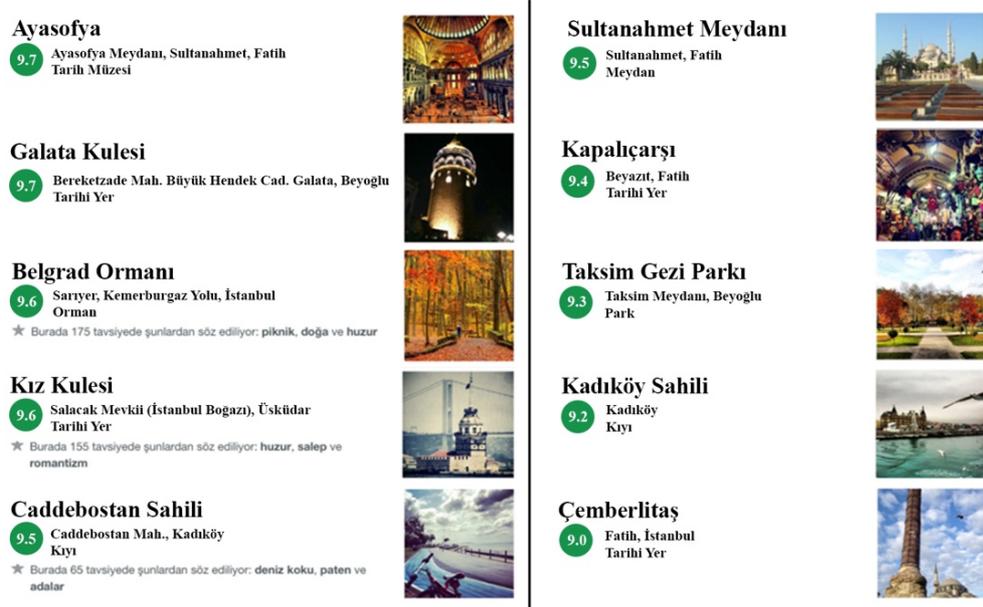


Figure 4.13: Most preferred destinations; top rated. (Source: Foursquare)
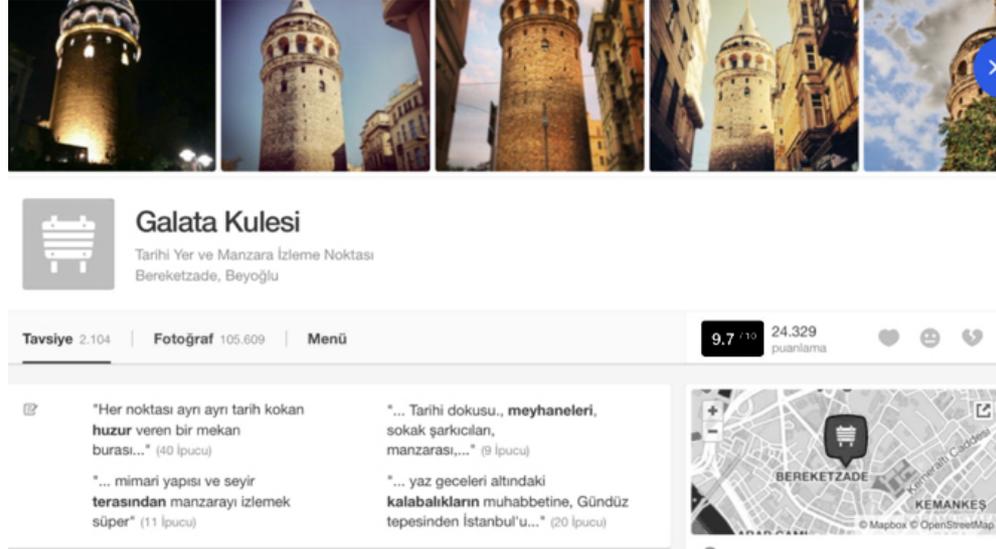
Figure 4.14: Galata Tower information page on Foursquare.

In this era where social media is being used at an incredible speed, it is possible to create interactive maps by accessing the location information of the movements on the applications. Twitter handles tweets and users, which are instantiated over the locations they have set, to an interface. This processing technique is shown point-by-point and lines such as a star map can be used when the expression is varied. Likewise, with the live broadcast feature of **Facebook** in 2016, users from all over the world have reached many people by making instant shots. Blinking, glowing blue dots on the map created by specifying the location, content and user of these live videos refer to the location where the broadcast was made, and extensions, representing the monitored regions. This live **broadcast map** of Facebook is always up to date.



Figure 4.15: Broadcast map on Facebook.

After the first generations person-oriented applications of traditional representation methods, the visualization has come to the forefront with the inclusion of computers in the transformed flat and the second-generation methods have been identified. Participation, which is important in the second generation, maintained its place in the third generation. Unlike the second generation, with the emphasis on big data, digitalism, internet and the active use of social media are important. Analyzes starting with observations have been transformed over time and access to information with many different senses and angles has become possible. Every urban designer who use these third-generation methods, there is no doubt; as long as designer follows her/his day and age, will always be practical and have up-to-date information archive.

# CHAPTER 5

# CONCLUSION

There are various methods of obtaining information in urban design studies. The concepts of obtaining to information and the representation of information are essential subjects of an efficient design process. Therefore, in this study, these concepts are emphasized, and periodic investigations have been made in order to determine the efficient methods that can be used in the field of urban design. The designer's first job to understand the relationship between human and place, to analyze environmental perception and seeing the environment in urban studies.

In the study, the first generation, which began with the mind map study by Kevin Lynch in 1960, where participation is low, passes through individual studies, where only the eyes of designers are studied. Observation, drawings, public interviews, creating mind maps are the first-generation methods. The methods of the first generation are described in more detail in the study. As a visual representation tool, photography can be considered as the sub-element of each generation, whereas Al-Kodmany refers to the photograph as the traditional method (Al-Kodmany 2001); Krieger mainly uses the photograph in a tomography which is a third-generation method (M. Krieger 2011). In this case, the photograph is found as an intersection set in the visualization techniques of each generation. However, it continues to be discussed in every generation with the way it represents information and the content it describes.

In the 90's, the internet and computer participation in the life became a leap point for urban studies. Work on paper now moves to a screen! The digitalization of visualization leads to the transformation of the tools used. Computer-aided methods take part in urban studies. Adding computers to the design process allows many software and applications to be created.

It is the most exciting method to see and experience a physical change in a virtual way before it is completed, so that simulations begin to be produced. Virtual reality has expanded its field for many years; today, it continues to be used in social science applications and technological environments. 3D representation of the space has been made possible by the computer programs created by the idea of virtual reality, and the proposed change can be visualized.

The second most important information obtaining, and information visualization tool is geographic information systems softwares. The layer information of any area on the GIS allows for the leveling and clarity of the work. The images in these layers serve to reveal or examine in more detail. GIS, the transition tool for the third generation, supports digital data archive by its common maps available in all areas.

With the concept of urban tomography, which was introduced in 2011, Martin Krieger likens the model of tomography to GIS's working principle. As we will not be able to understand every moment of a city on every subject, we need to divide the city into layers and analyze the movement in each layer separately. Photography and video shots used in the tomography method are used for perceiving the space as moving.

After investigations and evaluations of information representation methods, a timeline was created and the interaction relationship between generations was shown.
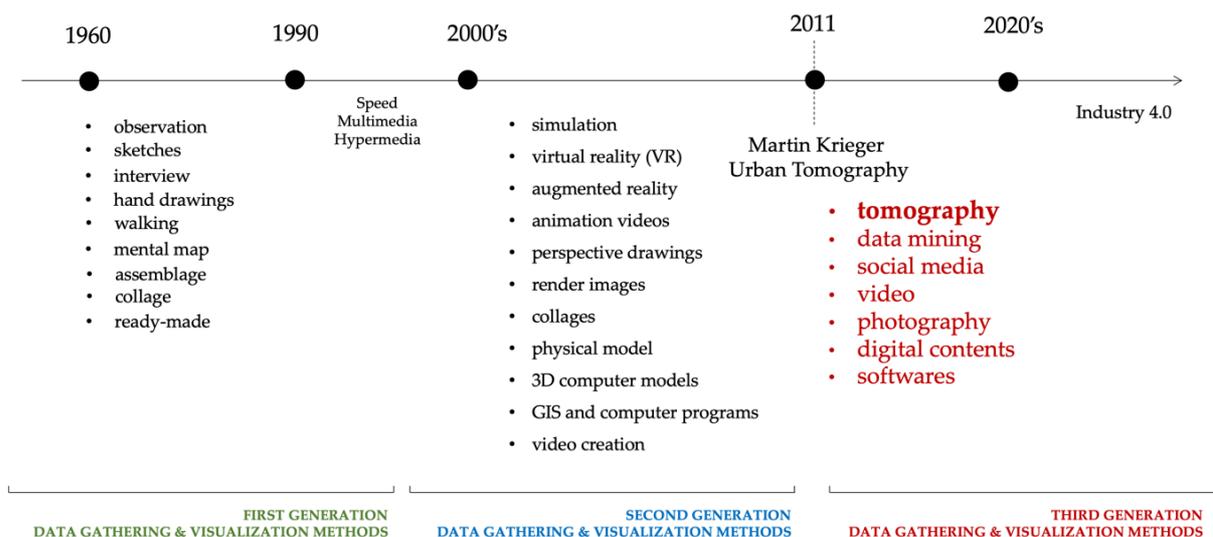
Figure 5.1: Summary of generations.

Nowadays, there is a large data archive that stores digital maps, different kinds of multimedia documents and an interactive pool on the internet. Every day, this archive grows with the digital signage and accumulation of every move that people make by connecting their personal computers to the internet. The concept of digital humanities serves to reach the life-use information of the societies that are created by the accumulation of these traces and to create a network between the past and future. In this

study, the theoretical aspects of the concept of digital humanities are explained and how to use it in urban design studies question were discussed with emphasizing the interaction.

In the universities that provide design education, the design process proceeds as analysis, synthesis, design and presentation. There is no doubt that each individual's perception and seeing are different. Drawing technical plans immediately after the analysis, sometimes delaying the reaching of the 3D image in the mind and drowns the design process with details. In order to prevent these situations and to keep the viability alive in design, efficient use of visualization techniques before the technical drawings can make the process more productive. A designer who can show his / her design in three dimensions is capable of expressing the technical details of this project. This digital approach in the design process can create a more active and fertile process.

The traditional methods of gathering information, which are used in visual-perceptual dimension in urban studies, have been developed and renewed with the developing technology and internet facilities in the world of 2000s, but the urban design techniques are far behind this. The use of technology by the transforming generation and the changing technical possibilities of the sectors change; the use of urban design tools also needs to change. Various methods of perceiving the environment by technological means should be determined and these methods should become widespread. Our age is the age of knowledge and speed. Therefore, it is important to be quick, practical and knowledgeable in all areas of design.

With the development of artificial intelligence in societies transformed with Industry 4.0, most of the work that people can do, can be done by robots. In this way, the production and workforce will be fully machined and will remain in electronic devices that can communicate with each other. While this may seem to facilitate the life of humanity by increasing mass production and minimizing human labor-related errors, the need for manpower will decrease and a society that does not work will emerge with changes in work and work environments. When Industry 4.0 starts to be seen in the construction sector, the need for workers will be minimal while production is accelerating. With computer-aided technologies, all data are now available in digital media in urban design projects. Although the rapid development of technology and the advantages we face will work in the flow of our daily lives, this will also lead to a society that does not produce in the long term. In today's World, human organs can be made with 3D devices, if the robots do the surgery, the profession of medicine will be discussed. These technological developments and the state of transforming societies will continue to be discussed in the coming years.

In this digital age, where communication is so fast and we are facing visual impact, it may be difficult to understand technological developments as much as to follow. What does a robot mean for societies that have not yet experienced a computer, for uneducated societies, for societies that fighting hunger and disease, for societies dealing with ethnic and religious problems? Ideas that we can't even imagine may have already been invented in one corner of the Earth. Even now 4.0 concept may have been completed and the industry will soon begin the age of 5.0. Who knows?

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