ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

REPRESENTATION OF URBAN IMAGE IN THE INFORMATION AGE: A CASE STUDY OF GALATA

M.Sc. THESIS

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Department of Architecture

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

BİLGİ ÇAĞINDA KENTSEL İMGENİN TEMSİLİ: GALATA ÜZERİNE BİR ÇALIŞMA

YÜKSEK LİSANS TEZİ

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İlgi Hacıhasanoğlu, a **M.Sc.** student of ITU **Graduate School of Science and Technology** student ID **502091063** , successfully defended the **thesis** entitled "**Representation of Urban Image in the Information Age: A Case Study of Galata**", which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor :	**Prof. Dr. Sinan Mert ŞENER** İstanbul Technical University	.....
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Date of Submission : 19 December 2011
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To my parents,

FOREWORD

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İlgi Hacıhasanoğlu

Architect

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ABBREVIATIONS

AR	**:** Augmented Reality
CAD	**:** Computer Aided Design
GIS	**:** Geographic Information Systems
GPS	**:** Global Positioning System
ICG	**:** Interactive City Guide
ICT	**:** Information and Communication Technology
ID	**:** Information Design
IS	**:** Information Systems
IT	**:** Information Technology
LBS	**:** Location Based Service
NAI	**:** Netherlands Architecture Institute
POI	**:** Point of Interest
QR Code	**:** Quick Response Code
UAR	**:** Urban Augmented Reality

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REPRESENTATION OF URBAN IMAGE IN THE INFORMATION AGE: A CASE STUDY OF GALATA

SUMMARY

Advances in information technology have led to the definition of a new era, called the information age. Information technologies bring changes to urban life in both physical and intellectual level. Moreover, Information and communication technologies have changed the city's definition, formation, and perception in many ways.

The first section of this thesis examines how the information technology revolution affected urban life, and how it had led to the emergence of new urban theories. Theoretical studies are presented in this section; in particular, issues such as digital city, e-city, informational city, sentient city. Many thinkers, sociologists, urbanists, architects, such as Manuel Castells, William J. Mitchell, Christine Boyer, and their works are examined. Such studies play a role in determining the theoretical framework of the study, and clarifying issues about the breakdowns of urban information technology. Then, to build a theoretical framework for the proposal, an extended study about the city image and visual continuity is accomplished.

The second part consists of the visual representation of urban environment. In this chapter, urban and architectural representation tools and interfaces are analyzed. Definitions of notions such as maps, mapping and cartography are given, as well as technological changes occurring in the field of cartography is discussed. The emergence of new technologies related to urban representation are examined. Geographic information systems, Internet maps, GPS, geo-tagging, 3D visualisations, mobile technologies and topics such as virtual and augmented reality are among the tools that represent urban information. These tools are introduced in this chapter and near future scenarios are discussed. Then, extended information about interactive city guides will be given and various types of interactive city guides, available through internet or mobile devices are investigated.

In the last section of the study, a mobile interactive city guide consisting of two phases are proposed, for the region of Galata in İstanbul: these phases are the interactive mobile city guide and augmented reality application. This proposal study is based on the previous research conducted on the urban image and visual continuity. The proposal is an interface design for the urban image of Galata according to Lynch’s urban image analysis and AR visualization studies according to the voyeur/walker concepts of de Certeau.

BİLGİ ÇAĞINDA KENTSEL İMGENİN TEMSİLİ: GALATA ÜZERİNE BİR ÇALIŞMA

ÖZET

Günümüzde, bilgi teknolojilerindeki gelişmeler enformasyon çağı adında, yeni bir çağ tanımı yapılmasına neden olmuştur. Yaşamın her alanında bilgi teknolojilerine yönelik gelişmeler olduğu gibi, şehir ölçeğinde de gerek fiziksel gerek düşünsel düzeyde, bu konuyla ilgili değişimler gün geçtikçe artmaktadır. Bilgi ve iletişim teknolojileri, şehrin tanımını, oluşumunu ve algısını bir çok açıdan değiştirmiş, yeni kentsel teorilerin ortaya çıkmasına yol açmıştır.

Bu kentsel teorilerin ışığında, günümüz teknolojileri ve bu teknolojilerle ilgili tartışılan görüşler dikkate alınarak, çıkış noktası şöyle belirlenmiştir. Kentin imajının, sadece kendi içerisinde değil görsel ve kültürel bağlamı içerisinde değerlendirilip, bu çıkış noktasından bir kent rehberi üretilmelidir. Bu konuda geniş bir çalışma alanı sunan interaktif kent rehberleri üzerine bir araştırma yapılması, bazı örnek şehirleri temsil eden mevcut kullanıcı arayüzlerinin incelenmesi hedeflenmektedir. Bu arayüzlerin içerik ve tasarımlarının geliştirilmesi için, çalışmanın sonunda bir model önerisi ortaya konmuştur.

Çalışma üç aşamadan oluşmaktadır. Birinci bölümde, enformasyon çağının başlangıcı ile bilgi teknolojilerinin kent ve mimarlık alanlarında nasıl bir paradigma kaymasına neden oldukları incelenecek, konu ile ilgili teorik çalışmalar sunulmuştur. Özellikle, kentsel teorilerin başlıkları üzerinden yürütülecek olan bu kısımda, dijital kent, e-kent, bilgi kent gibi teoriler açıklanmıştır. Bu alanda değerli çalışmalar sunmuş olan William J. Mitchell, Manuel Castells gibi teorisyenlerin düşüncelerine yer verilmiştir. Bu bilgiler, çalışmanın teorik çerçevesinin belirlenmesinde rol oynamakta, ayrıca bilgi teknolojilerinin çoğu alanda olduğu gibi, kent temsili alanında bir kırılma noktası oluşturduğunu esas alarak, çalışmanın devamına zemin hazırlamaktadır.

Birinci bölümde son olarak bahsedilen konu, bu çalışmalara ek olarak incelenen ve ayrıntılı çalışma yapılmış olan, kentin imajının temsil teknolojileri ile geliştirilmesi ve kentte görsel bütünlüğün sağlanması konusudur. Bu konu ile ilgili, kent araştırmaları tarihi boyunca çeşitli fikirler ortaya konulmuştur. Öncelikle, Lynch, Lefebvre, Norberg-Schulz ya da de Certeau gibi düşünürler tarafından ortaya konan kent imajı, anlamsal ve görsel bütünlük, görsel bağlam, "voyeurism" gibi kavramlar açıklanmış ve bunların konuların, şehrin günümüzdeki teknolojiler temsilini ne ölçüde etkilediği ile ilgili fikirler sunulmuştur. Kentteki görsel devamlılık sorununun değişimi ele alınarak, günümüzde ileri temsil teknolojilerinin hem teorik hem de pratik anlamda etkileri incelenmiştir.

Bu bağlamda, kentin geleceği ile ilgili projeksiyonlar değerlendirilmiş, konunun kentsel sürdürülebilirliğe etkileri saptanmıştır. Yine bu bölümün sonunda, öneri bölümünde cevaplanmak üzere bazı sorular sorulmuştur. Bu soruların cevapları ayrıntılı bir biçimde son bölümde verilecektir.

İkinci bölüm, şehrin görsel temsilini konu almaktadır. Kentsel ve mimari temsil araçları ve bu araçların arayüzleri ve içerikleri konu alınmış, diğer temsil çeşitleri çalışma kapsamının dışında bırakılmıştır. Harita, haritalama ve kartografi nosyonlarının tanımları yapılmış, kartografi alanında ortaya çıkan teknolojik değişimlerin yanısıra, kent temsil tekniklerinin dönüşümü ve yeni teknolojilerin ortaya çıkışı incelenmiştir. Bu değişimlerin ortaya çıkardığı tartışmalara, özellikle haritalamada açık kaynak paylaşımı nedeniyle oluşan mahremiyet ve etik problemlerine değinilmiştir.

Coğrafi bilgi sistemleri, internet haritaları ya da mobil harita sistemleri gibi teknolojilerin günümüzdeki durumu, GPS, coğrafi etiketleme, 3D haritalar, sanal ve artırılmış gerçeklik gibi konu içerisinde açılmalar sağlayabilecek potansiyeldeki yeni teknolojiler, ilgili konularda üretilen projeler yardımıyla ortaya konacak, ve yakın gelecek senaryolarına yer verilmiştir. Bu teknolojilerin, kentsel alanları ifade etmeye ne ölçüde yardımcı oldukları irdelenmiştir. Daha sonra, interaktif kent rehberleri ile ilgili tanıtıcı bir ön çalışma yapılıp, seçilen amaca, yani kentin mimari temsiline uygun seçilen interaktif kent rehberleri üzerinden tasarım ve içeriği geliştirme adına bir analiz çalışması geliştirilmiştir. Bu çalışmada çeşitli interaktif kent rehberleri, katmanlı anlatım, görsel bütünlüğü sağlama, mobil kullanım gibi birtakım kriterleri anlatmak amacıyla sistematik bir biçimde seçilmiştir. Bu örnekler kriter oluşturma bakımından bilinçli olarak alınmıştır.

İkinci bölümden elde edilen sonuçlar ile yapılmış olan öneri, üçüncü bölümde İstanbul'da Galata bölgesi geneli ve seçilen noktalar üzerinden sunulmuştur. Model ayrıntıları ile tasvir edilmiş, arayüz tasarımı yapılmış, önerilen teknolojiler ve fikirler, kısmi ve noktasal şekilde uygulanmıştır. Teknolojik uygulamalar örnek verme amacı taşımakta, çalışma alanının tümüne önerilecek olan teknolojik araçların sahada uygulanması tez kapsamının dışında kalmaktadır.

Bu kapsamda, Galata'nın kısa tarihi ve Galata ile ilgili yapılmış görsel temsil araçları önem teşkil etmektedir. Bu nedenle, Galata'nın kısa tarihi, geçmişten günümüze uzanan Galata üzerine yapılmış çeşitli nitelikteki temsiller sunulmuş, temsil tiplerine göre ve kronolojik olarak incelenmiştir. Daha sonra, bu bölümde Galata'nın kentsel imaj analizi öncelikle Kevin Lynch metodu ile yapılmış, beş farklı elemente göre kentsel özellikler incelemeye alındıktan sonra, de Certeau ve Norberg-Schulz gibi düşünürlerin fikirlerinden yararlanılarak, görsel bütünlük ve görsel bağlam kapsamında değerlendirmeler yapılmıştır. Birinci bölümün sonunda çalışmaya yön veren soruların cevaplanması yine bu bölümde gerçekleşmiştir. Bu soruların cevapları çalışmanın son aşaması olan arayüz tasarımı ve artırılmış gerçeklik uygulamasına da yol göstermiştir.

Çalışmanın son bölümünde, Galata üzerine, iki aşamadan oluşan bir mobil bir kent bilgi sistemi önerisi yapılmıştır. Bu iki aşama, interaktif mobil kent rehberi ve artırılmış gerçeklik uygulamasıdır. Bu tip çalışmalar özellikle Avrupa'da farklı bölgeler için yapılmış, ama bir arada uygulanması daha önce görülmemiştir. Bu iki özelliğin, yani kent bilgi sistemi ve artırılmış gerçeklik uygulamasının, birbirini tamamladığı daha önce yapılan teorik altyapı bölümünde irdelenmektedir. Bu irdelemenin bir uygulaması olarak, bu denli kapsamlı bir çalışmanın bir araştırma projesi bütçesi gerektireceğinden, bu tez kapsamında bir pilot çalışma ile konunun uygulanması uygun görülmüştür. Pilot çalışmada, öncelikle mobil kent rehberi, kent imajı ve mimarlık açılarından ele alınmış kent rehber içeriğini oldukça sade bir şekilde kurgulamayı hedefler. Bu hedefin sonuçlarını yansıtmak için içerik bölümünden sonra ele alınan arayüz tasarımı bölümünde, bir akıllı telefon veya tablet görüntülenebilecek olan programın arayüzünün tasarımı yapılmıştır. Yazılımın uygulaması tezin kapsamı dışında kalmaktadır, bu nedenle arayüz tasarımı seviyesinde kalınmış, programlamaya geçilmemiştir.

Artırılmış gerçeklik uygulamasında da, Galata bölgesinde birkaç yüzyıla farklı şekillerde damgasını vurmuş, kullanım ömrü boyunca değişikliğe uğramış ya da uğrayacak olan binalar seçilmiştir. Bu binaların ancak birini uygulaması yapılabilecek olduğundan, ağırlıkla bu binanın yani Bereket Han'ın (eski adıyla Palazzo del Comune) bilgileri ve tarih boyunca değişimi incelenmiştir. Daha sonra, Layar ve Poiz artırılmış gerçeklik programlarını kullanarak yapılan uygulamanın sunulmasına geçilmiştir. Bu tür uygulamaları sayıca artırmak için yapılabilecek oan artırılmış gerçeklik uygulamalarının bir öngörüsü, kolajlarla anlatılmıştır.

Bir diğer artırılmış gerçeklik uygulaması önerisi de, de Certeau'nun voyeur kavramı üzerinden ortaya konmuştur. Bu öneride şehri yukarıdan algılayan kişi Galata Kulesi'nden şehri deneyimlemekte, ve bu yükseklikten bazı özel binaları algılamakta zorluk çekmektedir. Bu nedenle, bu kişiler için sadece görsel olarak binanın isminin tanıtıldığı bir yere bağlı artırılmış gerçeklik uygulaması önerilmiştir.

Sonuçlar bölümünde, çalışmanın amacına ulaştığı ve ulaşamadığı noktalar ve durumlar değerlendirilmiştir. Bu çalışma kentsel ve mimari bir konu olan temsil konusunu ele alırken teknolojiyi araç olarak kullanılması durumunu, günümüzün çeşitli yön verici yaklaşımlarını irdeleyerek incelemektedir. Bu durumu, belli bir bakış açısı üzerinden, yani burada kentsel imajın, gündelik şehir deneyiminin ve görsel sürekliliğin üzerinden değerlendirmek amaçlanmıştır. Bu amaca ulaşılmış, ancak bazı teknolojilerin tam anlamıyla uygulaması, bilgi altyapısı ve grup çalışması gerektirdiğinden, bazı uygulamalar başta hedeflenene göre daha noktasal ya da bölgesel kalmıştır. Bu çalışmanın nasıl alanlara yönelebileceği, bu konuda çalışanlara tavsiye olması açısından, öneriler bölümünde ifade edilmiştir.

1. INTRODUCTION

Over the last two decades, using of the technology occupies a considerable place in our lives. The technological revolution has recently entered in our daily living and given rise to serious changes in our lifestyles. The information age, triggered by these technological revolutions, signifies a threshold for these changing habits, and mostly, the rise of an urban society.

The world of architecture and urbanism certainly made significant changes according to the information age matters. The progresses in technology on architectural and urban fields are diverse. There are several areas, discovering the advantages of technological tools. Construction technologies, design computation, data handling and sharing technologies like BIM (Building Information Modeling) and GIS (Geographic Information Systems) are among these technology areas, considerably known in the architectural and urban fields.

One of the foremost fields relating to architecture and urbanism, and which almost utterly makes part of the technological revolution, is the field of representation. Many technological tools serve to make a better representation of the architectural or urban properties. The representation of the city in both architectural and urban scales are crucial in this direction. This thesis explores the fields of information, city, technology and representation, from the point of view that new strategies can be found in order to develop tools that could play a role in the representation of cities.

1.1 Purpose of the Thesis

This study aims to discover how digital and mobile technological tools can affect the representation of the urban information and assure the visual continuity of the urban environment to ensure urban sustainability. Therefore, in order to make a complete framework about these matters, the theoretical background of the urban information and communication technologies in the information age, a detailed study on the visual experience of the city and urban image and the technological tools that are used in the representation of urban and architectural contexts will be examined

before moving to the conceptual design of a future interactive city guide that will be the principal concern of this work.

Meanwhile, it's important to state the secondary purposes of the work. The minor purposes constitute the framework of this thesis, and they can be listed as follows:

- To explore the role of ICTs on daily city life and how ICTs contribute to urban representation,
- To understand the importance of visual urban experience and the major qualities that a urban environment should have for a better perception of the city with the aid of technological tools,
- To acknowledge and to identify the technological tools that play a role in the representation of urban information,
- To emphasize the importance of technological tools in the representation of a city, as well as the importance of representing the city itself,
- To experience how these technologies could be adapted to an interactive city guide design,
- To discover what constitutes the design of an interactive city guide, and what can be its components.

1.2 Scope of the Thesis

The scope of the thesis is limited to the aspects of the information age in the urban context, considering its effects on the urban representation matters. In this framework, several points will be made on the use, design and development of the interactive city guides.

In the first chapter, some information will be given on the current phases of the information age and its consequences on the urban life. Urban ICTs will be examined as well as new urban theories adopted by several theoreticians concerned about urban technology. Then, very briefly, the current research areas and strategies about the urban technology and urban future will be discovered. However, the most important part of this chapter is constituted by the exploration of the visual context of cities, assuring the urban visual continuity in order to ensure the urban sustainability. This part prepares the theoretical background for the proposal.

The second chapter points out the importance of urban representation in the information age. Beginning with the definition of the important notions such as mapping, map and cartography, the chapter aims to find out how the current technologies are affecting urban and architectural representations today. To this end, new technologies of urban representation with different scales, types and methods are examined in this chapter, in order to understand the process of the technological advances in representational and cartographical sciences. The chapter also aims to discover the importance of "Interactive City Guides" and their developing role towards new ways of distributing and acquiring information, with the implication of several kinds of technological tools.

A case study will be conducted about an interactive city guide that ensures the perception of the visual continuity using some of the technological tools mentioned in the second chapter, especially augmented reality. This proposal will be made in an important historical neighbourhood in Istanbul: Galata. The neighbourhood of Galata is very famous for the Europeanised urban development during 18th and 19th centuries and is still important for its historical landmarks as well as urban renovation projects. First of all, the third chapter includes a brief historical study about the area of the case study, ancient and current representations of the Galata region.

Then the theoretical research that has been conducted on the urban image and the visual continuity will be applied to the case study. The image of the urban environment according to the urban image theory of Kevin Lynch, then the everyday experience, visual continuity and urban sustainability matters will be discussed on the Galata case. The views and theories of Michel de Certeau, Christian Norberg-Schulz and Christine Boyer will be adapted to the case study.

The results of this work will try to establish the relations between the perception of the urban image and the visual continuity with the representation technologies via a case study of interactive city guide and augmented reality application for Galata.

1.3 Literature Review

As the main interest of the study is about the information technologies in architectural and urban environments, the theses and papers already initiated and

presented in this domain from different viewpoints will be mentioned. The choice of the thesis theme will be analysed within this literature review.

From an urban perspective, Roysi Ojalvo examined the concept of city in a new context established by the information society, in her M.Sc. thesis entitled "New Ways of 'Being In The City' and New Understandings of 'City' in the Information Society" supervised by Belkıs Uluoğlu, in Istanbul Technical University.

Mehmet Murat Sönmez studies the city guide as a challenge in the domain of computer technologies in his thesis entitled "Using Computer Techniques In Creating A City Guide". Developing the content of the interactive guides for cities and enabling historical site representation, Gürkan Özenen worked on a M.Sc. Thesis entitled "An Interactive Database for Architectural History of Istanbul", supervised by Sinan Mert Şener in 2008 at ITU.

At this point, it is important to underline the possible relations that this thesis may establish, with the previous studies in a similar framework. The study in the region of Galata, which will be studied along the proposal, does not primarily aim to preserve the historical environment, as proposed in previous studies, but to ensure the visual continuity of the urban environment.

Another important domain that is examined by the former researchers interested in this theme is the industrial design. Özlem Taşkın submitted a M.Sc. thesis entitled "Information and communication technologies for public use and interactive-multimedia city kiosks", which investigates the use of city kiosks as new urban equipment, with the arrival of the information age.

This thesis will differ from the previous, investigating not the new equipment but the technological tools that have played a role in new styles of representations of cities, especially in the domain of mobile communications and augmented reality.

1.4 Methodology of the Research

This study is composed by three main parts: The theoretical background, the practical background and the proposal. The theoretical background will mention about the facts of urban life in the information age, the prominent urban theories in the information age and urban ICT research. The chapter proposes a viewpoint for the urban image and visual continuity in the urban context.

The practical background chapter will try to establish a base proposal study, which will link the theoretical and practical backgrounds. This part includes detailed information on the representation activities of the information age with the advancing technologies. The chapter will try to discover the representation types that will be useful for the proposal. A diagram is presented below to illustrate the structure of the thesis (Figure 1.1).

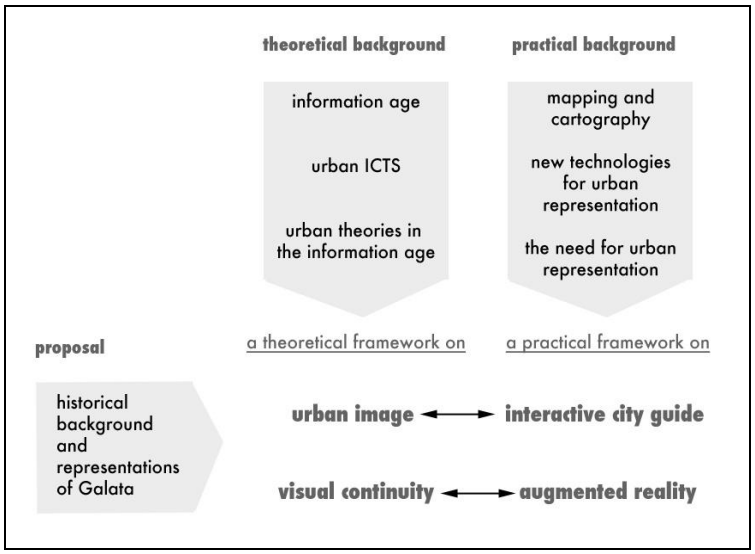


Figure 1.1: Methodology of the Research.

The case study for Galata will examine the challenges of representation in the Galata region of Istanbul, known as one of the most cosmopolite areas of the city, affected by renovation and gentrification processes. The thesis will include an interface design that investigates the urban image of the region, with augmented reality application that assures the exploration of the visual context, relating to the daily urban experience. In this final part of the research, the methods that will be used are the following: Literature review about the history and the representation of the region, personal observation, interpretations using analysis methods of theoreticians, application of the interface according to the foundings.

2. CITIES, ARCHITECTURE AND THE INFORMATION AGE

In the last fifty years, a new era has been introduced and called the "Information Age". Especially, over the last two decades, the production and use of information have dramatically increased in our society. The need for information triggered the invention of several kinds of technological items, tools and systems. The informational revolution, supported by the Information and Communication Technologies (ICTs) signifies a new threshold for our society which is rapidly changing and accepting a new way of life.

Nowadays, architecture and urban studies also form a bridge with the domain of the ICTs, especially relating to the data handling and representation processes in architecture and urbanism. Architects and urban planners are beginning to question how ICTs could contribute to their disciplines.

In this chapter, the main issues about cities in the information age will be explored from the viewpoint of architecture and urbanism. The definitions related to urban ICTs will be given to clarify the idea that new urban theories are needed in the information era. These theories will be studied, explaining some important concepts about the urban life in the information age. Then, some theories such as digital city, e-city will be explained. Urban ICTs change the way how surroundings are percieved. There are new relations between the theoretical base and the use of ICTs in architectural and urban platforms, that will be also argued in this chapter, in order to have a final insight about the conceptual framework of the urban theory in the information age, and propose a theoretical background for the model.

2.1 Information Age

The "information age" had a big impact all around the world. It consists of the advances in computerisation and the changes in life according to this advances. To pinpoint this revolutionary development, Halton (1985) mentions that this "progress has been truly amazing. In only about 40 years, electronic communications and news media have become commonplace and indispensable; computers have proliferated,

becoming increasingly fast, powerful, small and cheap so that now there is scarcely a human activity in which they are not to be found. (...) Now, information can not only be stored, retreived, communicated and broadcast in enormous quantities and at phenomenal speeds, but it can also be *rearranged, selected, marshalled* and *transformed*".

Step-by-step, information technologies changed the way of living, receiving information or communicating. The use of the earth, percentage of living in urban or rural areas, international relations, world economy and many other situations have also changed with the information technology revolution. Thus, to understand what really led the world to a shift of era, from the "industrial age" to the "information age", it is critical to define the ideas relating to information.

The term "information" has been defined in multiple ways. "Information is widely accepted to be a fact or series of facts that carry meaning" assert Aksoy and Denardis to define the concept of information, adding that "the value of these facts also varies and strongly depends on the context in which the information is provided" (Aksoy&DeNardis, 2008). Obviously, the context of the information changes the way that the information is perceived. The understanding of the same information can alter due to different professions, cultures or genders.

It is important to underline some special disciplines or terms related to information and information studies. First of all, let us define the disciplines of Information Technology (IT), Information and Communication Technologies (ICTs) and Information Systems (IS). According to Pettersson (2002) "Information Technology comprises research and development of the technical systems used for making production, distribution, storage and other information handling more efficient. This includes computer technology and electronics".

Information and communication Technologies (ICTs) have partially common characteristics with Information Technologies (ITs), particularly in information transmission. ICTs include all computer and computerized services, hardware or software engineering, all kinds of telecommunication services, and other services related to information sharing and communication growing each day. It is interesting to see today that almost every science, engineering or specific business area have strong reliance to ICTs, and previously switched to a computerised system in their

workplaces. People can exchange information in real time with others, at home, work, or simply anywhere with mobile technologies.

"Information systems (IS) comprises studies on development, use and evaluation of computer-based information systems in various kinds of organisations"(Pettersson, 2002). Its purpose is to systematise the information to make an easier retreival of the information. There are some significant information systems related to the domain of urban studies and architecture. Geographic Information Systems signifies a threshold for the disciplines of geography, considering the rapid processing of the information, comparing to the old methods.

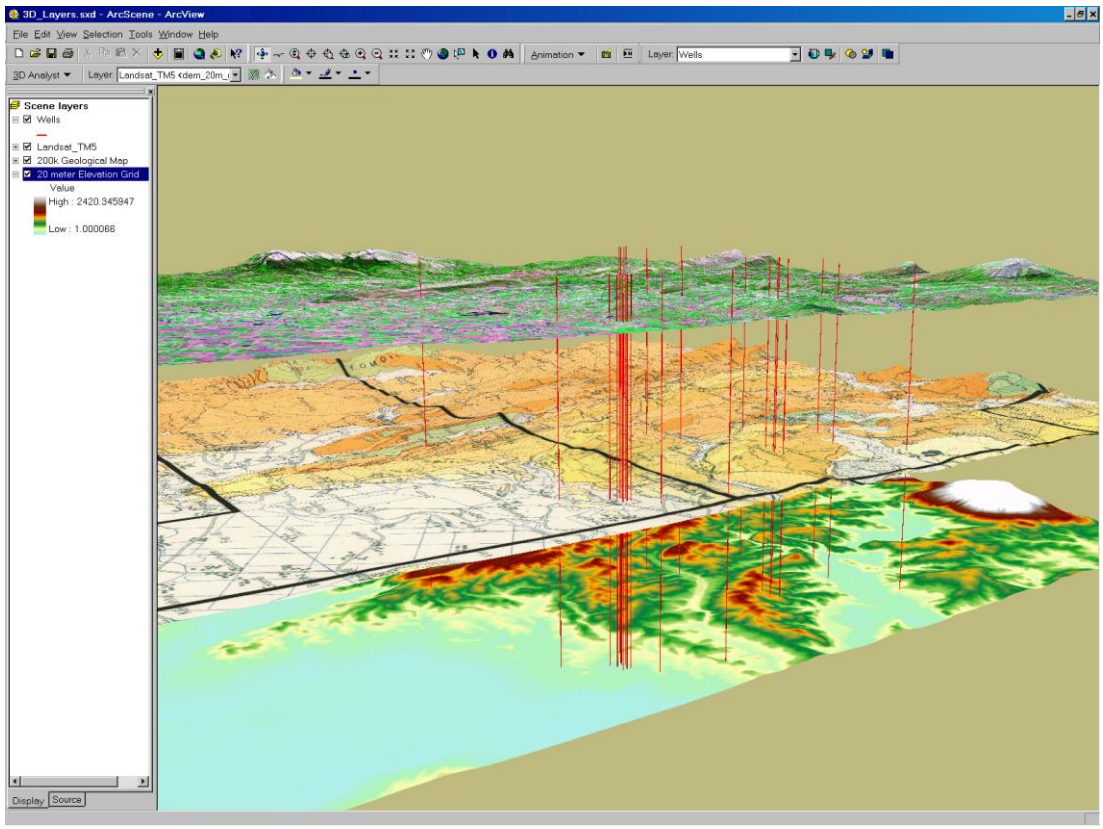


Figure 2.1 : A GIS Software: ArcGIS, [Url-1].

Also, in relation with the social viewpoints of the information revolution, the term "information society" is very popular today. According to Pettersson (2002), the information society is designated as a society which comes after the industrial society and "in which man's thinking power is supported by information processing computer systems and modern techniques of telecommunication". Nowadays, variety of terms connected to "information society" exist with slight differences in their meanings. "Mobile publics" and "hybrid societies" are among these terms that

societies are orienting themselves towards the ICT blended life.Since cities are the principal concern in this work, the challenge is to find out how the city life and ICTs relate. Under the following headings, the relations between cities and ICTs will be discovered.

2.2 Cities and the Information Technology Revolution

In some studies, it is claimed that people who are especially affected by the informational revolution are living in cities and metropolitan areas. As an example, Graham emphasizes the importance of cities in the evolution of digital technologies asserting that "the so-called 'information society' is an increasingly urban society. The 'digital age' is an age which is dominated by cities and metropolitan regions to an extent that is unprecedented in human history" (Graham, 2003).

However, the relation between cities and information technology was not noticed immediately. Only in 1990's with the rise of some new urban theories, the city has been the focus of the studies for information technology. These studies referred to multiple disciplines, such as economy, sociology or art and cultural studies and many more. Once again, these interrelations between cities and ICTs affected urban life will be the focus of the following part of this chapter.

2.2.1 Theoretical background of the urban ICTs

The theoretical and conceptual fusion of the cities and ICTs, resulted in three major movements according to Graham as he mentions in his book The Cybercities Reader. First of all, *substitution* and *transcendence* ideas appeared, where the main concept is to replace the territoriality of the city by the ICTs. During that phase, virtual reality applications were considered as options to the real city itself. The second perspective implies the *coevolution* of cities and ICTs where the principle is to produce urban places and electronic spaces together. Economy and mobility are prominent issues, concerning coevolution perspectives. The third and the last idea is the 'set of *recombination* perspectives'. Here, all technology, space, time and urban life fields all totally linked and related to each other (Graham, 2003).

Substitution and *transcendence* ideas were especially criticised when people realized that the principal concept was not to replace the city by ICTs, but to enhance the city by them. Graham points out that it is important to prove why it is unsense to think

that technological progresses and ICTs would threaten the existence of a city. It is at this point that *coevolution* and *recombination* perspectives come into question (Graham, 2003).

The impact of ICTs in cities also encouraged new urban theories adapted to the informational revolution. Relating to the use of ICTs, some theoricians emphasized the importance that the new way of life in cities necessitates new urban theories. William J. Mitchell emphasized the need to redesign the idea of a city, due to the changes during the technological era, asserting that "In a world of ubiquitous computation and telecommunication, electronically augmented bodies, postinfobahn architecture, and big-time bit business, the very idea of a city is challenged and must be reconceived" (Mitchell, 1995). Also, urban sociologist Manuel Castells mentioned that "we need a new theory of spatial forms and processes, adapted to the new social, technological, and spatial context where we live" (Castells, 2003).

At this point, the aim is to analyze these urban theories in concept of a new city that must be redesigned, considering the continuous changes in the urban life. In this new order, what are the opportunities and the threats affecting the city life? Of course, there are many more reasons that are effective on the metamorphosis of cities, such as political, economic, social, antropological and philosophical. Analyzing all of this reasons is beyond the scope of this research, so the urban theories will be restricted to the most known ones, relevant to shape a theoretical base for the research.

2.2.2 Urban theories in the information age

In this chapter, new urban theories that are adopted by the arrival of the information age will be discovered. Some of the prominent theories of the information age belong respectively to Manuel Castells, William J. Mitchell, and Christine Boyer. There are other urban theories – notably the notions of E-City, Sentient City – that will be mentioned later in this chapter.

2.2.2.1 Manuel Castells: The co-evolutionist perspective

The first new urban theory that will be examined is the one of Manuel Castells, a Catalan urban sociologist who has several works on the urban theory in the information age. He wrote essential books on cities and information age, namely "The Informational City" in 1989, and the Information Age Triology. Graham

(2003) denotes that Castells adopts a *co-evolutionist* perspective concerning the cities and ICTs. His work is centered on social, economical and cultural effects of ICTs. He also deals with macro scale consequences of ICTs, such as globalization, international connections and power. Several aspects of his work will not be discovered but his proposition of a new urban theory will be discussed.

Castells (2003) summarizes the new urban theory related to ICTs according to three "bipolar axes": function, meaning and forms. Functionally, he splits the city into global and local networks. In terms of meaning, he divides the social formation into individuation and communalism, and places the society somewhere in-between. As forms, he marks a growing tension between the "space of flows" and the "space of places".

He asserts, "Functionally speaking, the network society is organized around the opposition between the global and the local". Global networks organize processes like economy, technology and media, but processes such as daily work, private life and cultural identity are most of all local. The role of the city denotes Castells (2003), is the making the link between the local and the global, seeing the city as a "communication system" between these conflicting issues, and this is how the city gains a challenging position trying to link these realms.

Individuation and communalism are the two contradictory issues that affect our society, in terms of meaning. Castells (2003) mentions the term individuation as the enclosure of meaning of the individual, and communalism as the enclosure of meaning of the shared identity by a community. The society is in-between these two concepts as the "interface" between personal and shared identities. There is a growing tension between personality and culture. The city plays a major role "as a communicative and institutionalizing device" to gather individuals, forced to co-habit.

In terms of forms, Castells (2003) emphasizes the tension between "the space of places" and "the space of flows". "The space of places" deals with the local organization of experiences and activities, whereas "the space of flows links up electronically separate locations in an interactive network that connects activities and people in distinct geographical contexts". With possible recombinations of networks and places, cities are formed and reformed to combine "the space of places" and "the

space of flows". This "double system of communication" forms the informational city.

Manuel Castells sums up the urban spatial transformation in this way, underlining the growing tension of the opposing sides in respectively all of the three headings.

2.2.2.2 William J. Mitchell: An economical viewpoint

William J. Mitchell's work relates to the information technology and architecture. In this case, his thoughts and research about the urban theory will be examined. He has several theoretical statements on the urban ICTs and above all, he is one of the first researchers who declared the need of new urban theories in the information age.

William J. Mitchell wrote many books that pointed out the importance of new ways urban living, using new technologies in daily life. His written work mainly consists of 7 books and many other publications. The most important and widely known books that he wrote are, "City of Bits", "e-topia: Urban Life Jim—But Not As We Know It" and "Me++:The Cyborg Self and the Networked City", published respectively in 1995, 2000 and 2003.

However, his theoretical statement that will be studied in this chapter is in another book edited by William W. Braham and Jonathan A. Hale. The article named "E-bodies, E-buildings, E-cities" put forward a set of ideas that consists of an economical viewpoint to the problem of new urban structuring. Mitchell(2002) examines this new structuring by means of costs, benefits and associated patterns, and accordingly explores the metamorphosis of architectural and urban space types.

Mitchell (2002) begins by assuming that there are three types of costs – fixed costs, interactive costs and churn costs that bring out corresponding benefits for each of the situations. Fixed costs are related to a location. Transportation and telecommunication services have no effects on either the costs or the benefits of this type. However, interactive costs alter due to transportation interactions of the location. If the location is close to other activities, the interactive costs will be lower. The third type of costs, churn costs are changing due to moving activities, such as renovation or transaction costs when moving to another house. Heavy equipment will result in high churn costs, yet mobile commodities could decrease churn costs.

2.2.2.3 Christine Boyer: The new urban era and architects

Christine Boyer, professor of urbanism in Princeton University, deals with the subjects of urbanism in the twenty-first century and cyber cities. In her article "Playing with information: urbanism in the twenty-first century", she questions the standing of several architects who investigate the changing urban organization in the information age, from different viewpoints, but with the same purpose: the awareness about the urban future.

Boyer (2005) argues that architects are now more concerned about urban research.

> "They propose an alternative discourse involving analytical procedures of datascapes and diagrams, the consideration of complexity theory and non-linear urban dynamics, besides computational theories and modeling the influence the way the mega-city is imaged and represented." (Boyer, 2005)

She discusses the importance of what she calls big books that architects are giving new directions to critical thinking towards the problems cities are facing today. "S,M,L,XL" of Rem Koolhaas, "FARMAX: Excursions on Density" of MVRDV and "Move: Liquid politic" of UN Studio can be examples for this intentions. She also adds that architectural thinking can be visualized through "layered visual presentations" using graphing techniques and computational models (Boyer, 2005).

2.2.2.4 Paolo Fusero: E-City

In his book "E-City", Fusero (2009) explores the digital networks and cities in three parts: e-network, e-planning, e-cities. Within the scope of this thesis, the part "e-cities" will be the main focus.

Fusero (2009) investigates the concept of "Digital City" stating that "Digital Cities are often associated with an arena where people from a local community can interact and exchange knowledge, experiences, services, or simply share interests through internet". He informs his reader that, from his viewpoint, digital cities of this kind are equal to virtual cities, and it does not correspond to the objectives of the digital city. Therefore, to clarify the meaning of a "digital city" he defines in what he is more interested:

> "We are more interested in expanding the concept of Digital City and associate it with a city of the future (areal city, not a virtual one) where the intensive use of digital networks and ICTs can produce considerable changes in the way in which the city is used, as well as in social

> interactions, functions distribution and spatial set-up. In our case, considerations on the issue of digital cities by authors like W.J. Mitchell or M. Castells, who have developed important research on the sociological effects of a future dominated by ICT, are much more stimulating" (Fusero, 2008).

According to Fusero (2008), some actions today, such as purchasing books are "fragmented and reassembled" in homes and work places. The stores used to be places in the city centre in the past, but now with online stores they can be bought directly from the Internet. This phenomenon resulted in the change of some patterns of distribution and storage as well. Now, online stores do not have to store their stuff in the centre of the city, therefore the stuff is decentralized. The process of delivery has also been more rapid. Fusero talks about this kind of alterations, relating to the ICTs, the physical proximity that becomes unnecessary in many circumstances.

2.2.2.5 Mark Shepard: Sentient City

Sentient City is another interesting interpretation of today's city as a platform of information and communication. This term is adopted by artist and architect Mark Shepard, who recently edited the book entitled "Sentient City: ubiquitous computing, architecture, and the future of urban space". According to de Waal, who interprets Shepard's words, the term "Sentient City" emerged from the following process.

> "Increasingly, it is the 'dataclouds of 21st century urban space' that shape our experience of the city. All over the city, 'intelligent' applications have started sensing what is happening around them and reacting to it –be it smart traffic lights or cctv camera's whose images are computer analyzed for suspicious behavior. Add to this the increase of tracking devices such as cell phones that most urbanites carry, and as a result the city has become 'sentient' " (de Waal, 2011).

De Waal (2011) also indicates that the public sphere can create new forms of gatherings through the changes that the Sentient City is causing. First of these forms is the "shared issue concern". People can gather around some communal urban infrastructures in daily urban life. However, today there are new ways of gatherings in the city such as gathering around wireless networks.

Another point that de Waal (2011) makes is "sharing own biography". He gives the example of the project Trash Track of MIT SENSEable City Lab, where the aim is to follow the travel of a previously tagged trash item with a mobile phone modem, and a GPS device so that the owner can follow the trash item. This project creates

awareness on some people but everyone cannot be involved. De Wall adds that this process is not as simple as visualizing the data, the challenge is to share the data. He quotes Bratton and Jeremijenko asserting that "we do not need mere mappings, we need interfaces that allow the public not to take note of a dataset, but that also provide it with an agency to actually get involved".

2.2.3 Towards the future of urban ICTs research

Information and Communication Technologies are recently forming research possibilities in many areas, as well as the urban research field. The applications of urban ICTs are as important as related theoretical studies. In addition to the written sources, online journals and websites are very effective in keeping the studies up-to-date. Urban future initiatives constitute a common ground for technological and urban issues and their integration.

Urban future initiatives have made progresses today. Beyond the theoretical works about urban future, the initiatives and applications of the work are also expanding the field of urban practices in the information age. Urban future initiatives are various, they can be classified under institutions, laboratories, websites, books, conferences and many others.

2.2.3.1 Urban future institutions

One of the most known urban future initiatives is Urban Age investigation. This institution organizes conferences in various cities around the world to acknowledge the urban future of these cities. According to Urban Age official website:

> "The Urban Age Programme, jointly organised with Deutsche Bank's Alfred Herrhausen Society, is an international investigation of the spatial and social dynamics of cities centred on an annual conference, research initiative and publication. Since 2005, over ten conferences have been held in rapidly urbanising regions in Africa and Asia, as well as in mature urban regions in the Americas and Europe. As an event, the Urban Age catalyses the exchange of information, experiences and data across a global network of cities. The conferences operate as mobile laboratories, testing and sampling the social and physical characteristics of global cities through expert presentations and testimonials, research, site visits, mapping and informal information exchange.
>
> Each conference is attended by 300-400 invited urban specialists, policymakers, scholars, designers, practitioners and politicians who present new ideas and developments on environmental equity, social inclusion, the problems of housing and migration, the global

economy and the informal sector, as well as public transport, public space and social capital"[Url-2].

The cities that hosted Urban Age Conference up to now are: New York, Shanghai, London, Mexico City, Johannesburg, Berlin, Mumbai, Sao Paulo, Istanbul, Chicago and Hong Kong. Many important academic and professional people are invited to the conferences as keynote speakers or invitees of round table gatherings. The figure below is a photo taken during the round table gathering at one of the Urban Age conferences (Figure 2.2).

Figure 2.2 : Round table gathering at Urban Age Conference, [Url-2].

2.2.3.2 Urban future laboratories

The efficiency of the urban future laboratories that elaborate innovative concepts about urban technologyshould also be considered. The attempts made for analyzing the technological infrastructure of the city are also supporting the creation of new tools for urban information and communication technologies. Urban future laboratories are aware of this fact, consequently, they are among the first workgroups who investigate this kind of tools and projects. One of the foremost university laboratories working on these subjects is MIT SENSEable City Lab [Url-3].

SENSEable City Laboratory is a research initiative in Massachusetts Institute of Technology, having several projects on sensing and visualising the city in real-time. Urban sensing and real-time mapping are the most priority issues that come into question. In some projects, environmental awareness and sustainability matters are explored using real-time mapping techniques. Here are some of the projects realized in MIT SENSEable City Laboratory:

Figure 2.3 : The CO_2GO Project, adapted from [Url-3].

The figure above illustrates the CO_2GO Project. This project aims to calculate the user's carbon footprints on a mobile device, on the go. The system is working in real-time along with the person's daily actions (Figure 2.3). Another project is Real time mapping Rome, where the objective is mapping mobile people using the gps of their mobile devices. Therefore, this project investigates the density of people and public transportation during different periods, and the patterns of mobility in the city (Figure 2.4).

Figure 2.4 : Real time mapping Rome, [Url-3].

2.2.3.3 Urban future websites

There are also some urban ICTs research themed websites, noteworthy in keeping the research up-to-date. “The Mobile City” and “Urban Informatics” are the two sites that will be mentioned.

The Mobile City[Url-4] is a research group initiated by Martijn de Waal and Michiel de Lange in 2007 in Netherlands, who founded this organization to adapt their PhD projects to practical works. They state that they found out that there is big inconsistancies between the academic terms “augmented cities”, “cybercities” and “smart cities” and the actual design that is being done today by architects, urbanists and artists for urban environments. This website include several publications and news about digital media in urban space, as well as related book reviews.

Urban Informatics [Url-5] is another research laboratory founded by Marcus Foth in Queensland University of Technology (QUT). The principal sourcebook they produced is “The Handbook of Urban Informatics”. There are many researchers working in this laboratory. They assert that “the Urban Informatics Research Lab is a transdisciplinary cluster of people working on research and development at the intersection of people, place and technology with a focus on cities, locative media and mobile technology” [Url-5]. They define the term urban informatics as follows:

> “Urban informatics is the study, design, and practice of urban experiences across different urban contexts that are created by new opportunities of real-time, ubiquitous technology and the augmentation that mediates the physical and digital layers of people networks and urban infrastructures” (Foth, Choi, Satchell, 2011) in [Url-5].

These are not the sole initiatives to gather updated information about cities in the information age. Conferences, books and papers about several aspects of this subject are increasing year by year.

2.3 Architecture and the Information Technology Revolution

The information technology revolution affected many fields in architecture, as in other sciences. The changes in the tools for the design process, the information technology supplies to building, intelligent spaces, smart buildings, digital architecture are only a few of these changes, after the information age. However, according to the purpose and the scope of this study, only the use of IT in

architectural design process, computational design and the use of ITs in buildings will be mentioned.

Architectural design processes and design habits have been affected by the use of ITs in the last 20 years. For architects, the process of design and drawing has completely changed and the computer has become the crucial instrument in all architecture offices.

Computer Aided Design (CAD) has many advantages, the first one is to keep and archive the architectural data digitally. Secondly, it serves to create more drawings in less time. The users also have the possibility to share the drawings with others who work in the same project. The product is digital, it does not occupy a real space, and many prints may be made with only one drawing.

Another important and more recent design practice in architecture is computational design. In computational design, the tools are getting involved into the design procedure therefore architectural design is made by means of digital technology tools. Kolarevic cited in Uçar (2011) points out that "computational design tools and strategies such as parametric design, associative geometry, algorithmic procedures and scripting, which are already practiced in industries such as aerospace, automotive and shipbuilding propose the potential to alter the boundaries of architectural design and representation processes". Therefore, computational design is forming new ways of thinking and practicing architectural design, using scripting and geometric/numeric data as part of the design process.

The use of IT is popular also in buildings. The most explicit example inside a building is the "intelligent building". Intelligent buildings are automated buildings by IT technologies, and they adapt themselves to the needs and behaviours of their users. For example, digitally automated houses behave like robots and many of its control mechanisms are interactive.

The study of CAD and CAAD systems, intelligent buildings and smart spaces are not among the interests of this work, however they are significant in making an idea about the current situation of the ITs in the field of architecture. Now, it is time to step to the main purpose of this thesis that forms the theoretical viewpoint, which is adopted to create the proposal.

2.4 A Theoretical Framework: Visual Continuity and Urban Image as Challenges in Architectural Representation of Cities

Some of the architectural and urban theories and practices related to information and communication technologies have been recently studied. To draw the limits of the theoretical framework and propose a basis for the study. This chapter is going to investigate the issues about the urban image and the visual continuity of the city, how they can be represented using technological tools and their possible contributions the urban sustainability.

Visual properties often offer ways to perceive and cognize a space, understand it and make memories about it. While spaces can also be perceived by sound, odor or touch and other senses, visual features can effectively help people to identify a spatial structure. As well as perceiving an environment, a human can also recognize and memorize a "space", that makes it a "place" for this human. From an outer perspective, this last feature named "concretization of space" by Norberg-Schulz (1971) is one of the most important properties that constitutes the "image of the city" that Lynch (1960) studies in detail.

In this chapter, a theoretical framework will be proposed about the visual continuity and the image of an urban environment, referring to the Lynch's "urban image", Norberg-Schulz's "Genius Loci", de Certeau's "voyeurism" as well as many other theoretical works offering viewpoints on similar backgrounds. Some important issues coming into question are: the happening of a "place" in the urban environment, the formation of the urban visual context from places, the evolution of an urban image and character arising from the urban visual context.

As seen, these facts are interconnected to each other and they will be analyzed in this order. After these issues have been studied in detail, technological challenges that may affect the representation of places will be mentioned. Finding solutions to the need of place cognition today with the new technological processes will be discussed. After examining "how" technology can contribute to the representation of visual urban environment, the effects of these movements on urban sustainability will be investigated in details. The visual continuity of the urban vision during urban experience in our days, is crucial in this direction.

2.4.1 Formation of "Place"

In his famous example of "the bridge", Heidegger expresses a "place" as follows:

> "The [place] is not already there before the bridge is. Before the bridge stands, there are of course many spots along the stream that can be occupied by something. One of them proves to be a [place], and does so because of the bridge. Thus the bridge does not come first to a [place] to stand in it; rather a [place] comes into existence only by virtue of the bridge"(Heidegger,1971).

Sharr (2007) states that places were acquired by use and experience, just as things and buildings. According to Sharr, Heidegger means that people begin understanding the spot of the bridge differently, after the bridge was built, since the bridge carries a new meaning, becoming "the place of the bridge" in people's minds.

According to Norberg-Schulz (1980) "A concrete term for environment is place. It is common usage to say that acts and occurences take place. In fact it is meaningless to imagine any happening without reference to a locality. Place is evidently an integral part of existence". He adds that by place, "we mean a totality made up of concrete things having material substance, shape, texture and colour. Together these things determine an environmental character which is the essence of place. In general a place is given as such a character or 'atmosphere'".

2.4.2 "Voyeur" vs. "Walker": Daily urban experience through visual cognition

The everyday experience is crucial in understanding and perception of the city. However, there are different ways of perceiving the city according to where person stands. Michel de Certeau, french philosopher, explains the situations and possible effects of people who try to cognize the city from above and from inside, with differences between ones he calls "voyeurs" and "walkers":

> "To what erotics of knowledge does the ecstasy of reading such a cosmos belong? Having taken a voluptuous pleasure in it, I wonder what is the source of this pleasure of 'seeing the whole', of looking down on, totalizing the most immoderate of human texts.
>
> To be lifted to the summit of the World Trade Center is to be lifted out of the city's grasp. One's body is no longer clasped by the streets that turn and return it according to an anonymous law; nor is it possessed, whether as player or played, by the rumble of so many differences and by the nervousness of New York traffic. When one goes up there, he leaves behind the mass that carries off and mixes up in itself any identity of authors or spectators. An Icarus flying above these waters, he can ignore the devices of Daedalus in mobile and endless

> labyrinths far below. His elevation transfigures him into a *voyeur*. It puts him at a distance. It transforms the bewitching world by which one was 'possessed' into a text that lies before one's eyes. It allows one to read it, to be a solar Eye, looking down like a god. The exaltation of a scopic and gnostic drive: the fiction of knowledge is related to this lust to be a viewpoint and nothing more" (de Certeau, 1999).

According to this passage, for de Certeau, a "voyeur" is someone who observes the city form a distance. De Certeau points out here, that the "voyeur" tries to read whole city from above, instead of being inside the city. However a "walker" is more interested in the following:

> "The ordinary practitioners of the city live 'down below', below the thresholds at which visibility begins. They walk – an elementary form of this experience of the city; they are *walkers*, Wandersmänner, whose bodies follow the thicks and thins of an urban 'text' they write without being able to read it. These practitioners make use of spaces that cannot be seen; their knowledge of them is as blind as that of lovers in each other's arms. The paths that correspond in this intertwining, unrecognized poems in which each body is an element signed by many others, elude legibility. It is as though the practices organizing a bustling city were characterized by their blindness. The networks of these moving, intersecting writings compose a manifold story that has neither author nor spectator, shaped out of fragments of trajectories and alterations of spaces: in relation to representations, it remains daily and indefinitely other" (de Certeau, 1999).

In the passage, de Certeau indicates that the "normal" practitioner of the city, is at street level and his principal activity is walking. Named as "walker", this type of practitioner creates deliberately urban "text", but as he is inside the "text" he will not be able to read it. The main difference between "voyeur" and "walker" is that the "walker" acts without knowing exactly what awaits him. Phil Hubbard (2006) explains de Certeau's views about the "voyeur" and the "walker", asserting that "the view form above may exercise a strong appeal, yet it may lead us to (literally) overlook some of the most important facets of city life". He adds that for de Certeau, as he indicated in 2000, "the story begins on ground level with footsteps". It is, therefore, very clear for de Certeau, that the city is percieved and cognized through everyday experience, being inside the city at the ground level. He considers walking as an art of "composing a path" such as "turning phrases" in the art of poetry (de Certeau, 1999).

Daily experience at ground level surely has a depth in meaning and our perception, but from a social point of view, it is possible to consider "streets" as the network

where the daily urban experience usually takes place. Fyfe (1998) describes the meaning of the street as follows:

> "Streets, as Jane Jacobs reminds us, have always held a particular fascination for those interested in the city. Streets are terrain of social encounters and political protest, sites of domination and resistance, places of pleasure and anxiety. Located also at the intersection of several academic disciplines, the street is also the focus of many theoretical debates, about te city concerning modern and, more recently postmodern urbanism. For modernists, the street is a space "from which to get from A to B, rather than a place to live in", displacing the street "from lifeworld to system"(Lash and Friedmann,1992) for postmodernists, the street is a place designed to foster and complement new urban lifestyles, reclaiming the street from system to lifeworld".

As stated by Fyfe, the streets are like the nerves of the city. Without them, there is no circulation, and therefore no life in the city. The current views about the streets in daily urban experience, is closer to the viewpoint of the postmodernists that Fyfe mentions. More and more studies are done today, about the role of street life in the urban experience. This results in the awareness of the importance of street level in the urban perception.

2.4.3 The city image, urban visuality in context and visual continuity

The daily urban experience and the life in streets are very significant in urban living and the city image. However, there are some crucial elements apart from the streets that permit analyzing the city image. One of the most common descriptions of the city image belongs to Kevin Lynch. In his book " The Image of the City", which he published in 1960, he informs the reader about the his image analysis theory: This urban image analysis comprises five elements that a city owns. He notes these ones as paths, edges, landmarks, nodes and districts. This analysis is still popular and widely applied. Still, Boyer (1996) warns us about some inconsistencies of the analysis:

> "Lynch's analysis of the city rested on five different elements: paths, edges, landmarks, nodes, and districts. He noted that problems could arise in this system, which would disorient the viewer by blocking the road to recall. For example, edges could be too weak to delineate a place, or too wide, leaving a district exposed to view; a landmark could be too great or too alien to the character of a district; paths might lead towards but not to a node; or parts within a district might be loosely connected, roughly related, or without a structure of any kind. It then became the planner's task to restore order to the spatial container of memory icons by eliminating these visual inconsistencies in a city's imageable form" (Boyer,1996).

Lynch's analysis usually explores the visual form and content, without examining the properties of the content in detail. This may result in some lacks of understanding the actual situation of the surrounding. As an example visual context is also very important in determining the visual properties and the image of a city. Especially for architects and city planners, it is crucial to pay attention to the visual perception of the urban environment within its contextual frame. Considering this fact, Lefevbre's interpretations of the city can be inspiring: The city is an accumulation of several things and factors, and it is always the context and the eye of the spectator that makes the urban urban.

> "Piles of objects and products in warehouses, mounds of fruits in the marketplace, crowds, pedestrians goods of various kinds, juxtaposed, superimposed, accumulated—this is what makes the urban urban. If the city is always a spectacle for itself, viewed from high on a terrace, a tower, a hilltop, a vantage point (a high point that is the elsewhere where the urban reveals itself), it is not because the spectator perceives a picture that is outside reality, but because her glance is consolidating. It is the very form of the urban, revealed. Everything that occurs within the urban reality does so as if everything that constituted that reality could be compared, and always increasingly so. In this way—in confusion—the urban is conceived, perceived and revealed" (Lefebvre,1970).

Lefebvre considers here the urban environment as a hybrid whole. The context of the urban environment is usually tied together with the concept of visual continuity. The context, taken as a whole, is expected to produce a visual integrity with the surroundings. Visual continuity can be described as one of the form qualities a city must own, as Lynch (1960) cites it as one of the ten characteristics of the form qualities of a city. He describes continuity as an ensemble of "qualities that facilitate the perception of a complex physical reality as one or as interrelated, the qualities which suggest the bestowing of single identity".

2.4.4 Coherence and character of a city

Gutheim (1963) reveals the importance of coherence in the urban visual context as follows:

> "The most important design characteristic of a city is coherence. This means more than order. Indeed, order alone leads to monotony and deadness. It provides no role for the imagination. Cities are alive, and their living quality must come through in the articulation of the various parts of a city, in its adaptations, in its growth. A city tells us things, and our body responds to the perception of whether they are places of good or bad air, hot or cold, comfortable or

> uncomfortable, or provide other bodily sensations. But these responses must be supplemented by an understanding rooted in knowledge as well as in experience. The organic relations of a city—the interaction of its transportation and its land use, no less than of its people and their recreation areas—is an important theme of design. Such recognition also mirrors understanding of the city and our individual relationship to it, and this meaning is also a kind of coherence"(Gutheim,1963).

The American urban theorists tended to generalize cities as holistic systems say Amin and Thrift, placing importance on the ambition of these theorists about theorizing the city according to its internal dynamics. However, Amin and Thrift argue that internal coherence is not the only issue to be considered, because a city is never complete and is "an amalgam of often disjointed processes and social heterogeneity, a place of near and far connections, a concatenation of rhythms, always edging in new directions"(Amin&Thrift, 2002).

Today's urban theorists decline the fact that the city can be simplified to an internal organism. Instead, they indicate that there are oppositions and strict distinctions between the components of the city that constitutes the whole. This viewpoint is first adopted by Colin Rowe, writer of "Collage City", is known as "the prime mover in contextualist thought" (Ellin, 1999).

The coherence of the context of an urban environment can even go further and make people remember about its characteristics. This fact is related to the urban experience on site. Amin and Thrift (2002) declare that "We think of particular sites and moments when imagining a city: Paris as café life, New York as Manhattan, Calcutta as the noise of traffic." We generally think about places that we experienced before, thinking about their very own characteristics. These properties, evaluated into their context can often be visual particularities or patterns.

Some cities, especially Venice, Rome or Paris, have strong visual images that can be easily evoked in people's minds. Lynch (1960) in his famous book "The Image of the City", names this characteristic as "imageability" where he asserts:

> "A highly imageable (apparent, legible, or visible) city in this peculiar sense would seem well formed, distinct, remarkable; it would invite the eye and the ear to greater attention and participation. The sensuous grasp upon such surroundings would not merely be simplified, but also extended and deepened. Such a city would be one that could be apprehended over time as a pattern of high continuity with many distinctive parts clearly interconnected. The perceptive and familiar observer could absorb new sensuous impacts without disruption of his basic

> image, and each new impact would touch upon many previous elements. He would be well oriented, and he could move easily. He would be highly aware of this environment. The city of Venice might be an example of such a highly imageable environment. In the United States, one is tempted to cite parts of Manhattan, San Francisco, Boston, or perhaps the lake front of Chicago" (Lynch, 1960).

Norberg-Schulz's concept Genius Loci is another way of defining the essence of the city. "Genius Loci is a Roman concept. According to ancient Roman belief every 'independent' being has its genius, its guardian spirit. The spirit gives life to people and places, accompanies them from birth to death, and determines their character or essence" (Norberg-Schulz, 1980). He mentions "Genius Loci" here as the soul of the place. Like a person, a place has a certain spirit and people experiencing this place recall it through the spirit of the place.

2.4.5 Visualising the city: Technological challenges

Developing and representing the urban image and visual continuity in our century could be percieved as a challenge, because some kind of spaces are changing, and are becoming digital. Boyer explains this phenomenon with the following:

> 'Developing an image of the city in an age of visual saturation appears to be a problem, precisely because awareness of the physical space of the city is disappearing or dematerializing— the result, we are told, of new digital information and communication technologies. Paul Virilio says that every city is over-exposed and its physical sense of space decomposed as our eyes are constantly bombarded with ephemeral and interchangeable images, visions that move along the constant space of flows called the informational city'(Boyer, 1996).

As Boyer quotes Virilio stating that people is constantly seeing new images in the changing face of the city. Sometimes, this overexposition makes people more aware of the visual changes, it has some effects on visual memory as well.

> 'These two arts of memory can help us explore the question of the imageability of cities in the age of electronic communication. For the classical art of memory was embedded within modernists' visualizations of the space of the city, while the combinatorial art of memory appears to be more closely related to the postmodern view of a city that is increasingly disappearing or invisible'(Boyer, 1996).

Nowadays, most of the cities are changing everyday visually. In some way, it is possible to understand the concepts that have been argued previously in a different contextual frame: the visual continuity of a city does not mean the same anymore.

For a city of our time, it is not the coherence of all forms that is expected. However, as Lefevbre mentions, the city is made of a superpositioning of things and it can be claimed that all the different contexts can come together and form a reasonable whole with the in-between places they are forming.

At this point, visualizing the city is very challenging, and technological instruments can represent the changing city in its new and deviating image.

2.4.6 Effects of visualising the city

Visualizing the city when taken as a real challenge is an intelligent way of keeping notes and memories about the urban environment. The representation tells about the past, the future and today, and makes it possible to evaluate the possible circumstances may occur. Possible effects of visualizing the city are, along with keeping tracks, ensuring the urban sustainability. The urban sustainability, as mentioned here, concerns the urban environment, the imageability, the liveability.

A city's residents sensorial experiences are very significant in understanding the way that a city lives. From here, sensing the city 24 hours is an important process. In an article named "The Sensory City", the sensing of the city 24 hours with different multisensory activities, promotes diversity and livability, and yet, urban sustainability (Adams et al., 2009).

The works such as "Real Time Mapping Rome" that previously has stated also propose a kind of keeping track of the city. This kind of studies make unseen facts more visible and thus, more understandable. As well as academical studies that aims to discover and visualize a reality, the guides open to the public for experiencing, like interactive guides used commonly today, are important in the development of the technology and the perception of people in everyday life experiences. These facts will be explained in the following chapter.

2.5 Results

This part of the work summarized the main theories that have shaped the evolution of cities in light of new technological advances in the information age. The main part of the chapter, the theoretical framework on the urban image, visual continuity, imageability and coherence tried to create a background for the formation of the

proposal. Some issues come into question along with the proposal that will be made on the fourth chapter. These issues will be analyzed with some questions:

- To what extent the urban image analysis may represent the city? How can it be applied to the selected region?
- How does the daily urban experience affect the practitioner of the selected region?
- How the “voyeur and “walker” concepts can be adapted to the region? How can the practitioner perceive the chosen area like “voyeur” and “walker”?
- How does the context (historical, physical, social) affect the region?
- Can the region be evaluated as “coherent”? Does it have a special “character”?
- What are the technologies that permit representing and visualizing the data obtained from these experiments?
- How can the visual continuity be experienced in this area with new technologies, keeping the context as it is?

The final chapter, along with the case study, will try to answer these questions. But first, to answer these questions appropriately, it is essential to understand which technologies have shaped the realm of urban and architectural representations from past century to the present time. Therefore, the next chapter concentrates on the representation of urban and architectural environment.

3. REPRESENTATION IN THE INFORMATION AGE

There are multiple types of information representation, but here, only the visual representation of information will be studied, considering the scope of the research. Concerning the structure of this chapter, first of all, the visual information and information design concepts will be identified. Secondly, urban representation in the information age with the aid of the technological tools will be studied. Prior to the evolution of urban representation relating to the information age, the definitions and background information about mapping, map and cartography will be given. Then, the changes that information technology has brought to the realm of urban representation will be discovered.

The detailed research that will be explained afterwards is related to interactive city guides. This study will construct a base for the case study that will be proposed for Galata region in the following chapter.

3.1 Visual Information Representation

Zwaga mentions that "the concept of 'information' is related to meaning"(Zwaga et al., 1998). It is obvious that information and meaning have a strong relation. An information is useful once it is clear what is meant by this information. In parallel, the purpose is important in the organisation of information. According to Zwaga "information is data organized in such a way that it can be used by people to serve their goals" (Zwaga et al., 1998). Thus, organizing information for its own purpose is the first challenge to be accomplished, as well as other challenges such as visualisation and representation of the information. The essential goal is to discover how easily and directly people can understand what is meant by the information. The representation of the visual information becomes the subject of this purpose.

In Pettersson's words "In the design and production of the visual information, we have to consider the characteristics of visual languages. We need to know how the illustrations will be used. We should consider image variables related to content, graphic execution, context and format" (Pettersson, 2002).

“Information Design (ID) comprises research on the principles for analysis, planning, presentation and understanding of messages- their contents, language and form. Regardless of the selected medium, a well designed information set will satify aesthetic, economic as well as subject matter requirements”(Pettersson, 2002).

A map is also an information design product in some way, besides being a scientific representation of the geographical data, because the design of the information set is not only crucial for the aesthetics that a map should have, but also for the best perception and understanding of the data set.

As a matter of fact, when the design of the data set becomes important and when the technology is advancing, the arrival of the information age changed dramatically the way that people produce information design products, notably maps. The next chapter will clarify these facts, and give information about the representation of information in urban scale.

3.2 Representation of Information in Urban Scale

Representation is among the most important concentration areas in the field of urban technological revolution. According to Fusero, the impact of ICTs in urban transformation today, can be studied in 4 different levels. These are the representative level, additional level, instrumental level, complying level (Fusero, 2009). Representative level means all the processes that are related to the illustration of urban information in several contexts.

As seen the representative level plays an important role in the urban transformation. The main reasons for this fact is the constant change that the world of urban representation faces and gradually people become addicted to be informed anytime and anywhere. The way that maps and representations of urban environment changed through the last century will be discussed in this chapter.

3.2.1 Mapping, maps and cartography

In this part of the work, the definition, the role and the importance of mapping, maps and cartography related to urban representation will be discussed, covering the historical background and the different domains that they are related with, such as technology and culture.

Abrams and Hall (2006) argue that “mapping has emerged in the information age as a means to make the complex accessible, the hidden visible, the unmappable mappable” and that “mapping has become a way to make sense of things”. The most important property of mapping is the intention to represent some data, with some means, and to create a clear diagrammatic output.

The concept of mapping, while principally used in geographic science and cartography, is also present in mathematics, biology, neuroscience, logic, operations research as well as other sciences. Mapping gave rise to many disciplines such as brain mapping or cognitive mapping. Social content, such as power or political relations are very commonly represented as mappings. Mapping is more than a scientific diagram, it may also play roles in strategical decisions.

According Abrams and Hall (2006) there are differences in meaning between the terms “mapping” and “map”, as they state “if a map is a completed document, mapping refers to a process –ongoing, incomplete and of indeterminate, mutable form”. Here are various definitions concerning the term “map”.

The meaning of the word “map” is coming from its material as the etymological root of ‘map’ derives from the Latin word ‘mappa’ which means cloth (Thrower, 2008). The meaning that is used today gives us the chance to describe a map with its various aspects and properties, thus, ‘a map’ can be defined in many ways and from various viewpoints. However, concerning only cartographical maps, it is possible to define a map very simply and generally.

The most common definition is given by Thrower (2008) who asserts that “according to the definition used by earlier peoples-and still used by the purists-a map is a representation of all or a part of the earth, drawn to scale, usually on a plane surface”. Also according to French geographer Joly (1976) a map is a plane, simplified and conventional geometrical representation, with an appropriate proportion called scale. In this definition, the word “conventional” means geometrical representation and signs that can be globally understood.

Pickles(2004) quotes Henricksen asserting that ‘the notion of a map is essentially that of a model, a representation of a geographical area (usually) on a flat surface. Ordinarily, each point of a cartographic diagram corresponds to an actual geographical position on earth, according to a definite scale or system of projection’.

According to Kraak and Ormeling (2003), a map is ‘a graphic model of the geospatial aspects of the reality’, in a second definition they denote that a map is ‘a conventional image, mostly on a plane, of concrete or abstract phenomena which can be located in space’. Therefore, it means that a map can represent abstract phenomena as well as concrete phenomena, as long as it is part of the reality.

These definitions, however, argue that a map is representing geographical data, usually on flat surfaces. Kitchin and Freundschuh (2000) point out that a map can be either “two or three-dimensional spatial structures that represent some part of the environment and communicate information about the environment”. Therefore, a map does not have to be only two- dimensional, and represented on a flat surface. Kraak and Ormeling (2003) approve their statement denoting that maps do not have to be projected only on sheets, also relief models and globes are considered today as maps.

This is one of the changes for the meaning of the term “map”, but not the only. Since there has been some shifts in the meaning of cartography with the technological progresses in the last decades, the meaning of the word ‘map’ has also changed within time. Some geographers led to definitions which pointed out the meaning of map with the new visualization techniques. A definition of this kind is given by Board asserting that a map is ‘a representation or abstraction of geographic reality. A tool for presenting geographic information in a way that is visual, digital or tactile’(Board, 1990).

A sooner definition of a map by Krygier and Wood (2005) is “a graphic statement that locates facts”, who also denote that “maps are a powerful way of thinking about the earth”. In this definition the word “graphic” means “a visual display of marks which stand for something else”, the word “statement” means “to put forth information, a formal embodiment of facts or assertions” and “locating facts” means “tangible and intangible phenomena which can be located in space”. According to them, these facts are “what we can see” such as streets, lakes and rivers, “what we cannot see” like temperature or radiation, and the facts “varying in amount” like population, or “in kind” such as vegetation types. Concerning this definition, another property of the map is to locate the information on the representation using common graphics, easily understood by map users, yet called ‘conventional’ by Joly, in a previous definition mentioned above.

According to Pickles (2004), who quotes Latour (1999), "maps and mappings precede the territory they 'represent'. Just as scientific facts are produced through the overlay of circulating references". The figure represents the interpretation of a line, where Pickles (2004) quotes Columbus "what is geography if it is not the drawing and interpreting of a line?"(Figure 3.1).

Figure 3.1: Mapping as the interpretation of a line (Pickles,2004).

These are the most simplified definitions of a map from a technical point of view. They introduce representation, information and scale problems which are definitely the most important notions encountered in cartographical studies. However, maps are used in many areas, related to other arts and sciences, "as a synonym for the model of what it represents, a model that enables one to perceive the structure of the phenomenon represented" (Kraak&Ormeling, 2003).

Cartographic maps, as well as other kinds of maps, have various roles in our everyday lives. Liben (2003) quotes Muehrcke summarizing the principal properties of maps. According to Muehrcke, "maps record and store information, serve as computational aids, serve as aids to mobility, summarize complex, voluminous data, help us to explore data, help us to visualize what would otherwise be closed to us, and serve as trigger devices to stimulate thought". This is a brief summary of how a map can help us technically. Naturally, the first mission of maps is to record and store information. It is now possible, and easier, to make records and carry information amounts with the new computer technologies such as Geographic Information Systems (GIS).

A map is also supposed to make a summary of big amounts of information, using the visual advantages of geographical representation, so that information could easily be understood and explored in less time. A map must also trigger our imagination and creativity and make us think about diverse situations represented on it.

On the other hand, there are many important roles and properties of maps other than mentioned above. Usually, everyday use of maps consists on how to find our directions and move into a fragment of space. But also, maps are being used to make predictions for some situations. Kraak and Ormeling (2007) argue that a "map is a predictor of space". "We use maps in order to predict a situation at a certain place and at a certain time, or we use them to determine by which route we can best reach a faraway place. Of course, maps also have other applications, such as analysis, the storage of information, education, advertising"(Ormeling, 2010).

Another aspect of maps is that they "have a role in problem solving" (Liben, 2003). In education and research, maps are primarily used in problem solving and this characteristic became important in the last decades as the maps are now being used as information systems for a topographical area. These information systems play a major role in keeping the information up-to-date and archiving it, to solve problems in indeterminate situations.

MacEachren (2004) emphasizes the need to understand how a map works. He illustrates the system in the following schema. It explains in detail how the conception of the cartographer and the percipient is formed and where stands the knowledge (Figure 3.2).

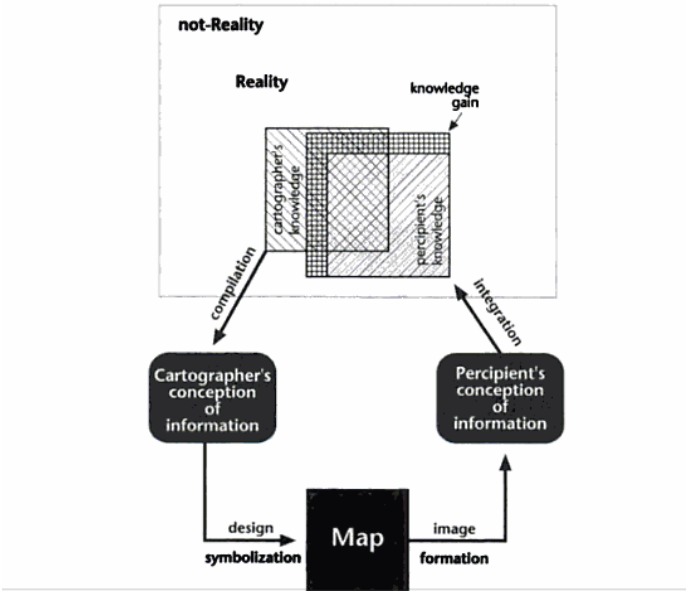


Figure 3.2 : How maps work (McEachren, 2004).

The notion of cartography also can be defined in various ways, but according to Misra and Ramesh (1989) “cartography is generally considered to be the science and art of designing, constructing and producing maps, (...) it is also treated as a science of human communication”. From this point of view, cartography has many points in common with architecture, as it can be considered as as science and an art, and the procedures of design, construction and producing are also valid for architecture. It’s related to many other sciences and arts, among them there is sociology, psychology, cognitive sciences, semiotics, politics, economics, philosophy, urbanism, architecture and graphic arts.

More than one definitions can be given for the notion of cartography. Kraak and Ormeling(2003) quote Taylor asserting that cartography is “the organisation, presentation, communication and utilisation of geo-information in graphic, digital or tactile form. It can include all stages from data preparation to end use in the creation of maps and related spatial information products” and they denote their own definition as “making accessible spatial data, emphasizing its visualization and enabling interaction with it, aimed at dealing with geospatial issues”.

From this last definition, it could be concluded that there has been critical changes for the meaning of the term cartography, after the technological innovations. These changes can even be called a paradigm shift. “A paradigm shift can be initiated when a system (e.g. a domain) is facing certain difficulties not any longer being able to solve problems that seem ordinary”(Brodersen, 2007). According to Ormeling (2010) in Germany 1820, cartography meant the “production of maps”. Later in the first part of the 20. century, cartography gained the meaning of a “projection theory, a multiple of ways in which one could depict the earth on a flat surface”. A first big revolution happened when the first satellite pictures appeared. Geographers had to chance to control if the previous projections were right (Kraak&Ormeling, 2003). After the 1960’s, with computer revolution, it’s preferred to define cartography as “ the visualisation of spatial information” that’s why Kraak and Ormeling (2003) point out that “the meaning of the term ‘cartography’ has changed fundamentally since 1960”.

In order to understand cartographical studies and the changes that happened very recently in the world of cartography, a brief history of cartography and the breakdowns in this domain throughout history could be inroduced and then continued

with the new technologies of digital cartography, before moving to urban representation means.

To have more insight about cartographical studies, it's crucial to know more about the history of cartography. It will be impossible to study the history of cartography with details in this work, so the principal periods and important changes in the history of cartography will be traced.

Peterson (2003) asserts that "it is impossible to know when the first map was made. The pictures of animals that have been discovered on cave walls from between 10,000 and 20,000 years ago are in abstract form as a series of lines and shapes. (...) The first known maps dates to Mesopotamia about 4,500 years ago. Drawn on clay tablets, these maps depict land boundaries and some physical features such as rivers and mountains". Also Syrian and Egyptian people drew maps on clay or metal tablets, and made sketches over papyrus, representing contours or itineraries, without any intervention of mathematics. Only the ancient greeks had begun to work with mathematical elements on cartography. (Joly, 1976).

3.2.2 Paradigm shift in cartographical representation

Nowadays, the progresses in technology affected the definition of cartography, as well as the processes and the outputs of the cartographical work. Internet has been widely considered as a new platform, where people can make use of maps. Digital cartography gives us the chance to manipulate maps anytime, which is called ubiquitous cartography. Also, Geographical Information Systems (GIS) showed us that maps are now being constructed as "data portals" according to Ormeling's words, as he stated in his article "From Ortelius to OpenStreetMap"(2009). These data can be different types of information, concrete or abstract, visible or invisible. But, the point is that maps can used today as cartographical search engines.

In this section, some notions like GIS, ubiquitous cartography will be introduced and the changing relations between new medias and cartographical work in the conception, realization phases will be explored, as well as the rise of the Internet in the creation and use of maps.

To point out the changes in the pratice in cartographical studies with the digital revolution, Laurini states:

> "In the 70ies, the used expression was "computer-aided mapping" emphasizing the idea that printing maps was the sole scope of using computers. Then, in the 80ies, the more important was considered as structuring geographic database, and then the expression "Geographic Information Systems" was coined. From this period, research has been done on presenting maps as well as presenting queries. For centuries cartographers have created a large corpus of rules for manual mapping. Those rules were progressively integrated and enlarge to compose maps. For instance, zone hatching was considered as a boring task when manually done, whereas with computer, this is straightforward. In contrast, name placement was considered as a relatively easy task although by using computing, this is still a challenge." (Laurini)

After the digitalization of the paper maps, the first and the most important uses of technology in cartography is without doubt the area of Geographic Information Systems (GIS). According to Bertol(1997),"GIS visualizes and analyzes different types of information according to geographic location, achieving a complete digitalization of the territory". She adds that GIS uses several kinds of information like 2D satellite imagery, 3D computed-generated models, geophysics information as well as socioeconomic data. Bertol(1997) states that GIS is used in many areas, but mainly by "urban, social and financial analysts and planners in a broad range of fields extending from resource and waste management to civil engineering, geology and military".

Besides its use in many fields, GIS is also important for its analyzing tools. The usage of GIS could provide the forecasting of many kinds of information and possible situations, related to geographical placement. Ayşe Pamuk (2006) analyzes the role of GIS in the acquirement of spatial thinking, and the analysis and visualization of the urban planning issues with the following:

> "Spatial thinking and analysis are essential for intelligent urban policymaking in a globally connected world. Without a spatial and analytical understanding of how cities are organised and how residential patterns are shaped as a result of population and employment changes, we risk designing urban plans and policies that are unrealistic at best, and exclusionary for new comers at worst, GIS can be usefully applied by planners to new urban planning challenges in these global metropolitan regeions and megacities, espaecially those where rapid demographic transformations are primarily responsible for recent rapid growth"(Pamuk, 2006).

Also, Fusero (2008) states that "to elaborate the choices of urban planning instruments, the most widespread application of a GIS is the realisation of an "intelligent" digital cartography capable of connecting spatial coordinates with the multitude of parameters expressed by the territory".

Besides GIS, another important threshold in the world of cartography, is the changing means of transmission and usage of maps. The transmission of maps as well as other representations on Internet has been started approximately two decades ago.

According to Peterson (2005), "Internet is redefining how maps are used", they are no longer restricted to paper, so that they can be easily distributed and reachable by all users. There is also a question of time, of the new reality that maps can be updated many times even through a day. Information is accessible any time and up-to-date. The most important advantage is that the maps on the Internet became more interactive. This progress is visible on the recent work of map servers.

Peterson(2005) also asserts that Internet has engendered three major changes in the distribution of cartographical stuff. "In the first stage, paper maps were simply scanned and distributed like pictures. In the second stage, beginning in about 1997, the Web emerged as a major form of delivery for interactive maps. In the current third stage, the continued development of this form of map delivery is dependent on solving specific problems related to map delivery, map design and map use".

Concerning maps and the Internet, four areas of research have been identified by ICA: Internet map use, Internet map delivery, Internet Multimedia Mapping, Internet Mobile Mapping. Peterson(2005) quotes Richmond and Keller asserting that Internet maps are commonly used in web-based tourism destination marketing. In their study in 2003, they examine 181 maps in 40 official tourism websites.

As a new concept, let us introduce the notion called "ubiquitous cartography". Ubiquitous cartography is the term that initiates the close relation of the world of cartography and the world of real-time mapping. According to Ormeling(2009) "up-to-the-minute spatial information" that is always available to anyone who needs it, anywhere and anytime is called "ubiquitous cartography". As a principal step in the transformation of urban spatiality representation, ubiquitous cartography opens the way to open source mapping tools that can be updated anytime.

Another aspect of ubiquitous cartography that must be mentioned is the fact that opens the geographical data to everyone, giving them the possibility to add information on maps, and moreover, to create their own maps.

3.2.3 Means of the urban representation

Nowadays, the means of urban representation has dramatically changed and is ready to develop each day thanks to the technological advances that will be mentioned in this chapter. Several urban representation tools will be discovered, prior to moving to urban representation aspects of the three dimensional representation and imaging tools, as well as the effects of mobile technologies and hyper reality to the realm of urban representation.

The concept of ubiquitous cartography covers a variety of attempts to make the world more accessible by mapping. From the OpenStreetMap project and Geo-tagging, to the virtual cities and augmented mobile technologies, the representational studies of the world as well as specific cities have progressed with the initiation of ubiquitous cartography.

3.2.3.1 The OpenStreetMap

The OpenStreetMap was the first important initiative in creating a tool that could help people in making their own geographical maps. It was founded by Steve Coast in July 2004. According to Perkins and Dodge, in the OpenStreetMap Project "the model is to make and share our own mapping rather than simply adding our data to map that someone else owns". They add that the OpenStreetMap project is transforming itself to "an international non-profit organisation dedicated to encouraging the growth, development and distribution of free geospatial data to providing geospatial data for anybody to use and share"(Perkins&Dodge, 2008) (Figure 3.3).

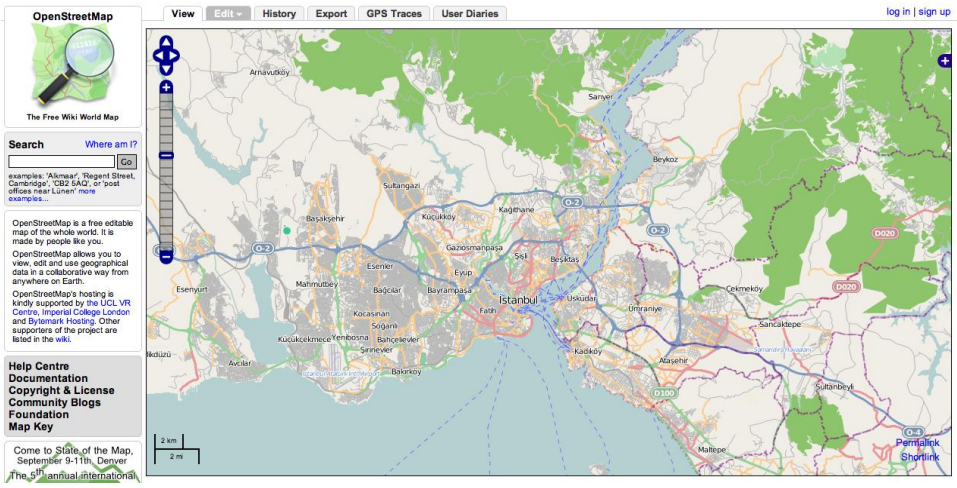


Figure 3.3 : The OpenStreetMap Project Website, [Url-6].

In OpenStreetMap, users are able to make a map in five stages. First, they have to register to begin creating their maps. Then, they may start to gather data in the first stage, and upload the data they gathered afterwards. The Open Street Map gives access to editing maps and data. When the whole process is over, the user may render the maps.(Figure 3.4).

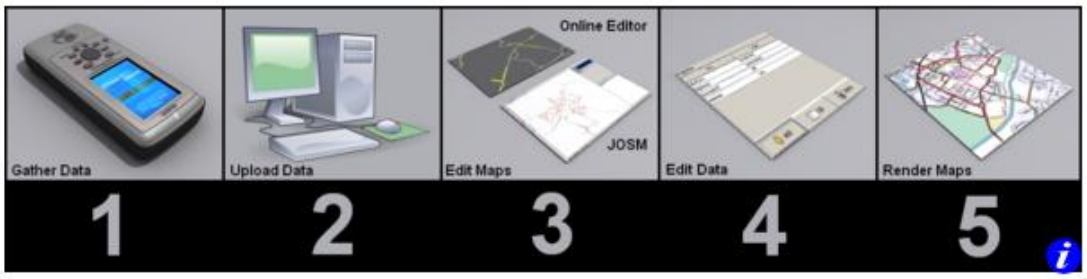


Figure 3.4 : The OpenStreetMap creating process, (Perkins&Dodge, 2008).

3.2.3.2 Global digital maps and geotagging

Since the beginning of the 1990's, there is a huge increase in digital maps published on the Internet, as previously stated. The first global maps provider was MapQuest published in 2000 by AOL company. Now the most popular map provider is Google Maps, which was founded by Google in 2005.

The foremost advantage of global map providers is that they have all the visual information together such as maps, satellite photos, topographical data, street view and 3D models. These information could be published or edited by the users with personalized maps, with no programming knowledge.

The interactivity level of the global maps are increasing today as the users can personalize maps, add their information to the maps and share them with everyone. This procedure is called geo-tagging.

3.2.3.3 3D modeling and visualisation

3D visualisation of cities and 360° image capturing technologies like Google Street View increased the level of perception of cities in the digital realm. The visual digitization of cities has many benefits as well as Geographic Information Systems or Internet Maps where information about cities is archived and used in many design or engineering areas.

3D modeling exists in multiple levels, such as the illustration of an interior space to the visualisation of a geographic region. One of its important uses is available in the city scale. However in the city scale, the purpose of 3D modeling is not to visualize the building with high level details, but to navigate in the city model, serving as a digital database, and giving actual information about the built environment of the city. Levy (1998) states that "the use of 3D computer models can create a virtual environment for communities and cities at all scales, from the design of a single streetscape to the massing of an entire city"(Figure 3.5).

3D models of cities have various purposes such as databases for noise or pollution simulations, and even for natural disaster simulations. They can be used to check the conformity of buildings to construction laws, moreover, they can help many professionals from real estate agencies and mobile phone operators, to historians and archeologues (Laurini&Servigne, 2008).

However, a major characteristic of 3D visualizations of cities, that could be principally discussed is the architectural or urban representation. From tourists to citizens, people generally consult maps before they visit an area. The 3D visualizations are very significant in the perception of the city. More or less, it signifies the "voyeur" of de Certeau, a glance of the city is taken from an outer perspective. These visualizations help the users, forming a visual memory in their minds, before visiting an area.

Figure 3.5 : New York 3D buildings on Google Earth, [Url-8].

3.2.3.4 Google Street View

Google Street view provides images of streets around the world. These images are of 360 degrees horizontally and 290 degrees vertically, so that the user could easily navigate the interface like a pedestrian. This system was released in 4 cities in the USA for the first time in May 2007, and now it is propagated for use in thousands of cities all around the world (Laurini, 2010). An example showing the current captures of Google Street view is below (Figure 3.6).

Figure 3.6: Google Street View Screenshot from New York, [Url-7].

In order to take the photographs Google Street View is using automobiles with a special camera maintained with a vertical support. For use in places where cars cannot enter, such as pedestrian ways or pathways, bicycles carrying a camera system propose a good alternative. In snowy areas, picture capturing is made using a snowmobile also equipped with cameras. And finally, Google started very recently capturing interior public spaces such as museums that can be visualized through a camera hold by a trolley. These alternatives are shown in the figure to demonstrate respectively how a car, bicycle, snowmobile and trolley appear (Figure 3.7).

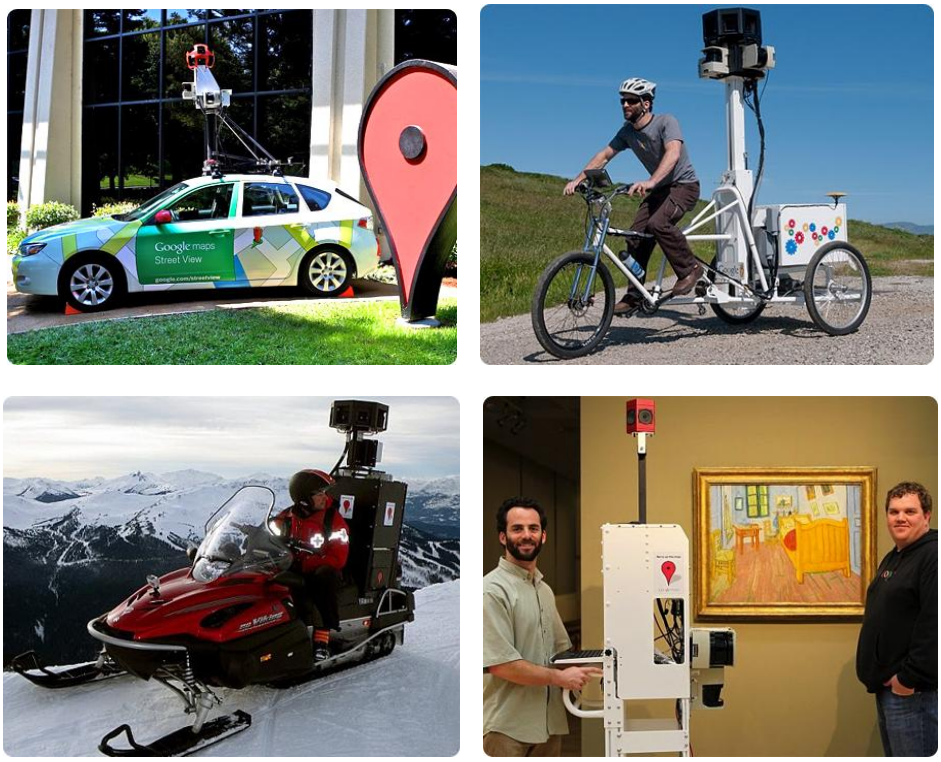


Figure 3.7: Google Street View: Alternative vehicles for image capturing [Url-7].

Google Street View evolved quite rapidly in just a few years. By August 2011, the map of the places photographed by Google Street View is as follows (Figure 3.8). It covers the total of the United States, a part of Canada, a big majority of the land in Europe, South Africa, Rio de Janeiro in Brasil, a vast area in Australia and New Zealand, almost all the lands in Japan, and a few other specific cities of the world such as Shanghai.

Figure 3.8: "Where is Street View?", [Url-7].

Street view technology has many advantages, as well as some disadvantages, for citizens and tourists as well as urban researchers and investors. To begin with, it is a useful tool for the orientation of users. Citizens or tourists who want to explore a city or a specific neighborhood, can simply walk through the streets virtually, before going to that area. This characteristic of the street view tool can appear as a mere benefit, however it accompanies a disadvantage for many of its users. It diminishes the chance to explore the city without knowing every single detail of it, therefore to encounter less surprises and decrease the possibility to get lost.

Another outstanding benefit of the street view tool is its potential to build a database of the visual record of cities. It is a good intention for archiving visual data, to be served as historical evidence in future studies. This advantage counts also for the improvement of the current situations of cities. Urban designers, real estate investors, architects can search particular visual information about an area, building or built environment.

An apparent disadvantage of this tool is the problem of privacy. Many people is uncomfortable with the fact that the tool contains pictures from real life, thus all the private information can be found online worldwide. Google is investigating this problem thoroughly, and is blurring the vehicles and individuals on the images.

3.2.3.5 Mobile technologies

The use of digital or interactive maps in mobile technologies has progressed during the last years, thanks to the increase in the use of smartphones and GPS devices. According to Lee (2008) “among the technological devices, the mobile phone may be the one that has the most significant effects on our everyday lives. As a result of its development as 1G, 2G and 3G multimedia, the mobile phone produces new kinds of mediascapes and bodyscapes in the so-called information city and network society” (Figure 3.9).

The use of mobile phones increased the will to be informed anytime and anywhere, using several types of locative media. One attracting example of this fact is the vast use of MMS. Its use and purpose is resembling to geo-tagging, however, is not always related to a specific place. The use of MMS reflected the need to be tagged in a place.

Figure 3.9: Mobile phone with map services, [Url 9].

The geographic placement issue and the use of mobile devices are closely bonded now. Not only mobile phones or gadgets that can be connected to internet, but also GPS devices, notably navigators (Figure 3.10), are important in the development of this process. These gadgets, particularly interesting to use in automobiles, are helpers for today's drivers' wayfinding.

Figure 3.10: GPS Navigation device, [Url 10].

3.2.3.6 Augmented reality (AR)

"The so-called "enriched" or "augmented reality" is a relatively new form of the human-computer interaction (HCI). Augmented reality generally refers to a real-time overlapping of human sensations with computer-generated models. An AR system can accordingly overlap and render visual, acoustic, and haptic information in real-time" (Höhl, 2008).

Bertol (1997) expresses the augmented reality user's perception process with the following:

> "AR merges the virtual reality world with the real, actual environment; the participant can see the actual surrounding environment combined with the computer-generated imagery. Instead of creating representations whose perception replaces that of the real world, an augmented reality application complements the real world perception with information not ordinarily discernible by human senses. The actual and the virtual world coexist in the participant's perceptions as a tool to improve the participant's understanding of his environment".

Höhl (2008) quotes Azuma describing three characteristic features of an Augmented Reality system:

- "Combination of actual and virtual reality"
- "Interactivity and real time capacity"
- "Registration in three dimensions"

Höhl(2008) also states that the purpose of augmented reality is the integration and the merge of actual and virtual reality, whereas virtual reality (VR) only simulates reality. Accordingly, an augmented reality simulation can be called a hybrid visualisation.

Before the advanced technologies of augmented reality, shape recognition was made via QR codes, abbreviated from quick response codes, where the principle is to recognize the texture of the QR code, and with the required application installed on the phone, and to request the server for what this tag carries as information (Figure 3.11).

Figure 3.11: Smartphone taking a snapshot from QR code, [Url-11].

The applications of augmented reality are diverse. They may differ according to their use and purpose. Some kinds recognize and use text, shapes and colours, like Google's Goggles for example, it is possible to let the system recognize books, logos, artwork, landmarks and even wine labels. Some augmented reality applications, notably Layar as the head of the market, can also recognize the geographical standing via GPS, making it a Location Based Service (LBS), and place text and photos onto the view on the camera of the smartphone.

Other augmented reality applications offer various kinds of information found in layers onto the base camera view. Yelp's Monocle, Urbanspoon and Wikitude are among these kinds of augmented reality based applications. Urbanspoon shows the restaurants, clubs and their offers when looked towards that side with a camera (Figure 3.12).

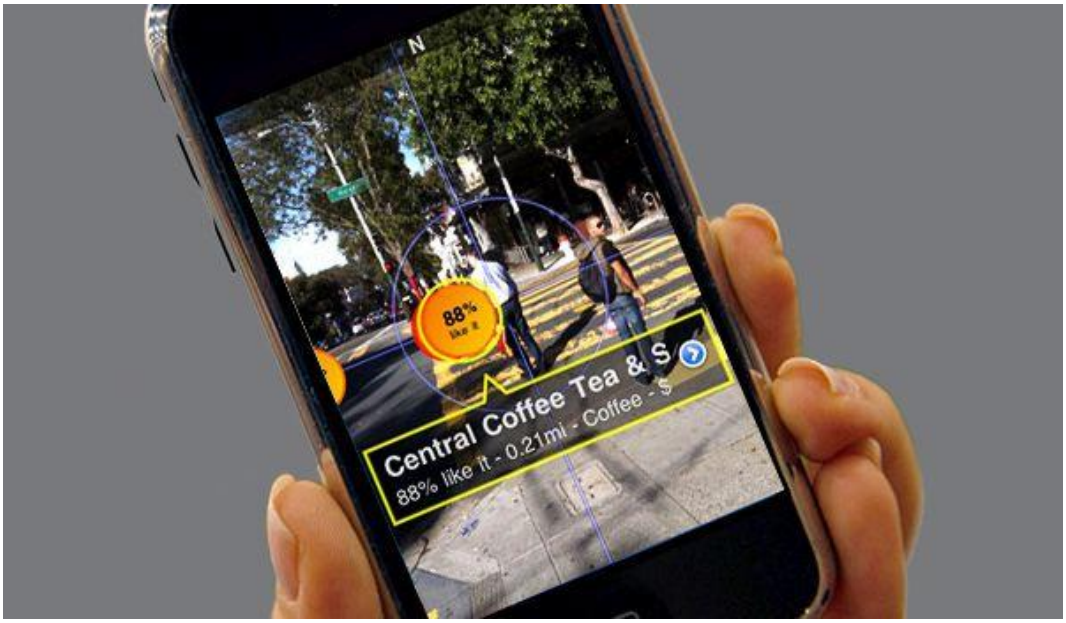


Figure 3.12: Urbanspoon Augmented Reality Application, [Url-12].

Layar Augmented Reality technologies have studied on new information tagging applications very recently, notably on Stiktu, the new application launched on the 20 December 2011, that permits to share tags all around the world, publishing content after scanning visual data from any specific object. There are also Layar approved designing and publishing tools, such as Poiz and BuildAR that are playing a role in the making, positioning and publishing augmented reality content anywhere onto the world.

3.2.4 Levels of the urban representation

Besides the tools that have an important role in representing the urban, the way that the information is transmitted is an important fact. Information can be transmitted in a variety of ways, concerning the urban representation. There are obviously some specific methods that are commonly used in interactive guides as well as global map databases.

One of these methods distributing and sharing the information in different layers on a same ground. Layers of information are useful in order to percieve data through filters on a same map. In the example shown below, different kinds of information are visualised in distinct layers (Figure 3.13).

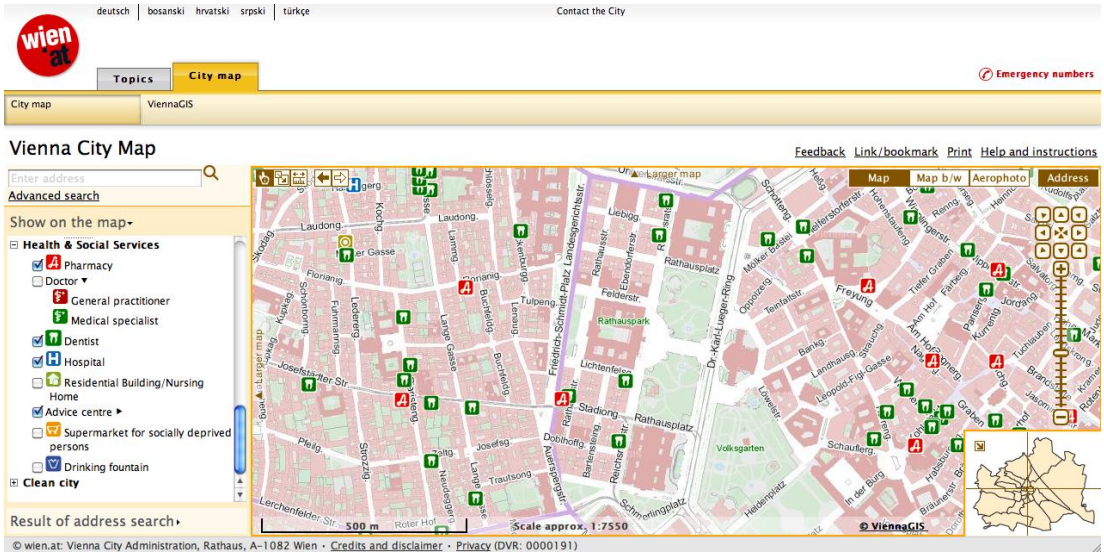


Figure 3.13: "Wien.at" an example city guide with layered information, [Url-13].

As shown in the image, this type of maps offers opportunities to show or hide information through selected kinds of data. Relevant information is shown when it is selected, thus the information panel serves as a filter that shows or hides information according to the selection of user.

There are also some filters that enable users to manipulate the selection of information. However, the visualization of the information in different layers can be done in different ways. It is beneficial to enhance the variety of colors, icons and shapes in order to provide a better perception of the interactive guide. Some data on interactive maps cannot easily be distinguished because of the lack in the diversity of shapes and colors that could be used.

Icons that are used on the interactive maps are also giving a better and a more brief explanation about the type of information on the maps.

Giving access to various kinds of sources such as 3D buildings and street view are also important steps in visualizing information.

3.2.5 Architectural representation in an urban context

Architectural representation in an urban context became an important challenge for architects as well as urbanists. This can be done in several ways, such as the diagrammatization of architectural elements, or 3D modeling of architecture into maps, applications of augmented reality and visualization of the building interiors as a part of street view technology.

Diagrammatic explanation of architectural elements in an urban context is the most known way of representing the architecture of an urban environment. Architects also prefer to make diagrams to explain their architectural and urban projects properly. Diagrams help people to understand the relations of the architectural property with the sourrounding as well as its interior relations. Some diagrams aim to be perceived by people who have an architectural background but others aim to be understood and perceived by everyone.

Nowadays, technological advances affect the architectural representation forms. Digital representations of the real world is a huge step for the perception of architecture, however it may also damage the perception of the real world as it is. Street View from Google enhances the architectural representation of the world giving access to some buildings' interiors such as art museums (Figure 3.14).

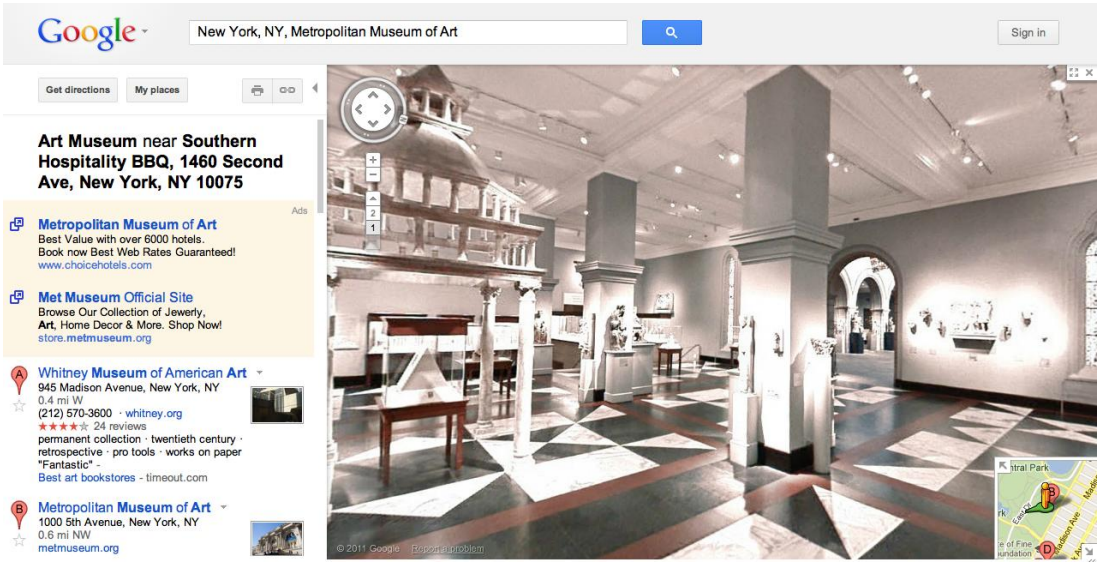


Figure 3.14: Interior view from New York Metropolitan Museum of Art, [Url-7].

Augmented reality applications, which are developing rapidly and becoming new ways of representing digital information onto a camera view, are also very effective in representing architecture in an urban context. Here, an example of the best architectural representation ever done with augmented reality could be seen, which is a visualization of an unfinished building within the UAR project (Figure 3.15).

Figure 3.15: Future projection in UAR, [Url-14].

3.3 Urban Representation Technology Matters

Although some thinkers of mapping and cartography think that technological advances and computers have only a role in the representation of urban environment as a tool, there are contrary viewpoints supporting the effects of technologies in the changing lifestyle.

Arnaud (2008) states that the informational tools are only a new way to handle data, and faster from previous machines which necessitated technicians to manipulate. However, it is impossible to use these tools without having the elementary knowledge of cartography, so he adds that informational tools create risks in case of being in the wrong hands.

Another aspect of the urban visualisation technology is an optimistic point of view. It is claimed in the article "Yes, that'a a nice urban data visualisation, so what?" that ownership is an important notion in urban experience today. They assert "For us 'ownership' is about bringing about a sense of engagement with urban life and providing citizens with opportunities to (collaboratively) act", and they ask "How we can design or employ digital media in such a way that they may contribute to such a sense of 'ownership'. Therefore, "ownership" is an important concept for the awareness of people who want to exhange their views and experiences through urban representation and visualisation technologies. The mobile applications for urban daily life may also contribute to urban responsibility in many ways.

The urban representations in the form of interactive city guides ensure the information flow and the visual interpretation of the urban environment. The information flow is also a major concept especially for cities where the importance of exchanging information very rapidly increases.

3.4 Current Issues about Interactive City Guides

Information flow in cities becomes one of the most crucial impacts of our days. The city as an "information pool" needs to be filtered to make a reasonable representation of the city, to make it perceivable and to ensure the visual continuity of the urban environment. The purpose of representing a city by maps and other technologies is not to put everything down without analyzing the efficiency of the given information or the method. To deduct the design principles of an efficient interactive city guide, the purposes, the possible descriptions and the state of art about interactive city guides will be studied in this chapter. The results of this work will give the possibility to discover in what extent the current guides are insufficient, and how they can be ameliorated.

Explaining the term "Interactive city guide" can be very difficult, since the term has various meanings in different contexts. Thus, a certain viewpoint will be adopted to describe the basic components and characteristics of an "interactive city guide". To this end, the possible answers will be given to the following questions:

- What is an interactive city guide?
- Why it is needed?
- What is the role of architects and urban planners in the making of the interactive city guide?

To describe the meaning of an "interactive city guide", analysing the words that constitute the term will be the first step. The notion "interactive" reminds an interface that can be manipulated by the user.

Nowadays, new conditions of city life gave rise to many new behaviours and habits in humans. For instance, they don't have to memorize phone numbers, or any other important information that they can find on the Internet anywhere and anytime. The same process is valid for the mobile maps and way finding systems. Therefore,

people don’t have to memorize maps anymore, because they can easily be oriented with the aid of mobile maps. Even if they don’t have mobile maps, they can easily reach any map on the Internet, and even personalise a map that they can later make use of. It is clear that interactive maps and guides have an important role in our daily life.

The essential problem arising here consists of understanding the need of an interactive guide devoted to a single city. Global map providers have a wider database and give easier access to that data. They are also more reachable and customizable. However, inside the global maps, it is not always possible to make a real representation of the city, providing more detailed data, peculiar to the city. Therefore, a more detailed map and a guide with special aspects of the city are needed. This is how the need for “Interactive City Guides” can be explained.

Mobile guides are also undeniably useful for the perception of the surrounding in real time. The mobile guides have the capacity to locate where is the person standing, with GPS services. With mobile guides, it is also possible to explore the environment with Augmented Reality technologies.

The third serious discussion is the importance of the role of architects and urban planners in the design of “interactive city maps”. The role of architects and urban planners certainly has a great importance in the representation of characteristic monuments or buildings of a city, or transport networks. The city maps used only in way finding, or in order to find some data on a specific background, such as “up-to-the-minute traffic conditions map” or “open pharmacy map”, might not be the principal concern of the architects and urban planners. Instead, they are interested with the representation of what constitutes the image of the city.

The first step is to analyze where stands the term “interactive city guide” into the realm of urban representation. “Interactive City Guide” is, as previously stated, an ubiquitous guide for public use, representing the urban context and the architecture of a city, by means of technological tools.

Here, obviously, the need for interactive maps/guides for single cities is to be questioned. Why do people need specific “city” guides, instead of using global guides such as MapQuest, Google Maps?

There are several reasons that justify the need of a single city guide. These reasons could be discovered along examining the types of interactive city maps on Internet. First of all, global guides cannot provide some information about cities for its inhabitants. Of course, people can load information, add locative media concerning their surroundings, however sometimes there is need for some information that even citizens do not know. As an example, digital maps/guides prepared by city municipalities contain a lot of information about cadastral plans and parcelling, that usually require a GIS based interactive city map.

There are also some important touristic city guides, which include several kinds of visual and verbal information about a city. Municipalities or individuals as well as tourism companies can provide touristic guides on Internet. This type is important because the providers can easily control the content of the information. A third type is the specialized city guide. This type includes practical information about a specialized subject concerning the city, such as the transportation. The diagram below illustrates the types of interactive city guides and mobile city guides in an overall context (Figure 3.16).

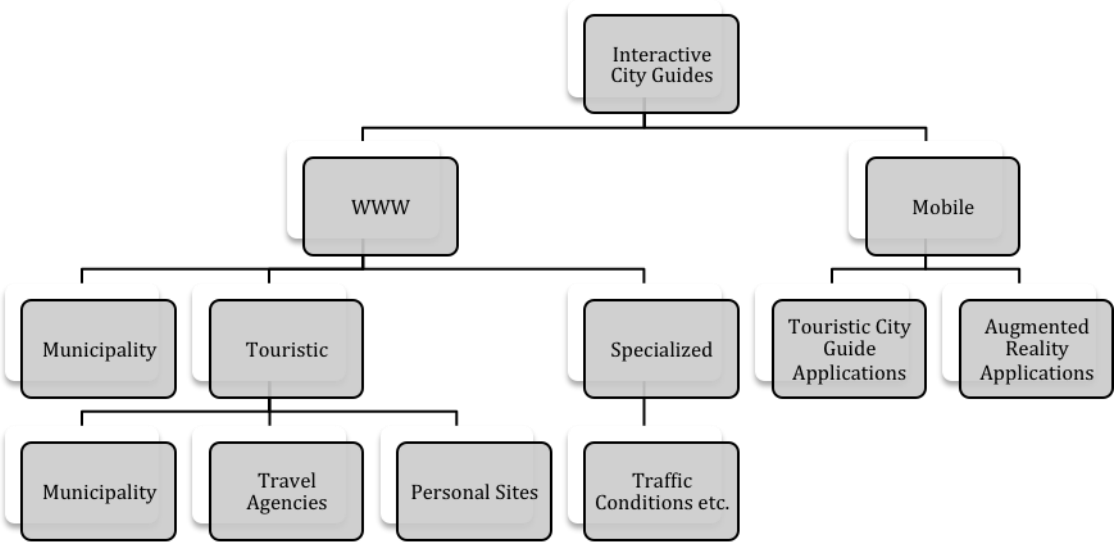


Figure 3.16: Interactive City Guides Types.

3.4.1 Interactive city guides through WWW

The first type of interactive city guides is the one published on the Internet. There are three different contexts of the Internet based ICGs: The GIS based municipality guides, official touristic ICGs by the government, and specialized ICGs, concentrated on only one aspect of the city such as traffic conditions.

3.4.1.1 Municipality guides: the example of wien.at

The interactive city guide (ICG) of Vienna, published on the site www.wien.at [Url-13] by the city government has many features that are not included in equivalent city guides. This map is superior to other municipality maps included in the research that has been conducted through the major metropolitan cities in Europe, because of the diversity of the content it offers and also for its interface design.

The content of this site is integrated with the map, and information can be perceived by layers onto the same map. There are several types data, which has been clearly classified under the titles: traffic and transport, art and leisure, public facility, education, health and social services and clean city. Under these headings, there are more than a 50 type of information, including city walks, museums, bicycle stands, universities and even Christmas market, without forgetting handicapped people with traffic lights with acoustic signals and parking places for handicapped people.

The interface design of this interactive city guide is also successful, because of the several layers that can be viewed one onto the other (Figure 3.17). This way, if a person can perceive very easily different types of information on the same base. The GIS based map is provided from ViennaGIS corporation and has the same features that a global digital map: Zooming, map, aerial photos, measure and scale components.

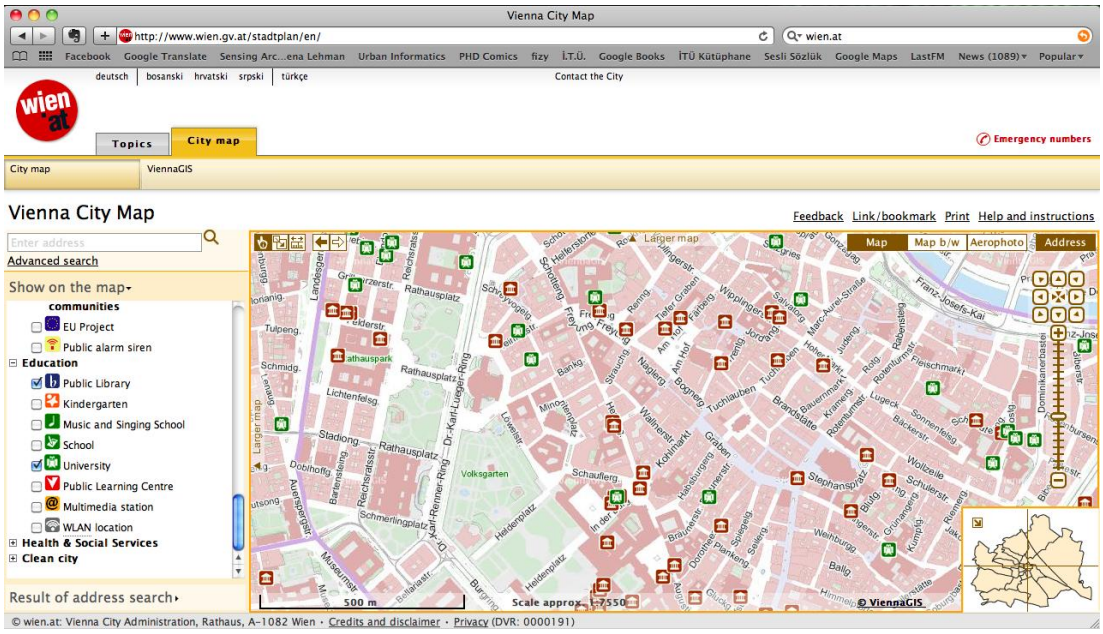


Figure 3.17: Layered information on wien.at: Vienna ICG, [Url 13].

3.4.1.2 Touristic city guide by municipality: Venice Connected

Venice Connected [Url-15] is a touristic city guide provided by the official tourism portal of Venice. This interactive city guide is special and different from other equivalent city guides and maps because it contains its own street view and 360 degrees of perception at all points with a superior quality. There are also records along the canals shot on gondolas (Figure 3.18). These particularities make this guide very special.

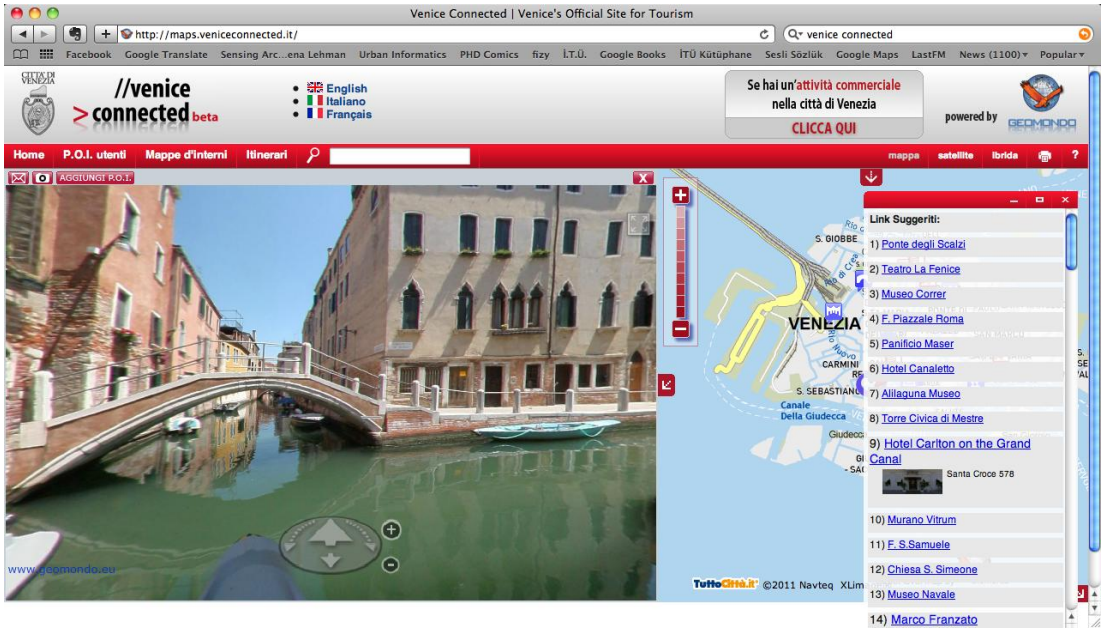


Figure 3.18: Venice Connected: Record from gondola, [Url-15].

Touristic digital maps are usually more focused on the perception of architecture and urban environment. This interactive city guide brings a new understanding of representation of urban elements. It illustrates the interior of the most known buildings in Venice such as Ca'Rezzonico, Ca'Pesaro or Palazzo Ducale. The figure below shows an visual of the interior recordings of Ca'Rezzonico (Figure 3.19). The navigation in the interior of the buildings comprises all floors and outdoors.

Figure 3.19: Ca'Rezzonico interior views in Venice Connected, [Url-15].

3.4.1.3 Specialized city guide: Bruxelles mobilité

This type of interactive city guides includes specialized information about a need. For this example it concerns the transportation and mobility all around the city. The city of Brussels provides this guide in order to give information about several types of transportation that is offered by the city government as well as new road constructions and obstacles, real-time traffic and cameras. The interface is very practical as it can manage to view all layers on only one base (Figure 3.20).

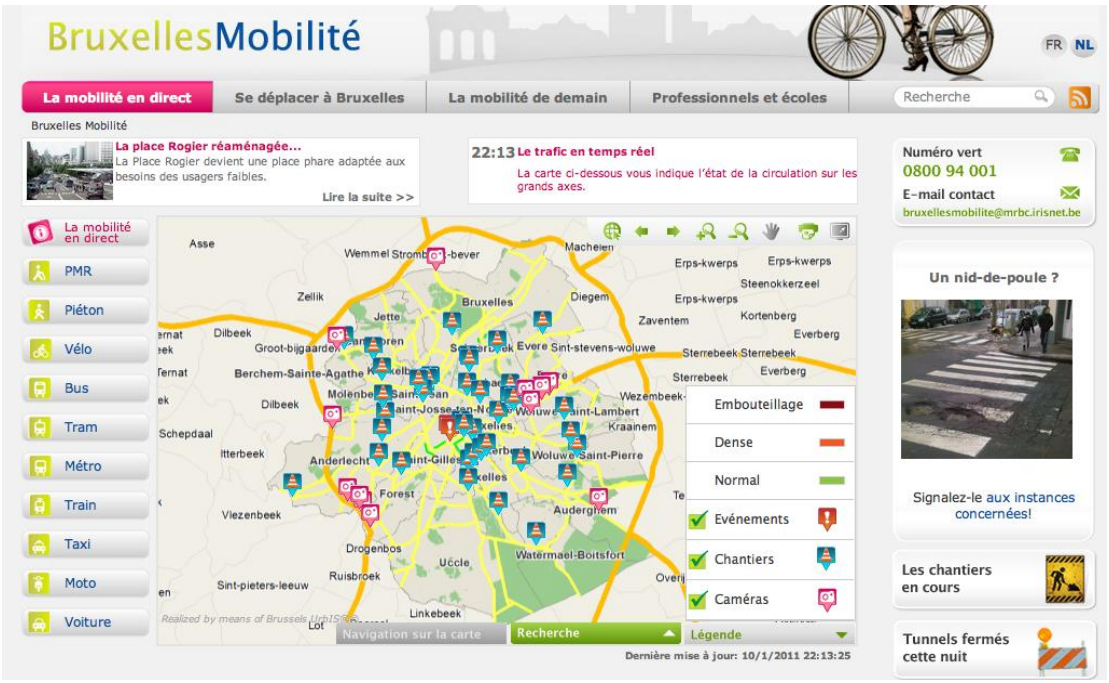


Figure 3.20: Brussels mobility: ICG of urban transportation, [Url-16].

The interactive city guides of these types are diverse and increasing more and more in amount. It is crucial to know that the examples indicated above are not the only guides of their types but only better examples than others in order to illustrate the situation of interactive city guides published on Internet. 20 European cities have been included in the research to choose theses interactive city guides.

3.4.2 Interactive city guides and applications on mobile devices

Guides on mobile devices provide information on the go, so that people do not have to memorize the data. This is very practical for visiting a city because the information is carried in the mobile phone of the user, so it is very reachable; however it forces people to have a suitable smart phone.

3.4.2.1 City map and guide on mobile: I Amsterdam

"I Amsterdam" is among the most developed city guides available on smartphones. The content and the interface are similar to the WWW version, simple and easy to use. It mainly gives information about the kinds of functions that are found in the city, especially attractive to tourists. These places are tagged onto the map and the linked content can be visualized as seen in the first picture (Figure 3.21).

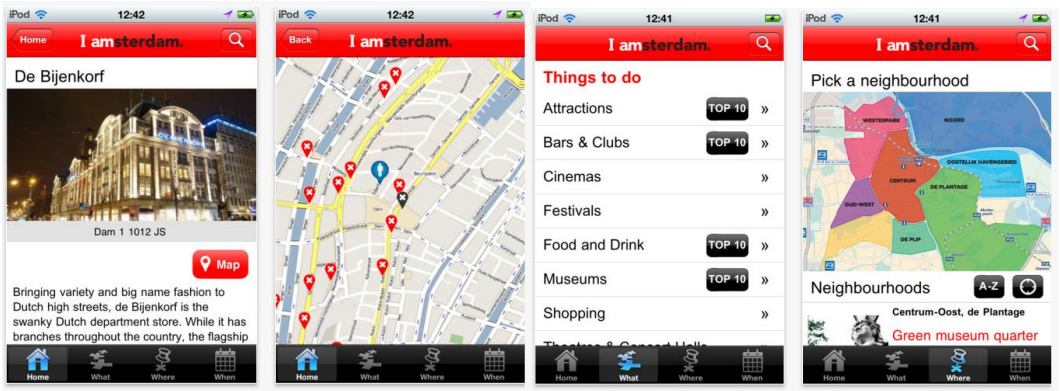


Figure 3.21: I amsterdam mobile city guide, [Url-17].

3.4.2.2 Augmented reality application on city architecture: UAR

Augmented reality is among the new and popular ways of sharing 2D and 3D virtual content on real world. This system is used in many fields as previously stated but the most interesting application in the world of urbanism and architecture, is UAR: Urban Augmented Reality.

This application is a product of NAI, Netherlands Institute of Architecture, which aims to place 3D architectural models onto the camera view of the real world. NAI indicates the following in the website:

> "UAR, the NAI mobile architecture application, provides information about the built environment on the basis of text, image, archival material and film on an iPhone or Google Android (and on Nokia phones at a later stage). By means of advanced 3D models, right in the middle of the city UAR shows you on your phone what isn't there. The city as it once was – for instance by showing buildings that once stood there. The city as it might have been – by showing scale models and design drawings of alternative designs that were never implemented. And the city of the future – by showing artist's impressions of buildings under construction or in the planning stage" [Url-14]

Figure 3.22: UAR Screenshots, [Url-14].

3.5 Results

The technological advances in the field of mapping and cartography has changed the way that the urban environment is represented. Nowadays, there are new ways to illustrate the world, as well as urban places, using different kinds of tools that are susceptible to increase the potential of visual perception of the users. The urban representation and visualization is crucial for these reasons as well as for the awareness of people to participate into urban environment, as these tools permit the contribution of people. The three important technological advances that will be extensively used in the proposal are: mobile interactive city guides with layered information, geo-tagging and augmented reality.

4. A CASE STUDY FOR REPRESENTING THE URBAN IMAGE OF GALATA

Galata is known as one of the most interesting neighborhoods in Istanbul, reflecting the best cosmopolite nature of the city. Therefore, Galata is chosen as the case study of the technological representation of the urban image and visual continuity. To understand the historical and the cultural context of the area, first the historical and the cultural background will be studied. Then, the representations of the area will be analyzed chronologically. The urban image, imageability, the visual continuity and context of the region will be analyzed according to the studies made in the second chapter. Then, a proposal will be made in relation to the works that have been explained in the third chapter.

4.1 Historical and Cultural Background of Galata

Freely (2000) indicates that "The historic origins of Galata are as remote as those of Byzantium itself. From very early times there had been settlements along the northern shore of the Golden Horn, known in Greek as Chryso Keras. Byzes the Megarian –the eponymous founder of Byzantium (ca. 660 B.C.) –supposedly erected a temple on the north shore of the Golden Horn and dedicated it to the deified hero Amphiaraus". Freely also underlines the past of the region of Galata, named as Sykai:

> "The most important of the ancient settlements on the north side of the Golden Horn was known as Sykai; "the Fig Trees". Sykai occupied the area along the shore between the two brigdes, extending from there to the heights above. Subsequently the settlement spread out to the confluence of the Golden Horn and the Bosphorus. During the reign of Theodosius II (r. 408-50) Sykai was made the thirdteenth regio or ward of Constantinople. (...) Around 447, Sykai had 431 houses with a church, a forum, public baths, a theater, a harbor, and was surrounded by a defense wall.(...) The town continued to be known as Sykai up until the seventh century, when it came to be called Galata, a name of a uncertain origin" (Freely, 2000).

In the Byzantine period, Galata was a trade colony belonging to Genoese people. That's why this region has always been home for non-muslim traders. The density of

the non-muslim people altered in different periods, however with the rights that had been given to non muslim during the reforms (Tanzimat), the area occupied by the non-muslim Ottomans expanded (Öncel, 2010).

Galata was one of the places that best reflects the cosmopolitan atmosphere of Istanbul in history. The places where people used to live were mainly the historical peninsula where muslims lived in general, and Galata and Golden Horn region where non-muslims lived. Before 16th century, Pera, as the extension of Galata, was a deserted area except some little muslim communities gathered around buildings such as Mevlevihane, Şahkulu Mescidi, Asmalı Mescit and Aga Mosque. Beginning from 16th century, the inauguration of European embassies in Pera played an important role in the transformation of the area (Akın, 1998).

Until the end of the 18th century, Galata remained inside the ramparts. Beginning from 18th century, non-muslims communities densified around the embassies. In this period, Galata and Pera were considered as the regions of Istanbul where non-muslim minorities, as owners of most of the "han"s in the region, created a finance and trade bourgoisie, with the contribution of countries such as England and France. Galata and Pera regions are also famous with the abundance of educational institutions in the area, especially teaching French language. There are also reading lounges in the area, and some non-muslim newspapers are printed and distributed in the area (Akın, 1998).

The data about the physical environment of Galata region at the beginning of the 19th century shows that built environment did not go beyond the walls, and that Pera was developed mostly in the 19th century. As non-muslim people had restricted rights to build, the region did not spread. By the end of the 19th century, these dual rights were abandoned by the government. The most damaging incident was the Great Fire of Pera in 1870, which devastated the area and downgraded the construction works (Akın,1998).

The monumental building types in Galata are also affected by the resemblance to the buildings of the European architecture. In addition to religious buildings such as churches, synagogues and mosques, municipality buildings, theatre, restaurants, cafés, music cafés, tavernes, passageways, and residential buildings out of the ordinary were constructed for the first time in Istanbul, in the region of Galata (Akın,1998).

The 19th century also gave rise to the foundation of a municipality for the Galata, Pera and Tophane regions, named "Altıncı Daire" municipality founded in 1857. This establishment followed the model of European municipalities, being the first foundation in Galata that made decisions about the building and road constructions, parcelation and renovation of the surroundings (Öncel, 2010).

Today, Galata hosts mostly art galleries and temporary art events, some banks and commercial centers, as well as many important landmarks that still exist in that area. There are also buildings that are repaired and restorated, as well as deteriorated areas. This phenomenon can be defined as "gentrification". According to Yücel (2008), the dictionary definition of gentrification "is a term applied to the displacement of the old residents of old and physically deteriorated neighborhoods where the property prices are low by more wealthy new residents due to an increase in property prices brought on by the physical renovation of the neighborhood. This phenomenon can be exemplified in İstanbul in neighborhoods like Cihangir, Galata, Haliç and Balat".

The gentrification process has both positive and negative effects to the area. There are many art galleries, fashion designer ateliers and shops, art events and formations. There are also some buildings that are restorated to this aim. As an example, Ottoman Bank Museum has been repaired and redesigned as Salt Galata.

Also, some studies on the future projections are done related to the urban development in Galata, for example the space syntax project and walkability anaysis along the İstiklal Avenue axis to Tünel Square then to Galata and Karaköy Squares. This study is prepared by Ayşe Sema Kubat and Özlem Özer.

4.2 Representations of Galata

The representations of Galata regions are in different forms such as drawings, plans, maps, paintings or photos. First of all, we will mention the paintings from 15th century. In 19th century, an important development for Galata was the intention to draw plans to design and represent the urban environment. In this part of the work we will analyze different maps chronologically. The maps that will be mentioned are Kauffer Plan, Moltke Plan, 1860 Parcelation Plans, Schneider and Nomidis Plans.

- 15th century: Galata drawing by Matrakçı Nasuh (Figure 4.1)

Figure 4.1: Galata drawing by Matrakçı Nasuh, in 15th century.

- 1820: First plans of Istanbul

- 1822: Kauffer Plan (Figure 4.2)

Figure 4.2: Kauffer plan.

- 1837: Moltke Plan (Figure 4.3)

Figure 4.3: Moltke Plan.

- 1860: Galata, Pera, Pangaltı parceling plans (Figure 4.4)

Figure 4.4: 1860 Parcelation Plans.

- 1864: Cadastral Plans
- 1865-67: Engineer Leval Map
- 1880: Stolpe Map
- 1895: R.Huber Map
- 1905: Goad Map

Figure 4.5: Goad Map.

- 1928-32: J. Pervititch Map
- 1944: Nomidis and Schneider Map (Figure 4.6)

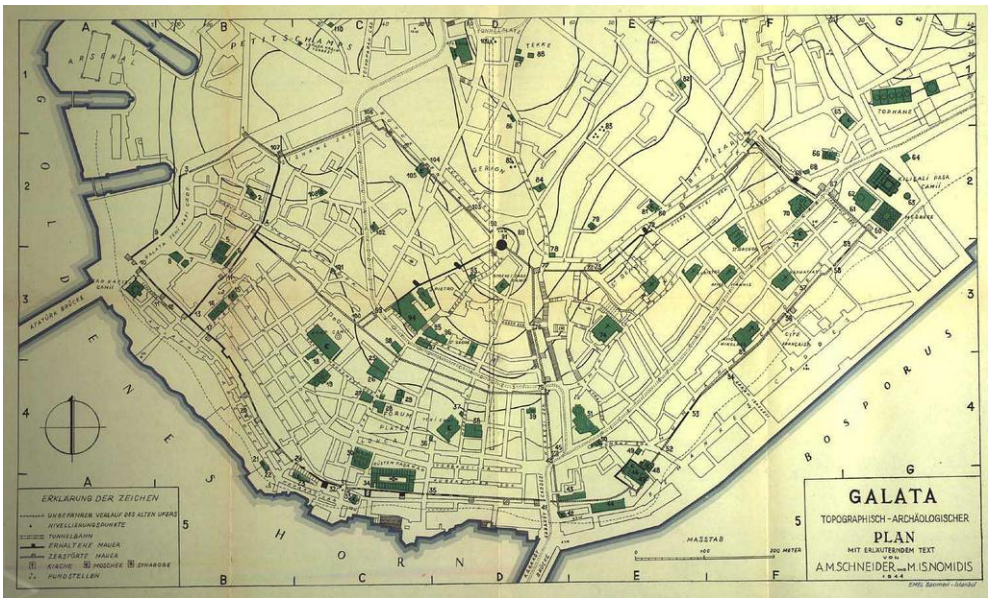


Figure 4.6: Schneider and Nomidis Plans.

Currently, there are other maps and representations of Galata, notably the Galata Culture Map by Ottoman Bank Publications, which gives detailed information about the landmarks of the region. It is a very useful map as well as for tourists and architects who want to explore Galata (Figure 4.7).

Figure 4.7: Galata Culture Map, Ottoman Bank Publications.

There are also guides published on paper, like Galata Map, which informs the region inhabitants and Istanbulites about the events that will take place in the following month. The illustration below is from a exhibition in SALT Art Center in Beyoğlu, that shows the modern representation of the Galata region (Figure 4.8).

Figure 4.8: Galata map-model, in Salt Beyoğlu.

4.3 Urban Image Analysis and Visual Continuity of Galata

Galata is today one of the foremost neighborhoods in Istanbul which protects its cosmopolite integrity. It has been the host of several art stores, galleries and events for the last ten years, in addition to being a favorable place to settle for industrial and fashion designers. The changing face of the old Galata permeates new settlements and functions that are articulated near old ones, creates junctions and in-between places. The most important feature of Galata is this hybrid formation that still evoluate and emerge in this area.

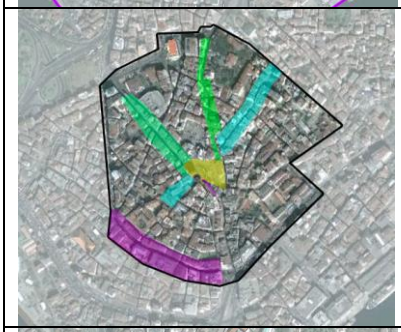
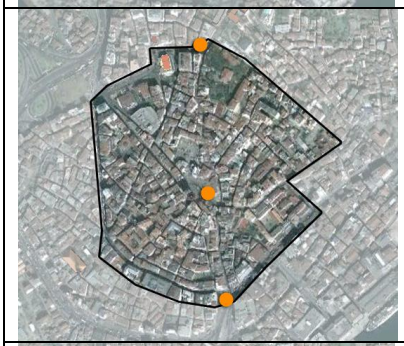
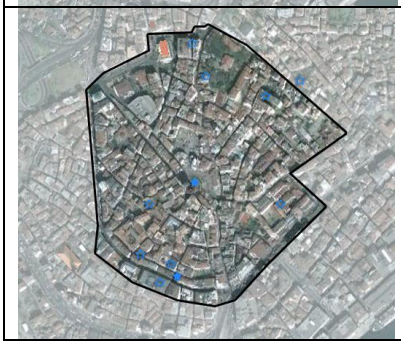
For improving the visual perception of this neighborhood, first of all, we will try to use the image analysis of Kevin Lynch (Figure 4.9), to analyze the paths, nodes, districts, edges and landmarks, which permits an overall evaluation of the urban

environment. Then, we will try to understand where stands Galata in the urban context today and whether it constitutes a coherent environment. Finally, we will evaluate the visual continuity of the area, according to de Certeau's and Norberg-Schulz's views.

Figure 4.9: Urban Image Analysis for Galata.

Lynch's (1960) method for the urban image analysis is constituted from five elements: paths, nodes, districts, edges and landmarks. These elements can be whether of primary or secondary importance. The paths constitute the main roads, walkways or transportation itineraries. The nodes are places that one or more paths overlap, and that are characterized by this overlapping. The districts are regions that are characterized by a common property that separates these places from their surroundings. The edges are the elements causing interruption or difference, such as walls, gates or shores. Finally, landmarks are special urban elements that possess particular importance, and which are identifiable as a result of a scale difference. The table shows the study in detail and gives information according to the five elements (Table 4.1).

Table 4.1: Image Analysis of Galata according to the Five Elements.

	PATHS Yüksekkaldırım Street, Büyük Hendek Street and Bankalar Avenue are the most significant paths in Galata. There are also other streets which links the tower to the surroundings, that are also used, but not as crowded as the mentioned ones. =as part of ROUTE mode in the ICG
	EDGES The edges in Galata are not very well defined because the most significant elements that can be named as edges were the walls which are now all destructed. Some walls near the Galata tower and also the shore that can be seen as edges in the area. =as part of ROUTE mode in the ICG
	DISTRICTS Districts in the area are very related to the streets and paths because the function of the buildings are usually the same along the street. Musical instrument shops, electrical equipment shops and fashion designers ateliers are the functions which form different districts in the area. =as part of ROUTE mode in the ICG
	NODES The main node points are the squares along the north south axis. The Tünel square, the Galata Tower square and Karaköy Square. =as part of MAP mode in the ICG
	LANDMARKS The most important landmarks are Galata Tower and the Camondo Stairs. The other landmarks are Mevlevihane, Salt Galata, Bereket Han(Palazzo del Comune), Beyoğlu Hospital, Doğan Apartment, St. Benoit Highschool, Sankt Georg Highschool, Kırım Anglican Church. =as part of MAP mode in the ICG

However, the five elements of image analysis does not include insights about the everyday experience of the environment and is based on personal ideas. The urban daily experience could also be investigated as “walker” or “voyeur” in Galata. As a walker we may experience Galata from all the streets and the squares around, at the street level. We may want to choose special routes to experience the region from different viewpoints. That is what we are going to try in the route mode of the ICG. Also, the perception of historical or future visions of the environment are crucial in the visual continuity of the region.

As a voyeur, the best way to percieve the region is from the top of “Galata Tower”. Here, we may visually experience all the Galata region as well as its context in the city. Obviously, the context of Galata makes it richer. The historical context enriches the region but it’s also the main reason that brings the problems of gentrification process. The physical context is still problematic however because it does not offer an effective environment in terms of walkability.

The region cannot be evaluated as “coherent” because so many buildings and renovations have been made that it is nearly impossible today that a coherent environment in terms of historical and cultural integrity could arise.

4.4 Galata Interactive City Guide and Augmented Reality Proposal

The “Galata Interactive City Guide and Augmented Reality” proposal will be a hybrid design that will include both an interactive city guide designed departing from the urban image analysis previously done, and an augmented reality proposal which will be based on the visual continuity concept.

4.4.1 Interrelations with the theoretical background

The proposal is interrelated with the theoretical background in many ways. It is the urban image of the neighborhood that is represented using the method of Kevin Lynch. The interactive city guide content is specified with the aid of the urban image study. The landmarks and the nodes represent spaces that became places in people’s minds. Districts and edges also signify the urban image of the region, and although they are not directly represented in the interactive city guide, they play an important role with the paths, in the creation of the routes.

The visual continuity concern is more clearly exemplified. For example, in de Certeau's view, experiencing the city at the ground level is more interesting and efficient than looking to a city from above. The daily experience and being between the walls and discovering give more insights about the overall aspect and the essence of a city. Therefore, the visual continuity and the daily experience is ensured by walking inside the city. To augment the urban daily experience, people may want to try different routes. With augmented reality technologies, they may augment the urban experience by seeing what was there before, or even what is not there yet.

4.4.2 The content

The content of the interactive city guide is provided by the ancient and current representations of the area. The places (landmarks and nodes) and the routes (paths, edges and districts) will be analyzed and shown onto the map with the suitable tag type. Then the routes will be traced according to the functions that will come together to form a path. As an example, the fashion route, the music route and the art route. Here, we will share the map prepared for the overall content of the interactive city guide (Figure 4.10). However, the detailed explanations of the buildings and the routes, as a reflection to the landmarks and the paths of Lynch, will be appearing on the Appendix A.1.

Figure 4.10: Galata interactive guide content maps: Places and routes.

4.4.3 ICG interface design

The system is composed by four different modes, relating to each other: Map mode, routes mode, AR mode, information mode. The application automatically runs with map mode.

- **Map Mode:** The map mode begins with locating the user automatically, using GPS systems. Then, the functions expressed with different colours and pictograms appear on the map. These buttons are clickable and when it is clicked, a name and definition appear on the upperleft of the clicked button. This label gives information about the chosen place. On the one side of this label, there are links to other information under three buttons: info button, AR button and route button. In case, there is available information about the place, or an AR representation, or any route relating to this place, the relating button appears on the side of the label. The map mode offers some of the content published in the ICG: landmarks and nodes according to Lynch's analysis.

Figure 4.11: Galata interactive city guide: Map mode.

- **Route Mode:** The route mode appears onto the map mode, and it adds some routes that are significant to the area. It shows the routes that has been previously studied in the content. When touched on any part of the route, it shows the roads and the places that are related to that particular route. This section shows the content for the paths, edges and districts in Lynch's analysis.

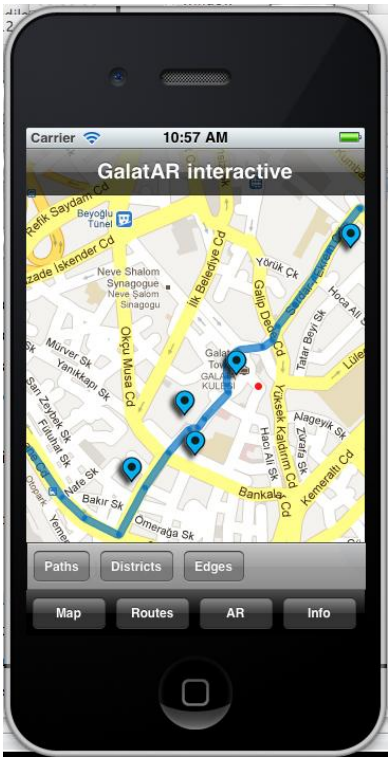


Figure 4.12: Galata interactive city guide: Route mode.

- **Augmented Reality Mode:** This mode can also appear in two ways, when clicked on the AR link on a particular place label, or directly shifting to AR mode using the toolbar at the buttom. AR mode informs the user about the identity of the 2D or 3D AR contents. The information includes the name, the date and the aim of the AR content. For example, The AR content is published for expressing a future projection of the place where the content is tagged. Like Layar, in the upperright part of the screen, the application informs the user if there is other AR content in the same or other directions in the surroundings.

Figure 4.13: Galata interactive city guide: AR mode.

Information Mode: The information mode provides alternatively, when directly clicked from the toolbar at the bottom, a list that includes all the places according to their functions and types. Available information is shown when clicked on appropriate place from the list. On the page, a title which signifies the chosen place, a photo and detailed information appears. The information mode also gives links to map view, AR view and route view of the particular place, if applicable.

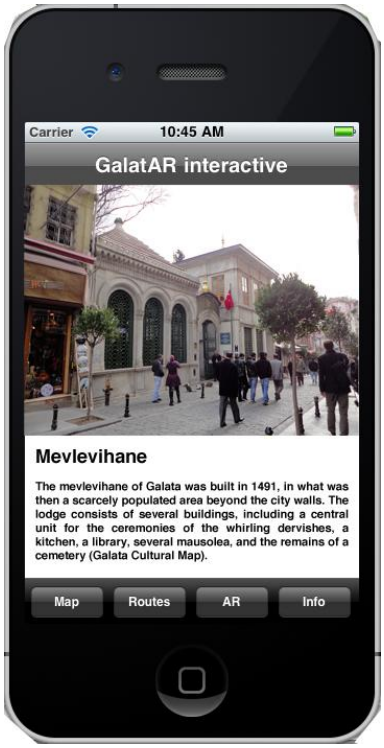


Figure 4.14: Galata interactive city guide: Information mode.

4.4.4 Augmented reality application

The augmented reality application is designed within the interface of the interactive guide, however the actual application that will be proposed here will be a single project, that aims to visualise the Palazzo del Comune as it was before. The project necessitates the use of a augmented reality viewer and publisher. The viewer will be Layar Augmented Reality, and the designing and publishing tool will be Poiz.

4.4.4.1 AR for "walkers"

Augmented reality application for "walkers" ("walker" as the term of de Certeau), aims to define a solution to the visual continuity, using technology, without changing the street physically. The aim is to find buildings and monuments, which have interesting historical backgrounds, and which changed once or more than once in history. In the scale of the street, a "walker" can discover these buildings during daily urban experience in Galata, however it is impossible for them to know and perceive how this building has changed and in which context it used to be. Therefore, it will be interesting to experience the superposition of the buildings during their lifetime. The application of this kind of research requires time and group work, thus the application of the work will be limited to one example. The augmented reality

application will be made about the exterior of Bereket Han (Figure 4.15), former Palazzo del Commune of Genoese Galata.

Figure 4.15: Bereket Han.

After the major fire that happened in 1315, Palazzo del Comune, also known as Palatium Comunis or Podestat, have been constructed in 1316 as the town hall of the Genoese Galata. The building was preserved even after the Genoese reign in Galata, until the 1880's without major changes (Eldem, 1999). In the 1850's, a drawing representing the current situation of Palazzo del Comune, known as Francini Han at this period, was inspired by Tecco's drawing (Figure 4.16).

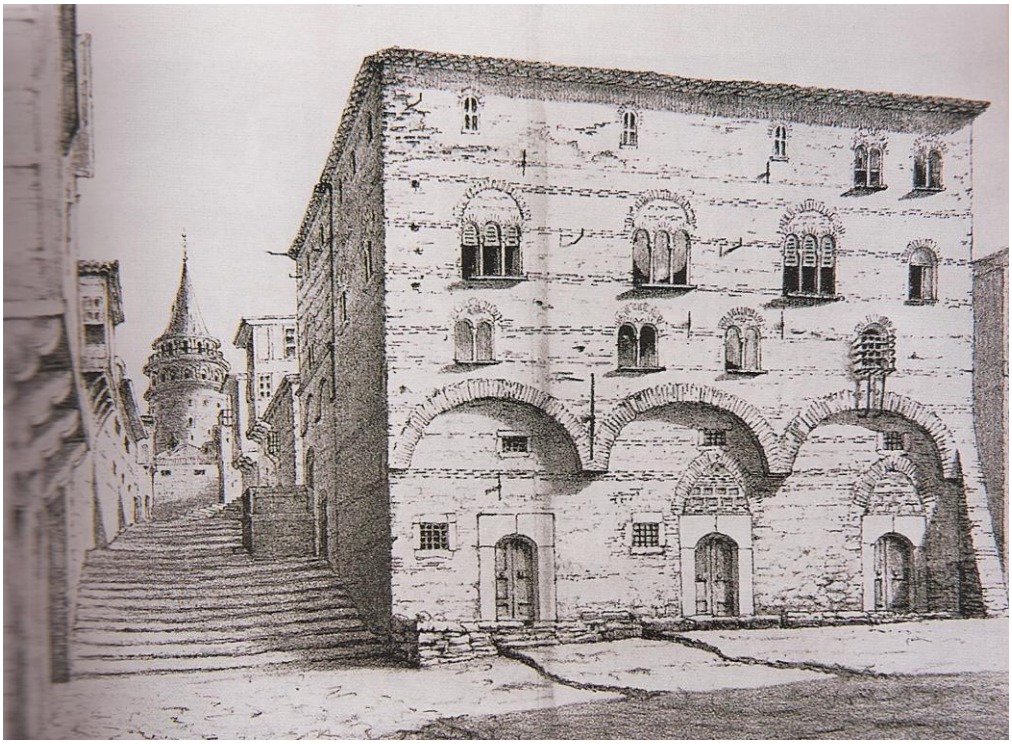


Figure 4.16: Palazzo del Comune (known as Francini Han) drawing in 1850's.

Approximately in the 1880's, when the tramway work has been done, the front façade of Francini Han changed to façade of Bereket Han, and still preserves its appearance today. The photo below shows Francini Han's appearance in 1870's, before the demolition of the former front façade (Figure 4.17).

Figure 4.17: Photo showing Francini Han in 1855.

After the demolition, Francini Han have been called Bereket Han with its new façade. There are still some elements on the left façade that did not change since Palazzo del Commune.

To make an augmented reality experience from this building which has an interesting historical background, Layar and Poiz will be used. Layar is an augmented reality publisher and viewer, Poiz is a design tool in which we are going to design the augmented reality content. The ancient version of the building is aimed to be shown, to create a new experience for the "walker" on the street level. The aimed visualisation is below (Figure 4.18).

Figure 4.18: Aimed AR visualisation.

To obtain this visualization, several AR publising tools could be published. However, one of the most effective tools that permit visualizing content without any programming knowledge is Poiz, a verified Layar content publisher. The tool Poiz begins with creating a layer where multiple POIs (points of interest) can be shared. To concentrate on only one POI, Palazzo del Comune has been chosen. First, the layer should be created, then the POIs, images should be loaded for the POIs, and location and viewpoints should be selected. Here is an example of the publishing

content using Poiz (Figure 4.19). A picture of the content appears on the tag, so when users are near the layer, they can experience the visualization of the AR.

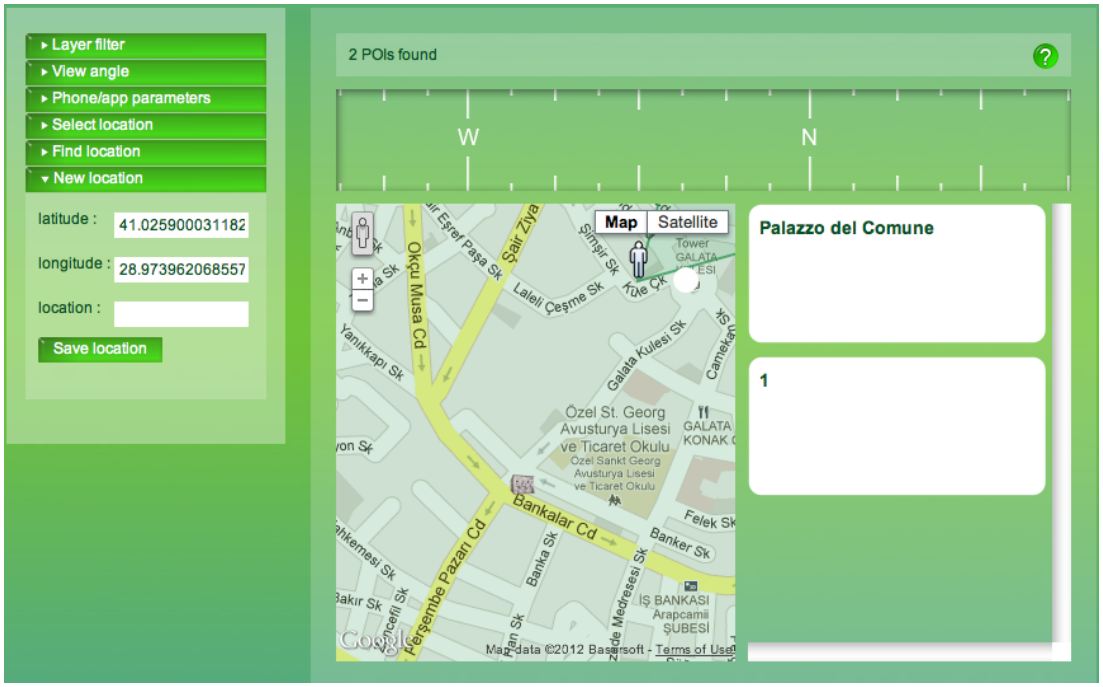


Figure 4.19: Poiz Application.

4.4.4.2 AR for "voyeurs"

The second example of augmented reality that is not going to be examined in details, could be perceived from a height just like the "voyeur" of de Certeau is practicing the city. The same equipment is useful for seeing the results, a smart phone and Layar Application but the publishing is not as simple as the previous because it necessitates more than one publishing. That's why this time, the content will not be published, but only be designed to see how it would look like with photo editing software (Figure 4.20).

Figure 4.20: Panorama view from Galata tower with AR proposition.

4.5 Results

This case study aimed to develop an interactive city guide design proposal in order to illustrate the urban image of today's changing city. The results of the work shows that an interactive city guide proposal could be enriched with other data such as augmented reality, and that the technological instruments could serve the designer as tools to represent the urban environment through many ways.

It is important to underline the process that is used to shape an effective interactive city guide and augmented reality application in Galata. The process required three major phases of work, the theoretical background of the urban research in the information age, the practical tools that are used in the representation of urban environment, and finally the context of the region Galata and the case study.

5. CONCLUSION AND RECOMMENDATIONS

The thesis aimed to study the architectural and the urban representation in the information age, from the hypothesis that new technologies may be effective in the representation of the urban image and the visual continuity. Galata, as the study region, satisfied the needs of a cosmopolite area, which is constituted by several architectural styles.

The base of the study was constructed on a three-phased research. The first phase aimed to make extended research on the information technology and urban life, as well as urban research and theoretical urban studies that were shaped with information age intellectuality. However the main part of the first phase was based on the possible contributions of the information and representation technologies on the urban image and visual continuity.

The second phase concentrated on the applications of the representation technologies on urban scale. Beginning from the definitions of map, mapping and cartography, the main changes that started with the arrival of the information technologies in the world of cartography have been studied. The main part of this phase was constructed by new technologies and ways to represent the urban environment for the use of the city practitioner. The Interactive City Guides and Augmented Reality technologies are among the prominent practices of representing the urban space.

The last, and the third phase were based on the application of this study, which was previously examined from a theoretical and practical point of view. The choice of Galata was very important in this case because it significantly fulfils the general ideas that were stated in the first phase. As for the applications of representation technologies, the choice of Galata has also been accurate because there have been so many features that could be included, such as routes in interactive city guides or augmented reality applications.

Now, the aims that have been reached may be discussed as well as unreached aims and inconveniences that have been encountered during the research. The aims that have been reached without problem were the applications of interactive city guide on Galata. The aims were to represent the urban image of the area, and to make an interface design that would meet the needs of people who want to explore the city. So, the main purpose was to offer ways for a better perception, with maps, routes, Augmented Reality content, and additional information. The lack for this part of the work was the programming of software as a mobile application, enabling people to understand the content and the conjecture of the region.

There are also some lacks in the application of the Augmented Reality. For AR for "walkers" the design tool for augmented reality content was at an early stage of development because these tools are newly being used. The most of these tools belong to the last three years, because before that Augmented Reality was applied only like Virtual Reality or with quick response codes. The application of the AR is a primary one, with the current technologies that free tools offer. But, from now on, the applications of augmented reality will be more and more popular all around the world.

AR for "voyeurs" however may be applied in detail and more easily, with the technologies offered as augmented reality tagging. But, there is no location based augmented reality design tool, which offers more than one tag to publish, up to now. Publishing requires permissions and financial charges. With today's conditions it is impossible to make visualization with all the tagged augmented reality content without financial support and group work.

However, it is also a great experience to examine finished works already made on this subject, and imagine and design what will our augmented reality content look like. There are not many finished works about the AR applications of buildings like AR for "walkers" that have been studied, only a few ones such as UAR or Mimoa Augmented Reality application.

It is clear that some subjects remain unexplored in the areas of urban representation and technology. Of course, there are some gaps that are unexplored in the theoretical and practical studies. But, it will be impossible to analyse these gaps. So some recommendations will be done only for the third phase.

For the urban environment of Galata, a 3D model can be very useful for architects and urban designers, because there is a huge lack in the representation of architectural work in that area according to several periods in history. The important buildings are easily found in previous research studies because the area is still interesting for researchers.

Also, the augmented reality application of this study may be developed in the future, with better "augmented reality" publishing tools and knowledge. Augmented reality according to GPS is not yet a very common representation type. However, when the Augmented Reality tools will evolve, it will be easier to make a representation of a whole neighbourhood as it was before or what it will look like in the future.

There are also other approaches to a same framework. From a critical viewpoint, the effects of the technology can be discussed in relation to the changing aspects of urban life. As well as representation, there are many sub-disciplines that are affected from the changing urban habits.

When it comes to urban representation, another interesting point of view that can be adopted is the urban "gamification". Urban spaces tend to be considered more and more like game spaces and technological tools and gadgets are helping this transformation. Urban gamification could be another start point for a future research.

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APPENDICES

APPENDIX A : GalatAR interactive city guide content

APPENDIX A

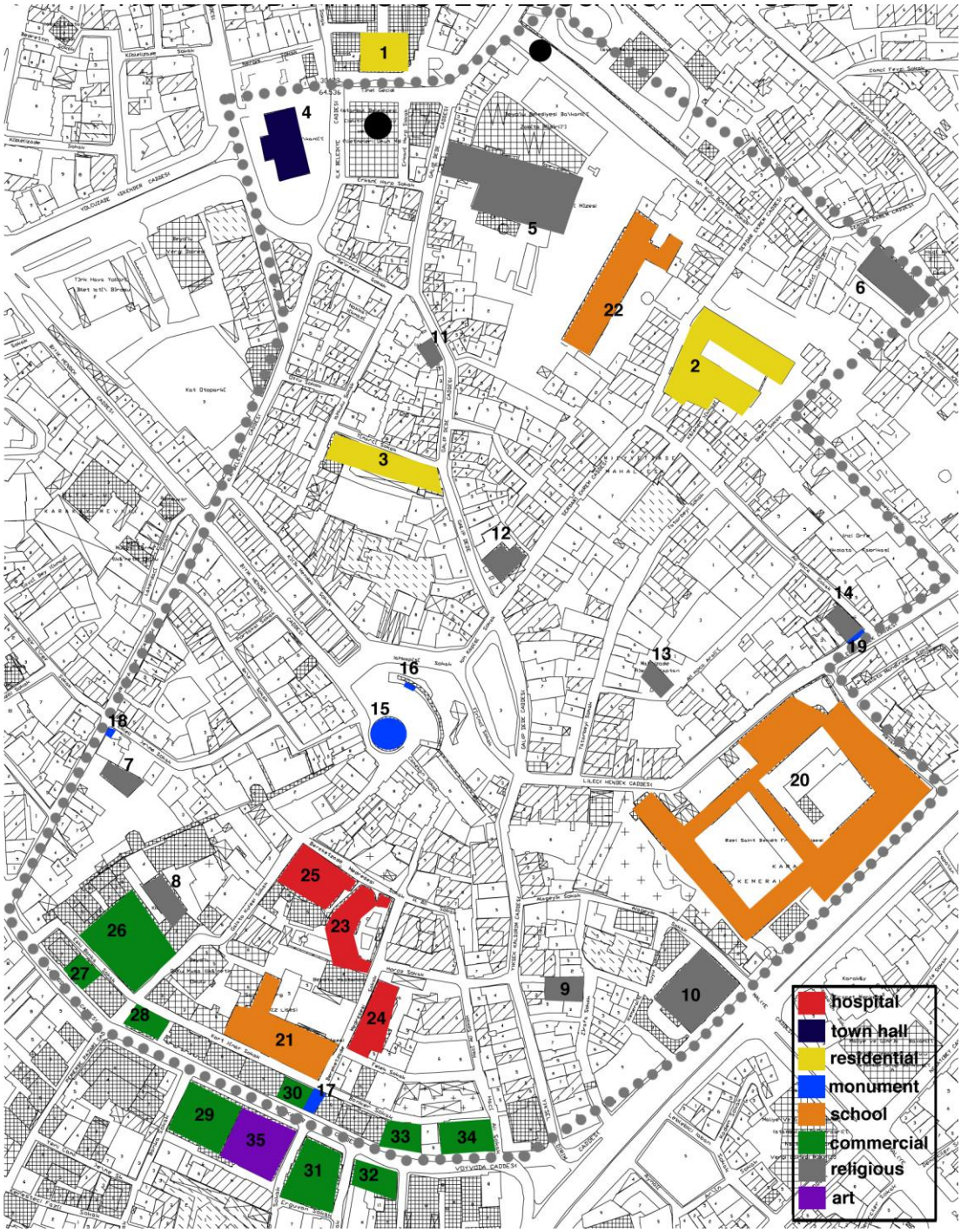

Figure A.1: GalatAR interactive city guide content: Landmarks.

Table A.1: Names and images for the GalatAR ICG content.

1	**Tunnel Apartment**	
2	**Doğan Apartment**	
3	**Demir (Barnathan) Apartment**	

Table A.1(continued): Names and images for the GalatAR ICG content.

4	**Beyoğlu Town Hall**	
5	**Mevlevihane** The mevlevihane of Galata was built in 1491, in what was then a scarcely populated area beyond the city walls. The lodge consists of several buildings, including a central unit for the ceremonies of the whirling dervishes, a kitchen, a library, several mausolea, and the remains of a cemetery (Galata Cultural Map).	
6	**Kırım (Anglican) Church** Built between 1858 and 1868 in honor of British soldiers fallen during the Crimean War, this British church of neo-gothic style was designed by G.E. Street. The church serves now as an Anglican church.	
7	**Italian Synagogue**	
8	**St. Pierre and St. Paul Church**	

Table A.1(continued): Names and images for the GalatAR ICG content.

9	**Ashkenazim Synagogue**	
10	**Surp Pirgich Church**	
11	**Şahkulu Mosque**	
12	**Müeyyedzade Mosque**	

Table A.1(continued): Names and images for the GalatAR ICG content.

13	**Hüseyin Kaptan Mosque**	
14	**Ali Hoca Mosque**	

Table A.1(continued): Names and images for the GalatAR ICG content.

15	**Galata Tower**	 
16	**Bereketzade Fountain**	

Table A.1(continued): Names and images for the GalatAR ICG content.

17	**Camondo Stairs** Built somewhere about 1880, this elegant flight of steps connects Voyvoda Street to Kartçınar Street, formerly known as Camondo Street. This urban feature, rather unique in Istanbul, was probably commissioned by the Camondo Family of bankers, whose residence and bank were located nearby.	
18	**Laleli Fountain**	
19	**Mihrişah Kadın Fountain**	
20	**St. Benoit French High School**	

Table A.1(continued): Names and images for the GalatAR ICG content.

21	**St. Georg Austrian High School**	
22	**German High School**	
23	**Beyoğlu Eye Hospital**	
24	**St. Georg Hospital**	
25	**Beyoğlu Hospital**	

Table A.1(continued): Names and images for the GalatAR ICG content.

26	**St. Pierre Han**	
27	**Hezaren Han**	
28	**Bereket Han** Despite its late-nineteenth-century façade, Bereket Han stands on the very grounds of what used to be Palazzo del Comune or Town Hall of the Genoese colony. Built in 1316, half of the building was torn down in the 1880's to make way for streetcars. Yet the rear side of the building still bears traces of the original structure, including Genoese coats of arms.	
29	**Central Bank**	
30	**HSBC**	

Table A.1(continued): Names and images for the GalatAR ICG content.

31	**Assicurazioni Generali Han**	
32	**İş Bankası**	
33	**Ünyon Han**	
34	**Minerva Han**	

Table A.1(continued): Names and images for the GalatAR ICG content.

35	**Salt Galata**	

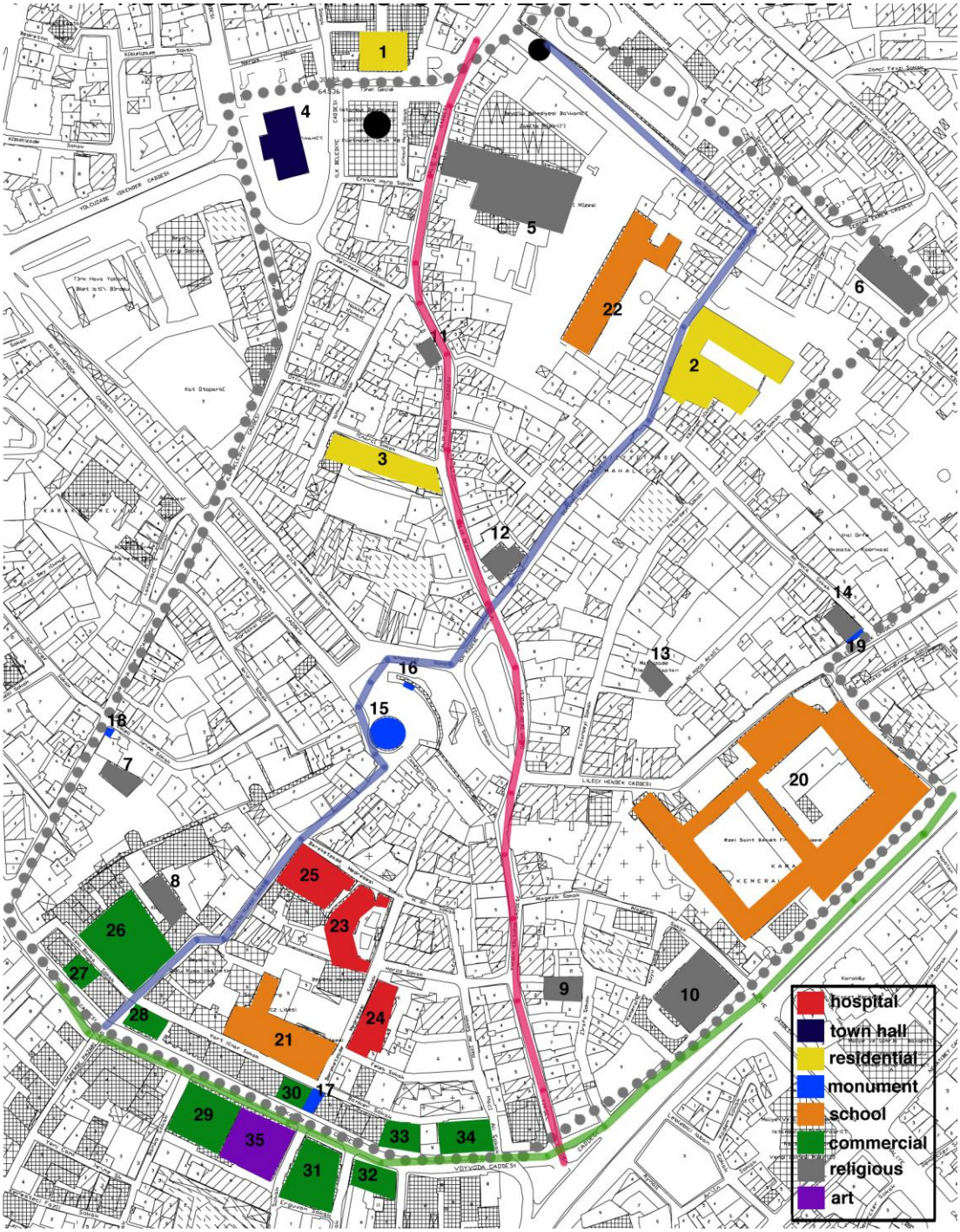

Figure A.2: Routes of GalatAR ICG.

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