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Rethinking Image of the City in the Information Age

Sarah Abdullah Al-ghamdi, Dr. Fahad Al-Harigi

*University of Dammam, Dammam, Saudi Arabia
College of Architecture & Urban planning*

Abstract

Mental image is an essential topic and it serves various fields in urban studies including behavioral geography, urban design branding and tourists destination management. The emergence of Information Communication Technologies (ICT) and corresponding socio-physical changes have affected almost every aspect of contemporary urban life together and the perception of the city. Legibility, mapping, meaning and experience of the space are all significant issues that need to be readdressed in order to understand how the new image of the city is forming. This paper discusses the image of the city in light of new technological evolution. It uses Lynch's (1960) model and tracks the impact of technology on both the observer and the observed. A descriptive analytical review of literature on legibility and environmental image, and the impact of ICT is carried out. Followed by an enquiry into how these issues affect our perception of space. Finally, a framework to study the image of the city in the information age is developed.

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1. Introduction

When Lynch (1960) wrote his masterpiece "Image of the city" in the sixties, he was concerned with "Legibility of the physical environment and providing people with emotional security while performing their daily tasks in the city. He described the experience of being lost in the city as "terrorizing" and may affect "our sense of stability and wellbeing" (Lynch, 1960, p. 4). Probably, he would have solved his imminent fear of disorientation differently had he had the chance to use Google Maps. Although he justified why using navigation tools like ordinary maps should replace legible mental maps, the set of criteria he assumed for good mapping and imageability match almost perfectly with navigation tools and applications available now. Even those criteria ahead of his time like adaptability to change, communicability to others and variety of solutions. Information and Communication Technologies (ICT) made possible with the GIS mapping and LBD systems embedded in smart phones and portable devices. Neverthe

reaching a specific destination readily was obviously not the main objective for Lynch study. His aim was to legibility of the city. In the sense of being visually clear and imageable to the inhabitants within the whole context pattern of the built environment. Consequently, this would lead to design and rebuild a better urban environment (Lynch, 1960, pp. 4-6).

Yet, on the threshold of the twenty first century, a new dimension has emerged. Information and communication technology has been affecting every aspect of human life. The unprecedented pervasive evolution of technology changing our view of urban life (Anttiroiko, 2013); (Meshur, 2013); (Cuff, 2003). All these digital, virtual ubiquitous systems are altering our perception of time, space and mobility. In light of this, many questions such as; how would information and communication technology (ICT) change legibility of contemporary city? How inhabitants conceive the image of their new city with affordance of these technologies?

1.1. Goal & Objectives:

The main goal of this paper is to discuss Image of the City in light of new technology evolution.

- To define the nature of city image and its mechanism through reading Lynch's (1960) model of image of the city and similar approaches.
- To explore emerging cutting-edge technologies that can affect legibility of the city.
- To study impact of ICT on meaning, experience and perception of the space.
- To construct the final synthesis
- To develop a framework to study Image of the city in the information age.

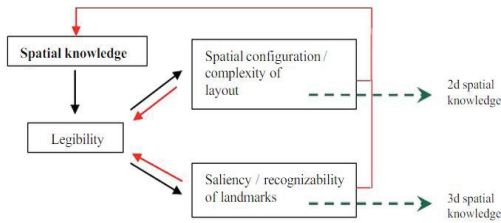
1.2. Methodology:

An analytical descriptive method is used to review in-depth literature on various approaches of legibility image of the environment based on Lynch's (1960) model. Followed by a study of the latest technology affecting legibility and forming imageability in two approaches; how it affect the concept per se and the inhabitant view of city image. The later points out issues of meaning, experience and perception of the space. Articulating these issues in depth will help in developing a model for more understanding of the contemporary city image.

2. Legibility of the City:

Lynch (1960) stated in his study of mental image that he chose legibility as the basic visual quality to focus on. Numerous researches covered the concept of legibility in urban settings. They almost reach a consensus on the definition of city legibility, which describes clarity of city parts that enable inhabitants to identify and organize in an overall pattern (Lynch, 1960); (Herzog & Leverich, 2003); (Kelly & Kelly, 2003); (Koseoglu & Onder, 2011). Moreover, Mahshid (2003) specified that a more legible city is able to maintain "continuity between salient elements of the city; main integrators and visible fields of the landmarks, to form a coherent structure" (Mahshid, 2003, p. 71.1). The importance of legibility persists more in complex, dense city environment and further significant in the information age where time and mobility present the main challenge of daily urban life.

Legibility has a strong effect on users understanding, experience and enjoyment of the city (Lynch, 1960). Moreover, it is the key of city prosperity "Applying legibility can help cities rethink how they present themselves and how they communicate" and ultimately endorse "civic pride" of users (Kelly & Kelly, 2003, p. 26). Different agreement on the definition and importance of legibility, studying the concept and process of legibility varies among scholars. While some researches insist on addressing subjective representations of the mind (Koseoglu & Onder, 2011); (Weisman, 1981), others suggest objective approaches for studying legibility of urban layout (Mal



finding behavior (Koseoglu & Onder, 2011). Perception of the “user” was introduced in the study as one of the characteristics of spatial knowledge along with characteristics of the space. In another study by Downs & (1973)

Figure 1: Components of the concept of legibility. Source: (Koseoglu & Onder, 2011)

- Sensory input (representation of the environment using senses “visual, haptic, auditory, olfactory, kinetic senses”),
- Sources of knowledge (Downs & Stea, 1973)

If spatial knowledge is forming legibility according to the diagram in (fig.1). Therefore, user’s perception essential aspect in forming legibility of the space. Moreover, Lynch (1960) mentioned that city could be familiar through other senses like auditory, haptic and olfactory, yet he did not explain how to utilize this fact in his study. This proves that users’ perception is of significant importance when it comes to form legibility of the space.

Nearly all urban studies focus on understanding legibility and its aptitude to enhance users’ imageability mental mapping. Their goal is to design and create a lucid city form able to communicate with the inhabitants.

2.1. Cognitive mapping and Environmental Image:

Cognitive/mental mapping is an interdisciplinary field, and just like legibility, it has been addressed with various approaches, and measured by different techniques. Studies of cognitive/mental mapping interested scientists in psychology, geography, anthropology and even linguistics. Cognitive mapping or “Mental mapping” are cognitive features of the human mind. The difference between mental and cognitive as Downs & Stea (1973) clarified is that mental mapping collect and interpret information about maps in the brain, or simply “map maps”. They described in detail the processes of cognitive/mental mapping as “the product of a series of psychological processes that register, code, store, then call to remind and decode all information on our ever spatial environment” (Downs & Stea, 1973, p. 15). Data gathering for mental mapping is usually obtained through sketch mapping. In this classical method, inhabitants are asked to recall how they remember the city and draw it freely. This will show how differently each user perceives and understands his environment. It provides useful spatial data about the environment and the participants. Criticism associated with sketch mapping includes validity and difficulty of collecting the data from large sample (Casakin & Omar, 2008).

In other words, mental/cognitive mapping is the image formulated by our mind in order to understand the surrounding environment. This image could be of a street, city, country, continent or may be a place never visited. It is affected by our perception but again it shapes how we see the world around us. A sophisticated subjective process differs from one person to another. Lynch (1960) in his study focused on environmental image particularly on the image of the city. Particularly he was interested in reaching a “public image” of the city on which he can develop urban design criteria.

Environmental Image serves mainly two functions based on Lynch model (1960): a Way-finding means, an organizer of activity in the city. He also categorized it in three components, see (Fig.1), these are:

- Identity: the ability to identify element of the city within the overall context.
- Structure: spatial relationship or pattern between the elements within, elements and the observer, an overall context.
- Meaning: practical and emotional value to the observer (Lynch, 1960)

2003). Even theoretical frameworks and methodologies applied varies to include; the rules of Gestalt, S syntax, multidimensional scaling of Q-Analysis SI Maps spatial representation theories...etc.

Koseoglu & Onder, (2011) argue that Legibility depends on physical spatial layout with varying degrees of complexity depends on the 2D and 3D representation of the space (fig.1) These two variables (2D+3D) are elements of spatial information used while engaging

Perception was involved through the processes psycho/cognitive inside the human brain, and divided

Lynch in his study focused on identity and structure or the visual aspect of the city and overlooked meaning.

2.2. Image of the city:

From all of the above an image of the city can be summarized as the process of picturing the city we live through a correlation between the physical representations of the city and the inhabitant that process the image. In other words, it is “the result of a two-way process between observer and observed” (Lynch, 1960, p. 118).

“Imageability” is another term used by Lynch describes the quality of the physical parts of the city that influence their “probability of evoking a strong image” to the observer. Great attention is given to imageability because it implicates physical form. Identifying what makes cities more imageable will help urban scholars to develop design principles and create better viable settings.

Lynch (1960) deduced five elements of cognitive image; these are paths, edges, districts, nodes, and landmarks. They were discerned after his extensive study of Boston city, Jersey, and Los Angeles. His study of these American cities has helped him to obtain certain design qualities that can improve imageability of the environment and hopefully inhabitants’ experience. Likewise, many scholars follow Lynch’s model and come up with new criteria. In (Table 2 in The Appendix) two different studies, proposed design criteria for increasing legibility of mental image in existing cities, Sheffield city and Tel Aviv. The results of the three studies indicate a strong trend towards simplicity in design, vivid elements and continuity.

3. Technology:

The evolution of technology in our age is challenging all previous development in the history of human civilization. There is a consensus among researchers that the new wave of technology is changing the denotation of “space, time and distance” (Meshur, 2013), the distinction between public and private (Cuff, 2003) and the experience of living in cities (Lange M. D., 2009). These technologies are evolving very rapidly that makes it hard to predict what the future will look like.

3.1. The introduction of Information Communication Technology ICT

The digital revolution started in the 1980s with swift development in the information technologies. Coupled with the alliance of communication technologies, ICT now is leading human development into the third industrial revolution. The impact of ICT on economic, urban and institutional transformation is equally apparent on our structures. In this part, we will review the latest technologies that have affected the image of the city directly or indirectly from two perspectives:

- Impact on the concept: Technologies as tool to study and facilitate mental image.
- Impact on the inhabitant: Technology effect on the observer.

3.1.1. Navigation, Mapping, locating

Mapping, navigation and mobile location services are linked with development of mobile global information systems (GIS) and mobile mapping location-based technologies (LBS) appeared in 1996 (Raper, 2009). These technologies have opened the door for unlimited applications and services in the field of mapping and communication. The introduction of (LBS) along with wireless network permitted the use of navigation and mapping systems for the public with affordable prices and ease of use.

- A. **“Mental mapping”:** Advancement in technologies and computation allowed researchers to develop software and tools to help them study cognitive/mental mapping. These tools are designed to collect, analyze, evaluate or represent data about mapping and legibility. Some of these softwares are listed in (Table 1).

Table 1: some of the available software serve as tools to enhance studying mental mapping.

Software name	Description	Implementation
Mapping with Users preferences	The invented program use a new way of mapping using GPS.	cognitive mapping through movement and preference
By (Kwon, 2010)	- It also captures users’ movement and preferences	preference

	inside the urban environment.	
Mental Map Editor (MME) By: (Letenyei & Borbély , 2010)	MME combines free recall with standard approximations. Software’s objective is to develop a “survey for mental maps”. - In phase 1: survey is obtained through asked & answered questions about people’s environment.(free call) - In phase 2: people locate on virtual map position of elements mentioned earlier. - Finally, phase 3: all collected data is analysed and visualized. - writing a report.	Analyse and visualized users’ Mental map through recall and map allocating.
C-Image By: (Lui, 2014)	Detect, measure, and analyse people’s perceptions through geo-tagged photos and through proliferation of crowd sourcing technology and using Python scripting language It reflects the interaction between city computation and city cognition. Important discoveries through these applications include that: C-IMAGE can partially confirm Kevin Lynch’s city image efficiently (Liu, 2014)	Monitoring city forms, Evaluating planning strategies, A reference for urban functions.
WayMaker By: (Strochecker, 1999)	“Microworld” style-learning environment. A tool for measuring inhabitant’s imageability. -using the software, participants can place elements of Lynch’s image (edge, path, district, and landmark) on a virtual map -WayMaker develop 2D diagrams and allow users to edit what they recall. -WayMaker can develop elevations based on the image participant form. -WayMaker also encourages designing at the experiential level,	Develop maps and 2D representation routes to analyse Users’ Imageability, (survey, collect data)
Sorin map By: (Sorin, 2005)	Software depends on algorithm with the ability to visualize maps in 2D & 3D forms due to specific data such as fear or lifestyle. (www.mentalmap.org)	

B. “Locative media”: is another GPS mapping technology combines positioning, real-time and social interaction to explore notions of space-time and social organization (Locative net, 2003). It “includes a range of experimental uses of geo-technologies including location-based games, artistic critique of surveillance technologies, experiential mapping, and spatial annotation” (Hamilton, 2009) There are almost 4 billion users of smart phones (Lange M 2009). This means that locative media services is available for two third of the population. Location and navigation services such as google maps and specific destination applications made moving and steering in the city effort and unwinding. In that sense, it increases legibility of the city and the ability to reach locations and acquire desired available routes, and time required. These mobile maps are supported with real-time technologies that detect congestion rates at specific time and suggest alternate solutions. In fact, Townsend (2000) named these navigation information and tools as new “Lynchian elements”. Despite the efficiency of these tools and applications, they are only achievable when wireless network is available, which may not be a problem with 4G networks installed in mobile devices, and when device is reachable. Without means of technology in hand, legibility is achieved through physical layout and user sense of the city.

The participatory affordances of digital media and peer-to-peer distribution model of locative media citizens' interaction in data streams, by prodding and redistributing them (Martijn & Cervený, 2009). available data/media are overloading the cyberspace with egocentric meanings and personal experiences. Now it is enough to look at how people tagged one place on the map in any locative-media application to develop a preconceived idea about it even without visiting the place. However, it is not yet identified how subjective meanings and experiences, bent virtually to physical space, are affecting our perception of the space and thus imageability

3.2. Meaning, Experience and Perception of the space

Cities as spaces live and thrive through personal experiences and activities, which are mostly subjective require the study of users meaning and perception to understand their effect on legibility of the city.

Through revolution of the people in Egypt, January/2011, Tahrir square played a vital role as a place of resistance. Protesters from all over the country marched in the square to claim their freedom. They inhabited the square for almost two weeks and 3 days. Meaning of the square as a public space was utterly evolving. A battle between protesters and government troops, a ground for political debate, a camping field, a mini market to sell and flags...etc. all these different activities took place in Tahrir square adding a new dimension of how people experience and perceive the place. Perception process can be explained as the transformation of a sensory input into a meaningful experience (Sartain, North, & Strange, 1967). This sensory can be a visual seen, a certain smell, distinguish sound or something touched that help deepen your experience in a certain time and space. The subjective unconscious along with personal background will then define the perception of the place (Koseoglu & Onder, 2012). Protesters in the freedom square has surely formed a profound experience about everything they felt and suffered those mixed feeling and tense incidents will create a perpetual meaning for the Tahrir square especially for people who were involved in the revolution. Tahrir square has witnessed revolutions before, but not as profound as the 25 Jan. Despite the wide controversy, it is illogical to ignore the impact of social media in facilitating the revolution. The new dimension of real-time locative technology fired up social media interactions whether Facebook or twitter. People saturated the hyperspace with posts, texts, videos and images from the square all over the world. Social media proven their impact on the public in this political scene. However, there are no proof yet that social media had a direct impact on the meaning or perception of the space. The case of Tahrir shed the light on two issues:

- One is how would this overwhelming experience affected Egyptians' imageability of the Tahrir square?
- How much input does technology place in forming and distributing meaning and perception of the space through various means delivered by locative media?

Towns (2000) said, "The cellular telephone...digital communications tools to come, will undoubtedly lead to fundamental transformations in individuals' perceptions of self and the world" (Townsend, 2000). Jean Baudrillard stated that our society has substituted reality and meaning with symbols and signs referring to media and internet which turns our experience to a simulation of reality (Baudrillard, 1981-1994). Meaning of the space is important. It is what turns the abstract space into a place as Creswell asserted (Creswell, 2004). Whether meaning obtained through personal experience or affected by our virtual experiences, it is of great importance to understand how image of the city is formulated. Lynch (1960) overlooked meaning in his model and preferred to let it develop by inhabitants on their own.

3.3. Virtual reality vs. Visual reality:

Virtual reality stemmed as a technology to simulate physical presence in real or imagined environment, it has tremendous implications in various fields. According to Graham and Aurigi (1997) "virtual cities" are internet based, local initiatives 'electronic spaces' accessed through computing equipment to: "market cities as a global investment, to widen local participation in telematics, and to engineer the emergence of new 'electronic' public spaces, to complement or replace the undermined physical public spaces of cities" (Graham & Aurigi, 1997). Virtual cities also describes simulations of certain urban spaces or whole cities developed to improve planning of a real-world city. The emergence of these virtual places has always raised questions of how they will affect social interactions, and perception of the real city. Lynch' model aimed to study visual reality of the city however the emergence of virtual reality necessitate more research on how virtual reality may affect inhabitants' image of a city. Billingham & Weghorst, (1995), conducted a study about cognitive mapping in virtual environment

understand how people form their imageability in a virtual space in order to develop virtual world design. They used Lynch model to perform the study, however, some difficulties appeared when they try to measure users' cognitive map of the virtual space, due to absence of most physical sensation like olfactory and kinetic (Billinghurst & Weghorst, 1995)

4. Synthesis:

The effect of ICT on image of the city in both proposed perspectives was immense. New technology produced tools that can help detecting, presenting, analyzing and evaluating cognitive mapping or what inhabitants recall about their cities. On the other hand, the spread of mobile-Location based technology whether in forms of devices, real-time maps, or locating applications, allows inhabitants to navigate easily through the city and increase their sense of legibility and clarity of cityscape. It also enhances their experience through stipulating further information such as, alternative routes, congested locations, estimated time and users' reviews and experiences of the space. Nevertheless, technology added new dimensions to legibility of the space. These include meaning of place and virtual reality. Meaning of space, which involves experiences and perceptions of users, formed through virtual interactions in cyberspace and geographical context of media, is still an imprecise issue that needs further scrutiny. Virtual reality along with these cyber meanings and experiences has brought up concerns about legitimacy of the space an issue that alarmed many thinkers and researchers. Castell (2010) said in (The Rise of the Network Society) "At the dawn of the information age, a crisis of legitimacy is voiding of meaning and function" (Castell, 2010, p. 419). Baudrillard (1981) also questioned legitimacy of our age. His concept of the (simulacrum) simulated described how people replaced reality with symbols, signs, and traces of the real, a generated model of the city without reality (Baudrillard, 1981-1994). Many critics like Baudrillard (1981) and Castells (2010) have skeptical ideas about the effect of media and cyberspace on people's perception of the real world. The massive amount of interactions between the virtual and the physical realm through means of technology is confusing human perception. With no vivid separation between true and lies, real and fake in the tremendous amount of data people receive every day, meanings and experiences may form distortedly. Image of the city in the information age is threatened to lose its validity in that context.

Beth and Piaget, (1966) stated that the process of human understanding of something can be learned through studying the something and the person (in the process of understanding it) (Strohecker, 1999). To allow inhabitants' image of the city more focus is needed on the city and its users while they are forming and recalling an image. The proposed model to understand Image of the city is discerned from Lynch's beliefs that the process of legibility involves both the observer and the observed.

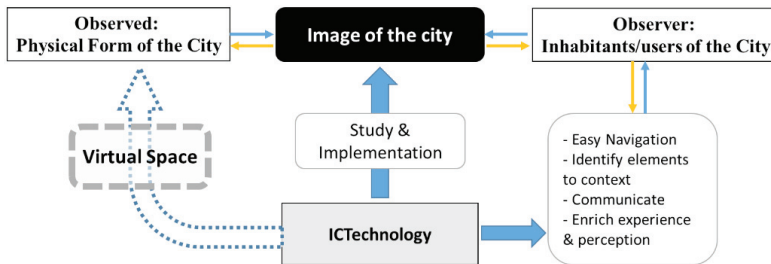


Figure 2: proposed model to understand image of the city in the information age. Source: the author.

In the proposed model (fig.2) Technology has direct effect on image of the city within the two perspectives addressed earlier:

- On the concept per se: as a tool to study mental image (collect data, analyze, draw, and measure).
- On the inhabitants: through GIS and LBD (navigation, identify elements to context, communicate, enrich experience and perception thus meaning of space).

Virtual space as an output of ICT appears in a marginalized association with the observed physical space & lack of clarity of its impact on mental image of the city, at the same time it cannot be ignored.

5. Conclusion and Recommendations

Understanding image of the city in the information age was the aim of this study. The research reveals the impact of ICT on the concept of mental mapping and the inhabitants' imageability of the city. A model is proposed to apprehend the process in which technology affects image of the city directly and indirectly. The reality and meaning of the place are important dimensions arising from technology and require further scrutiny. Will the future bring about new techniques to study users while they are forming their image? How far is the image-formation process affected by the massive meaning and egocentric allocated data available on the place through social media and communicative maps? These questions are remained open and need more research to reach answers.

Somewhere between the boundaries of legibility and legitimacy lies Image of the city in the information Age

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Appendix:

- Qualities for good map & image: Good enough to get one home. Sufficiently clear and well integrated. Readable. Safe, with a surplus of clues so that alternative actions are possible. Risk of failure is not too high. Image should preferably be open-ended adaptable to change allowing the individual to continue to investigate and organize reality: There should be blank spaces where he can extend the drawing for him In some measure, be communicable to other individuals.
- Table 2: Different ways of urban designer's interference to increase imageability of city layout

Lynch (1960) Boston, Jersey and LA	Mahshid (2003) Sheffield city	Casakin & Omar (2008) Tel Aviv city
Singularity or figure-background clarity	Creating Continuity of significant elements through high-integrated axes. Creating simple forms in some parts of the pathway configuration Distribution of pathway	Stress on the following elements: <ul style="list-style-type: none"> • increase number of business and offices • visible landmarks, • major road system, • public transportation,
Form Simplicity		
Continuity		
Dominance of one part over others		
Clarity of Joint		

	configurations.	
Directional Differentiation	Distribution of “Cores of Visibility”	Easy accessibility
Visual Scope	Creating order by hanging pathway	Avoid the use of : <ul style="list-style-type: none"> • repetitive structure • undergrowth vegetation • a secondary important elements
Motion Awareness	configuration	
Time Series	Interrelationship of the high-integrated axes.	
Name and meanings	Distribution of Zones of Activity	