CO-GNITO AS A SERIOUS GAME TO UNDERSTAND USERS' URBAN PERCEPTION

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ABSTRACT

CO-GNITO AS A SERIOUS GAME TO UNDERSTAND USERS' URBAN PERCEPTION

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This thesis offers an experimental research tool to be used for understanding people's perceptions and experiences in urban environments with regards to Kevin Lynch's well-known theory of The Image of the City. "Co-gnito" was designed as a serious game in order to produce collective and cognitive maps which are based on the users' real experiences. Hence, this research aims to evaluate this originally designed tool's performance in terms of its ability to collect reliable and valid perceptional data. The medium of serious board gaming has been used as a fun and interactive environment to encourage participants to share their experiences and to enhance the social interaction among them. The game was tested in two different university campuses: Arenberg Campus (KU Leuven) in Leuven and Middle East Technical University Campus in Ankara; both of which constitute different urban characteristics. The findings which were revealed in the two different spatial contexts were analyzed under two success criteria; i) the success of the tool as a fun game, and ii) the success of the tool as a meaningful research method. At the end, the findings of the research are critically evaluated to show the strengths and weaknesses of Co-gnito and discussed for further studies.

Keywords: Serious Game, Board Game, Urban Image, Mental Mapping, Kevin Lynch, The Image of the City, Collective Mapping

ÖZ

KULLANICILARIN KENT ALGISINI ANLAMAK İÇİN BİR CİDDİ OYUN OLARAK CO-GNITO

Görücü, Sinem

Yüksek Lisans, Kentsel Tasarım, Şehir ve Bölge Planlama Bölümü

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Bu tez, Kevin Lynch'in çok bilinen Kent İmgesi teorisine dayanarak kent kullanıcılarının çevresel algılarını ve deneyimlerini anlamak üzere deneysel bir araştırma aracı önerir. "Co-gnito", kullanıcıların gerçek deneyimlerine dayanan kollektif ve bilişsel haritalar üretmek amacıyla ciddi bir oyun olarak tasarlanmıştır ve bu araştırmanın öncelikli amacı, bu özgün olarak tasarlanan aracın güvenilir ve geçerli veri toplama kabiliyetini değerlendirmektir. Ciddi oyun kavramı, katılımcıları deneyimlerini paylaşmaya teşvik eden ve sosyal etkileşimi arttıran eğlenceli bir araştırma zemini olarak kurgulanmıştır. Co-gnito, birbirinden farklı kentsel karakterler gösteren iki farkı üniveriste kampüsünde uygulanmıştır. Bunlar, Leuven'de yer alan Arenberg (KU Leuven) ve Ankara'da yer alan Orta Doğu Teknik Üniversitesi kampüsleridir. Her iki üniversite kampüsünde test edilirken oyun sonucu ortaya çıkan bulgular da iki ana başarı kriteriyle incelenmiştir; i) geliştirilen aracın eğlenceli bir oyun deneyimi sunması ve ii) aracın güvenilir bir araştırma yöntemi sunması. Araştırma bulguları sonuç bölümünde tartışılarak, Co-gnito'nun güçlü ve zayıf yönleri irdelenmiş ve gelecekte yapılabilecek çalışmalar tartışılmıştır.

Anahtar Kelimeler: Ciddi Oyun, Masa Oyunu, Kentsel İmge, Bilişsel Haritalama, Kevin Lynch, Kent İmgesi, Kollektif Haritalama

To my parents

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LIST OF ABBREVIATIONS

MDA: Mechanics-Dynamics-Aesthetics

T+MDA: Technology + Mechanics-Dynamics-Aesthetics

CM: Cognitive Mapping

U.S.: United States

MUD: Multi-Player-Dungeon

CHAPTER 1

INTRODUCTION

Human understands the space that surrounds it through a complex series of actions, whether if it is a desert or a dense metropolitan area or even an empty room. The "mystery" of this perceptional process is quite a new issue. With the rise of human-centred movements during the 1960s and 70s, the "human" started to be considered as a social and emotional creature in opposition to the modernist rationalist ideals. Similarly, the cities where social creatures live, interact, produce and consume got acknowledged as complex social platforms than a pure mathematical order of perfectly designed infrastructures. During the fruitful period of the 1960s for all the social sciences, the urban planning and architecture practices got highly influenced as well.

Scholars like Lynch, Cullen, Jacobs and many others opened new horizons in the field. With the promising work of Kevin Lynch (1960), how a human being perceives the environment and what are the factors to affect that perception have become a hot topic in the urban design field. Since then, cognitive mapping gained great attention from urban designers, environmental and behavioural scientists.

Lynch offered a series of methods and a scientific framework to understand urban imageability. He defined the urban image under three components, which are structure, identity and meaning. While searching for urban imageability, why he did not include the component of meaning is a topic of discussion. Nonetheless, this research aimed to understand people's perception not only in terms of visual efficiency but also in terms of users' habits, problems and experiences. Thus, the primary motivation of this study is to propose a collective mapping tool as a "consensus ground" to understand the urban perception and experiences of city users while allowing people to reflect it. However, it is also discovered that one of the main

challenges for that kind of processes is collecting big amount of qualitative data about how people use and perceive the urban space. Another important challenge is to reveal what factors affect the mental image of people and how these images can be fully discovered.

In order to fulfill those needs, serious board gaming was proposed as a solution with its ability to enhance communication and interaction among players while keeping the motivation level high for long periods of time. Thus, this research developed a collective serious board game in order to take advantage of the interaction among players while searching for a collectively produced urban knowledge. Co-gnito was designed as a "co-llective" and "cognitive" mapping tool which functions through the mechanic of storytelling and produces an abstract physical representation of a sample size of four's perception map. Besides, this research aims to test the performance and ability of Co-gnito through two different case studies and evaluate its contributions to the urban designer as well and participants.

This thesis includes seven chapters, apart from this chapter (Chapter 1: Introduction). Chapter 2 presents an overview of the environmental physiology, cognitive image and cognitive mapping, perception and urban image by introducing a number of scholars' approaches. Chapter 2 also introduces the most well-known cognitive mapping study; The Image of the City by Kevin Lynch (1960). His approach is adopted as the theoretical basis of this research. Chapter 3 presents a comprehensive literature review on the medium of gaming with a particular emphasis on board gaming. That chapter constitutes the historical background of board gaming; the rise of serious games, their aims of usages and forms of existences, and lastly, the theoretical approaches to game design processes in the literature. Chapter 4 presents the research methodology of the thesis which includes the main motivation, aim, research question, research process, and, most importantly, the design process of Co-gnito. This part of the thesis needs to be viewed carefully to understand the research rationale behind design decisions. Chapter 5 introduces two university campuses on which and where Co-gnito was tested. One is KU Leuven-Arenberg Campus in Leuven, the other one is the Middle

East Technical University (METU) Campus in Ankara. The historical backgrounds, morphological features and layouts, spatial relations and functional issues of these university campuses are presented through maps and figures. The findings for each campus site are presented in two chapters. Firstly, the end-result maps and the stories which have created them were analyzed and then presented in Chapter 6 to evaluate Co-gnito's performance as a mapping tool. The second set of findings to evaluate the tool's success as a fun environment which provides reliable qualitative and collective data by analyzing players' behaviours, findings of the overall research procedure are presented in Chapter 7. Last but not the least, Chapter 8 discusses the weaknesses and strengths of Co-gnito and the research process and points out to the potential further studies and enhancements.

CHAPTER 2

URBAN IMAGE, PERCEPTION AND COGNITIVE MAPPING

2.1. Introduction

The rise of rapid urbanization all around the world which leads to complicated urban problematics and issues resulted in the development of inter-disciplinary approaches through cities. It has been understood that cities are not only physical objects, buildings, and infrastructures but also the most inclusive physical and social environments in which human activities occur in. For this reason, many of the environmental psychology studies have focused on the urban scale in order to understand urban perception and image to be assessed during design processes. Studies like Piaget's (1955) definition of *"spatial image"*, Boulding's (1956) *"world image"* which widened the scope of the term, Tolman's (1948) research of *"cognitive mapping"*, Lynch's (1960) influencing approach to *"urban imageability"*; Downs & Stea (1973); Neisser (1977) and Norberg-Schultz's (1971) definitions of image as an existential space; all stand as pioneering studies in environmental psychology. This chapter explains the historical development of the field to understand urban image and perception, as well as the phenomenon of mental mapping.

2.2. Rise of Civil Action and Environmental Psychology

In modernist approaches, spatial design and organization notions are based on pure positivist rationality which aims to control political, economical, social and cultural aspects rigidly without giving importance to the user itself. Nevertheless, by 1960s with the effect of *"...conflicts around housing, strikes against rent increases and campaigns for urban renewal in the face of segregation, suburbanization and the growth of 'inhospitable cities'..."* (Mitscherlich, 1965 cited in Domaradzka, 2018,

p.610), the notion of urbanism has completely changed against modernist ideals. Rise of civil action and the rise of the humanist movement worldwide, the human effect started to become recognized in almost all sciences. With that humanist wave, urban planners also started to seek for alternative context-based planning approaches with respect to the local knowledge and experience by understanding "*individual and community needs and aspirations"* (Fenster, 2009, p. 483). Urban studies placing the perception and image into the focus during the 1950 and the 1960s were a stance against modernist devastation and ignorance of human factor (Eraydın, 2007).

Especially after the publication of "The Image of the City"; the pioneering study of Kevin Lynch (1960), the conception of urban form revolutionized and feelings, senses, perceptions, textures, sounds, vision, etc. fade in the academic literature (Eraydın, 2007). Some other scholars like Gordon Cullen (1961), Christopher Alexander (1977, 1987), Amos Rapoport (1977) whose works remain to be milestones in urbanism, also broadened the horizon on human-environment relations in the early 1960s. Jane Jacobs's (1961) influential book, titled*"The Death and Life of Great American Cities"* focusing on vitality and security, associated the urban image directly with the streets of the city. She criticized the modernist urbanism in American cities which kills the urban interaction and life on the streets. In the same year, Cullen (1961) revealed the term *"serial vision"* in his well recognized *"The Concise Townscape"* book and appreciated the city as a solid-void composition. According to him, while buildings are unique singular objects, they form groups and create a serial vision within cities which evokes memories and experiences. He underlined that all those perceptive experiences realize at the street level with a similar approach to Jacobs'(1961) (Eraydın, 2007; Ulushan, 2004). Lastly, Henri Lefebvre's 1968 dated *"Right to the City"* was a pure reflection of concerns of the "68 generation" (Lefebvre, 1968).

From the 1960s to nowadays, the urban civil awareness has been raising day by day with slogans like *"Let's Take the City"*, *"Reclaim the Streets"*, *"Another City is Possible"*, *"This Land is Ours"* or *"Not-In-My-Backyard"* (Domaradzka, 2018), (Figure 2.1). Today, ideas behind many of contemporary projects, movements or

initiatives like ‘Urban Social Forum’ or ‘Future of Places’; focusing on social urbanism have their origins from that period of the history. The new human-centered trends and awareness brought new scientific areas into happening.

Figure 2.1 Reclaim the Streets Protests in London (1995)

(Source: web.1)

Humanity has been trying to organize its environment to create safe shelters since the Stone Age. During the development of space organization practices in the history, organizational efforts led to the creation of common spaces, streets, and towns but the environment has always seen only as a raw material to be changed or a scene to be watched for the big portion of civil history (Kuban, 2002).

> *“From the perspective of psychology until the 1960s, the space in which the behavior occurred was considered as a related, confusing variable in which should be controlled or, at best, a passive background to describe how human behavior effects.”* (Göregenli, 2018, p.1)

As Göregenli acknowledges, although the earliest studies by architects, psychologists, and psychiatrists which focus on the environment-human relations date back to the mid-1950s, the 1960s had been the milestone for all social science studies. It was understood that the universe is much more complicated than a laboratory alike environment which cannot be discovered and explained by ignoring the human factor and focusing only on controllable aspects. Therefore, with the rise of discussions about the issue, the first usage of the term *"environmental psychology"* was released by William Ittelson during a conference speech in 1964 and the field was born as a subfield of social psychology; researching the human-environment interrelation (Göregenli, 2018).

Harvey (1973), in his book; *"Social Justice and The City"* sees the environment not as an ontological aspect but as a social issue which shapes the human and be shaped by it through an endless bidirectional process (Harvey, 1973; Özbudak, 2018). Soon after in 1974, Henri Lefebvre (1991) underlined the social production of space while criticizing the idea of evaluating it as a *"mathematical entity"*. Since the rise of the field, environmental psychologists have been trying to discover that complex social system Harvey and Lefebvre refer in order to release how human being perceives a space, how an environmental image is created, what factors are to affect that process and more.

2.2.1. Environmental Perception and Image

> *"Seeing comes before words. The child looks and recognizes before it can speak. But there is also another sense in which seeing comes before words. It is seeing which establishes our place in the surrounding World; we explain that World with words, but words can never undo the fact that we are surrounded by it. […] Yet this seeing which comes before word, and can never be quite covered by them, is not a question of mechanically reacting to stimuli. (It can only be thought of in this way if one isolates the small part of the process*

which concerns the eye's retina.) We only see what we look at. To look is an act of choice. As a result of this act, what we see is brought within our reach – though not necessarily within arm's reach." (Berger, 1972, p.7-8)

As Berger clearly states, we understand the world by seeing it through not only a sensory but also a mental and perceptive action. The term; perception refers to an overall process of giving meaning to sensory data that have been collected and organized from certain objects and events (Özbudak, 2018). If an object exists, a subject necessarily also exists (Morval, 1985; Göregenli, 2018). In other words, an object needs to be perceived by specific someone to be in existence. Hence, while we can see the physical reality of what is being seen by an observer we can never foresee what it evokes for that person at that moment (Ercan, 2017).

Human observes, interprets and gives meaning to physical realities. As an output of this process, mental images are being created which can be defined as the overall memory created through the collection of smaller parts and details with the help of physical reality (Alemdar, 2009).

Although how the environment influence human behaviour has not been discussed for that long; the object-subject relationship, perception, and mental images have been discussed for many years. As one of the earliest opinions on image, Kant defines it as a subjective representation. The creation of the image in mind includes the intention and desire of the subject. For this reason, each object can create totally different images for each subject. That fact reminds Geldsetzer (1996), who argues that we bring meanings with ourselves. Besides the personal differences, a singular subject can have an infinite number of images about one object which would always be open to re-creation (Alemdar, 2009). This diversity can be explained with the importance of memory and experiences during perception processes. Cüceloğlu (1997) cited in Özbudak (2018) points out that transmission from sensory organs to brain includes a quite complicated selective process where a large number of data gets compared with one's past experiences to get excluded or included. All new experiences would change our mental image of each object in a space-time dependent context (Ercan, 2017).

According to Boulding (1956), human creates an overall world image through experiences with the help of factors like emotions, time, space, relations. Because of those factors, he indicates that people with similar social perspectives could grasp similar messages from the environment and introduced the *"group image"* term besides the individual ones (Boulding, 1956; Kahvecioğlu, 1998). Bailly (1977) visualizes the image creation process in Figure 2.2 below. He underlines the importance of cultural and psychological factors to image creation process (Göregenli, 2018). That illustration shows a similar understanding with Boulding's (1956) approach; group of people with similar cultural backgrounds would have similar images, while psychological factors still stand as the reason of personal differences.

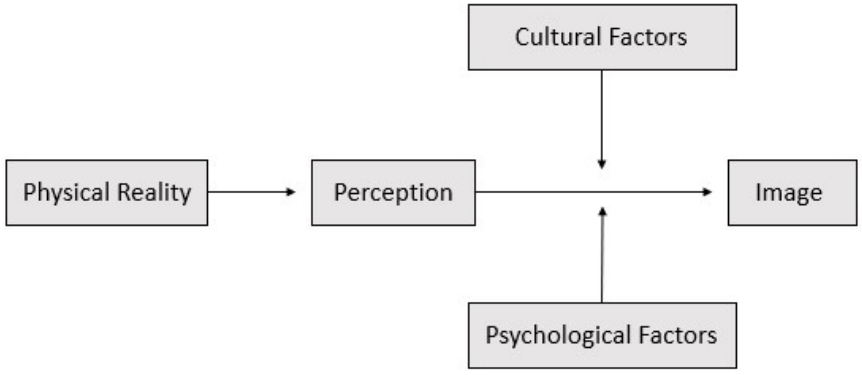


Figure 2.2 Image Creation Process

(Source: Göregenli 2018, p.25 (Translated from Turkish))

Kahvecioğlu (1998) presents a categorization to those factors which affect the spatial image creation. Space-based factors are listed as; physical features (color, shape, scale, microclimate, light etc.), context (function, activity, life etc.), usage (performance of the space) and aesthetic features. Observer-based factors are; (age, IQ, level of sensory abilities etc.), socio-cultural (education level, traditions, cultural background, level of

income etc.), past experiences, personality and psychological characteristics. The order or the importance of each of those factors also can be different for each individual. Additionally, observer priorities during the perception process affect how an image is being created.

Lastly, besides the processes which start with physical reality observation, Alemdar (2009) indicates that even in the absence of physical reality, a human can produce an image with the help of personal memory. Although no forms were revealed in the Invisible Cities (2002) of Italo Calvino, we can produce it mentally with the help of our own subjective images (Alemdar, 2009).

2.3. Cognitive (Mental) Mapping

Coon, Mitterer, Talbot and Vanchella (2010) cite Foo et al. (2005) and note: *"...you have an overall mental picture of how the town is laid out. This cognitive map acts as a guide even when you must detour or take a new route"* (page.252). As mentioned earlier, we all create our own mental maps to navigate ourselves in urban environments. Each of us sees, experiences, notices, latently learns and creates a limitless number of unique locally-made cognitive maps. Thus, including that locality in terms of knowledge and experience of 1st-degree subjects to be affected by the decisions made by planners has been gaining increasing interest and replacing top-down processes which prioritize the technical knowledge. Therefore, cognitive mapping has been considered as a remarkable tool to develop a common language between professionals and city users.

We do not move around in a city or even in a building through memorizing series of right and left turns to reach a specific point. Instead, we all use cognitive maps that have been constructed during our previous experiences within the same environment (Coon &Mitterer, 2010). Some scholars define that construct as a "geographical survival knowledge", consisted of abstracted and stored qualitative and quantitative spatial information (Kitchin, 1994; Golledge, 1999; Mohsenin, 2011). Raisz (1962)

puts it in another way with the influence of Dornbach (1959) and notes that while explaining someone how to reach a specific point, we actually use a mental map and then turn it into sentences. Generally, we even supplement the verbal introductions with gestures, acting like drawing an imaginary map with our hands (Wood, 1973). It is basically a knowledge transmission process from one's mind to other's mind. As Sanoff (1991) argues "*This knowledge includes the knowledge of routes and the location of key environmental features*" in order to orientate and navigate ourselves.

Cognitive maps or mental maps (Gould, 1966), spatial representation (Shemyakin, 1962), cognitive representations (Hart and Moore, 1971), spatial images (Gould, 1966) and so on, have been used for some years to understand peoples perception, mental images and how they interpret those in order to create an overall layout about the environment (Wood, 1973).

> *"According to Rapoport after perceiving the environment, cognition process starts, brain codes the environment into the hippocampus, for navigating in the building evaluations from what was perceived creates a mental map and we decide our way according to the mental map (Rapoport, 1977)."* (Sev, 2013, p.48)

As Rapoport (1977) explains, mental maps are the end-results of perceptive processes consisted of series of abilities *"to collect, organize, store, recall and manipulate information about the environment"* (Topcu & Topcu, 2012, p.577) Cognitive maps should be accepted as a black box of each human being to reveal his/her individual initial differences which stand as the basis of all decisions and thoughts related to spatial behaviour (Downs & Stea, 1973). They reflect the reasons hidden behind each of ourselves spatial behaviour consisted of an endless number of perceptive and active decisions.

Although there were a few related studies (e.g. Trowbridge's (1913)), the notion of cognitive mapping was first defined by Edward Chace Tolman and Charles Honzik with the help of laboratory experiments they conducted in 1930 (Tolman & Honzik,

1930). The study which aims to explain rats environmental learning abilities was applied to three different groups of rats. Each group was put in the same maze to find the exit. When they did, each group was always-rewarded, non-rewarded or late-rewarded to understand if the cognitive learning process depended on a goal or not. The study showed that although the rats without a goal (late-rewarded group) learned about the environment, it stayed unexpressed until a reward was presented. Interestingly, they even showed a better performance than the always-rewarded group (Figure 2.3). That result also proved that rats were able to interpret environmental information through a cognitive map in their mind to be memorized and used for wayfinding even while they were not aiming to. It can be valid for urban human life, as well. While walking, we pass by many buildings, streets, shops, etc. which we do not aim to learn about their physicalities but we unconsciously do. This kind of learning is called latent learning (Sev, 2013).

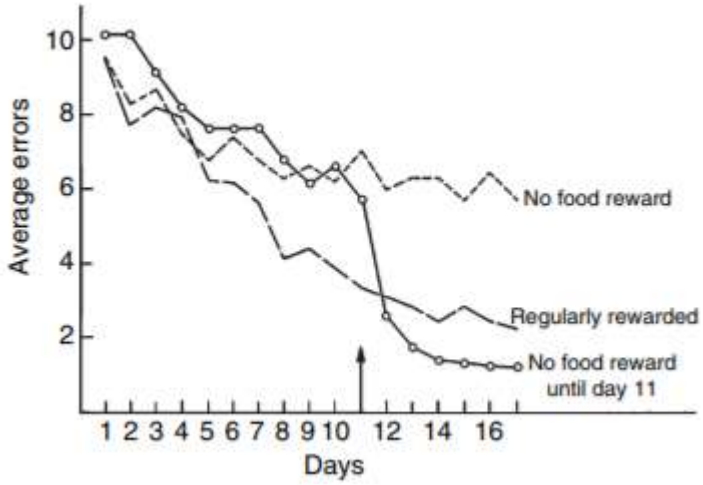


Figure 2.3 Results of Tolman and Honzik's Studies on Rats

(Source: Tolman, 1948 cited in Blaisdell, 2008, p.176)

Tolman (1948) pointed to that similarity and brought the discussion to another level through his work on both, rats and human; *"Cognitive Maps of Rats and Men"*. After

Tolman, the term became widely common among cognitive scientists referring to different concepts of usage while all related to human-space relation in terms of spatial knowledge (Fenster, 2009).

In 1960, Kevin Lynch came out with his book: *"The Image of the City"* which was the first to study mental maps with a multi-disciplinary perspective and created a tremendous impression in academia. He tried to understand how people image an urban environment, how they use those images during wayfinding, how they define references, etc. Although he applied a few methods like photo-sorting, verbal interviews, route finding/direction giving. The most significant part was individually generated sketch-mapping sessions where he asked participants to reflect their urban mental maps through sketching on a piece of paper in order to understand the common image of city users. Lynch's work will be explained in detail in the following sections of this chapter. Although Lynch is widely known as the first scholar who publishes on mental maps, Wood (1973) reports that an earlier scholar was John E. Dornbach who published a paper in 1959, titled "*The Mental Map?*". According to Wood (1979), Dornbach did not grasp enough attention, because "*he came too early*" while his audience of cartographers were still stuck with production techniques.

However, with the rise of Lynch's popularity, many scholars followed his lead. In 1966, John K. Wright related mental maps and geosophy to each other. Thus, deeper discussions on perception got into the air. Just at that time, Peter Gould (1966) published a paper which had a surprising new approach. He asked university students to rank their preferred (1) states to be living in the U.S., (2) countries in Europe and (3) districts in some African countries in order to produce a desirability map (Wood, 1973). While what he did was completely dissociated from Lynch and even Tolman, people acknowledged Gould's maps as mental maps believing that if mental maps are something in our minds, what Goulding did was also understanding what people had in their minds and reflected that information through maps. Thus he asserted that mental mapping was a form of representation of what people decide (Mohsenin, 2011). Like people's decisions of routes to be taken or states to be lived in…

Wood (1973) who has covered Gould's and Lynch's works in his *"I, Don't Want to But I Will"* book, gives apparent importance to differences between their approaches. He identified those differences through presenting three levels of standards for mental maps which he lists as Individual Mental Maps, Consensual Mental Maps, and Standard Mental Maps. He explains each level as:

> "*1. The lowest level and least general is the 'individual mental image'. This may be useful to, and only to, the imaginer.*
>
> *2. The first integration of these individual images is called the 'consensual image'. It is the image of a consensus of a given population. It can be used to predict or understand the behavior only of the entire population of which it is the consensual image. It is not used by any individual, but rather by the group.*
>
> *3. The most general of the images is the 'standard image'. It is a higher integration of the lower levels only in that it is created by individuals who are paid by society to set up a standard. This image is universally useful by all those capable of interpreting it (usually reading of map or text). It is the reference to which individuals and groups turn when they reach the limits of the usefulness of their own images. This may be manifested by individual map use, or by a group instance that the standard image be taught in schools or in a variety of other ways.*" (Wood, 1973, p.23)

Besides those three levels of images and therefore maps, he also identified a categorization of "external" and "internal" representations. External images were basically identified as visualized manifestations of internal images; images in peoples minds (Wood, 1973). He matched those 2 categorizations and explained 6 types in Figure 2.4 below.

TYPE	EXTERNAL	INTERNAL
INDIVIDUAL MENTAL MAP	1. That external manifestation of the internal representation in the form of sketches, drawings et cetera.	1. That material in a person's head relating in any way to the spatial component of experience.
CONSENSUAL MAP	2. That map revealing a consensus of behavior, attitudes, beliefs, regarding space among a specified group and compiled from (1) above or other sources.	2. That material in a person's head which allows him to find an external consensual image personally useful or relevant.
STANDARD MAP	3. That map universally regarded as useful at a given point in time and space.	3. That material in a person's head allowing him to find a standard map personally useful or relevant.

Figure 2.4 Map Types

(Source: Wood, 1973, p.54)

Besides Wood's comprehensive categorization, because of the divergence of numerous approaches and definitions in the literature, Kitchin & Freundschuh (2000) presented three different categories of existing definitions:

> *"First as a descriptive title for the field of study that investigates how people learn, remember and process spatial information about an environment. Second, it has been used as a descriptive phrase for the process of thinking out spatial relations. Third, it has been used as a descriptive name for a methodological approach to understanding cognition in general, consisting of the construction of 'maps' of cognitive processes..."* (Kitchin & Freundschuh, 2000, p.2)

In this study, the cognitive map term is used to refer to representative cartography-like visual mediums created with individual's cognitive images as Kitchin & Freundschuh (2000) also points out by their third category which also takes place under Wood's external types of maps whether included in individual or consensual categories.

In the process of way-finding and creating cognitive maps, two spatial reference strategies or "frames" are defined according to human's relational focuses. The egocentric frame is based on object-to-subject spatial relations which accepts the subject as the center of the process and gets references from her/his own location, orientation and distance to objects (Colombo et al., 2017). The observer memorizes about the environment while he/she imagines and focuses on directions and a specific route that he/she is taken. Because of that reason, some scholars call egocentric strategy as "route-based" strategy too (Rodgers, Sindone and Moffat, 2012). Differently, the allocentric frame bases on object-to-object spatial relations. Instead of imagining oneself as the center point in the environment, it accepts each object as a reference to the rest of the objects in terms of distances and orientations. That is why the allocentric strategy is being called as "map-based" strategy as well (Figure 2.5).

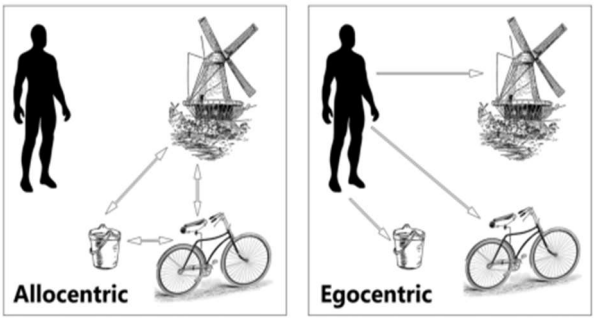


Figure 2.5 Allocentric & Egocentric Reference Frames

(Source: Proulx, Todorov, Aiken, & Sousa, 2016, p.5)

A growing number of studies are searching for the relation of these two spatial reference strategies today. While both of the frames stands for an equal level of importance in order to navigate in the environment efficiently, according to Colombo et al. (2017), *"ability to switch and combine different spatial strategies flexibly"* is the main requirement (p.605).

2.3.1. Kevin Lynch and "The Image of the City"

As previously explained, Kevin Lynch (1960) proposed a well-developed scientific frame: *The Image of the City*. One of the things that he grounded his research on was the human's ability of wayfinding in the natural environment; indicating that wayfinding is not a mysterious ability. He underlined the importance of environmental references in the process of wayfinding and sense of orientation whereas the environmental image is the key point (Lynch, 1960). He emphasized that in order to enhance the sense of safety against the fear of disorientation in the urban environment, wayfinding was a crucial ability; ability to understand and perceive it as a whole. For the sake of such perception, he deliberated over two terms; legibility and imageability. He was defining legibility as: *"…the ease with which its parts may be recognized and can be organized into a coherent pattern…"* (p.2). By saying recognizable it was not meant a stable, regular complete designed area but a meaningful, harmonious one where inhabitants can easily produce a cognitive map and understand relations of pieces in the urban environment (Göregenli, 2018). Alemdar (2009) comments as; *"Within different urban images, each element of chained structural relationships; functions by referring to one another."* (p.88). Her explanation is a really clear one to understand what Lynch refers while identifying legibility. The second term he strongly underlined was "imageability" stresses on the physical quality, which is expected to result in the creation of stronger mental images and increment of recognizability.

> "*Legibility itself is the simplicity of perceiving the spatial organization as a whole and recognizing the separated parts in this composition. Imageability, on the other hand can be summarized with the concept of identity, which means that the 'image' of one place that is created in human minds. Thus, these two concepts with the term image depend upon psychological process of building image.*" (Eraydın, 2007, p.121)

According to Lynch, an environmental image has 3 components; identity, structure, and meaning. To have an image, firstly it is obligatory to define a specific object differentiate from other things as a separate being with a distinctive feature which is

obligatory in order to have legible environments. That can be called as identity. Secondly, each object has a physical relation with other object or the context which is called the structure. And as the third one, the object does not represent the only physicality also practicality or emotions that the observer creates. This can be called as meaning (Lynch, 1960). These three components can not be separated from each other, but Lynch argues that it is not easy to discover meaning component. He also indicates that meaning can not be changed through any kind of urban interventions. Therefore, during his study, he only focuses on identity and structure but not the meaning of the urban image (Lynch, 1960). Lynch intended to understand pearls and pitfalls of physical urban structure. Therefore, besides the scholars explaining the image as a subjective representation, Lynch aimed to understand the common images of city users instead of focusing on individuals like Boulding (1956) previously pointed out. Each individual surely has a unique image, but there is a considerable amount of alignment which urban designers are actually aiming to understand in order the collect a valuable data to be taken into account during design processes for future interventions (Göregenli, 2018). Gölgelioğlu explains his approach as: *"According to Lynch (1960), every city has its own society-image. These images can come together and create a serial vision."* (Gölgelioğlu, 2014, p.30).

If we would like to categorize his approach according to Wood's (1973) map types, although he collected individual internal maps, he agglomerated those maps in order to create a consensual external manifestation to understand the "society-image". In order to create a reliable agglomeration, he tried to have a representative participant sample despite some non-balanced factors as he mentions; like distribution of participant's living places within the city.

He conducted the research through multiple phases. First, he applied a verbal interview study and asked seven types of questions (shown in Figure 2.6) to be interpreted with content-analysis methods.

1. What first comes to your mind, what symbolizes the word "Boston" lor you? How would you broadly describe Boston in *a* physical sense?

2. We would like you to make a quick map of central Boston, inward or downtown from Massachusetts Avenue. Make it just as if you were making a rapid description of the city to a stranger, covering all the main features. We don't expect an accurate drawing—just a rough sketch. [Interviewer is to take notes on the sequence in which the map is drawn.]

3a Please give me complete and explicit directions for the trip that you normally take going from home to where you work. Picture yourself actually making the trip, and describe the sequence of things you would see, hear, or smell along the way, including the pathmarkers that have become important to you, and the clues that a stranger would need to make the same decisions that you have to make. We are interested in the physical pictures of things. It's not important if you can't remember the names of streets and places. [During recital of trip, interviewer is to probe, where needed, for more detailed descriptions]

b. Do you have any particular emotional feelings about various parts of your trip? How long would it take you? Are there parts of the trip where you feel uncertain of your location?

[Question 3 is then to be repeated for one or mote trips which are standardized for all interviewees, i.e., "go on foot from Massachusetts General Hospital to South Station," or "go by car from Faneuil Hall to Symphony Hall."]

A. Now, we would like to know what elements of central Boston you think are most distinctive. They may be large or small, but tell us those that for you are the easiest to identify and remember.

[For each of two or three of the elements listed in response to 4, the interviewer goes on to ask question 5:]

5a. Would you describe_____to me? If you were taken there blindfolded, when the blindfold was taken off what clues would you use to positively identify where you were?

b. Are there any particular emotional feelings that you have with regard to_____?

c. Would you show me on your map where_____is? land, if appropriate:) Where are the boundaries of it?

6. Would you show me on your map the direction of north? *

7. The interview is over now. but it would help if we could just have a few minutes of free discussion. (Remainder of questions are inserted informally:)

a. What do you think we were trying to find out?

b. What importance is orientation and the recognition of city elements to people?

c. Do you feel any pleasure from knowing where you are or where you are going? Or displeasure in the reverse?

d. Do you find Boston an easy city to find your way in, or to identify its pacts?

e. What cities of your acquaintance have good orientation? Why?

Figure 2.6 Verbal Interview Questions of Kevin Lynch's

(Source: Lynch, 1960, Captured from p.141-142)

Since many of the participants got interested for another session, he conducted a photo-sorting study which a stack of photos taken in the city was presented to participants and asked to sort them in any kind of classification system they want. Thirdly, the same participants were asked to reach a specific point in the city on foot. As an "outside check" participants were asked to ask directions to a few randomly chosen passers-by at specific spots. While travelling in the city, participants were asked to draw mental maps with five Lynchian elements.

In the book, the five elements were explained in detail:

> "*1. Paths. Paths are the channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, railroads. For many people, these are the predominant elements in their image. People observe the city while moving through it, and along these paths, the other environmental elements are arranged and related.*
>
> *2. Edges. Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls. They are lateral references rather than coordinate axes. Such edges may be barriers, more or less penetrable, which close one region off from another; or they may be seams, lines along which two regions are related and joined together. These edge elements, although probably not as dominant as paths are for many people important organizing features, particularly in the role of holding together generalized areas, as in the outline of a city by water or wall.*
>
> *3. Districts. Districts are the medium-to-large sections of the city, conceived of as having two-dimensional extent, which the observer mentally enters "inside of," and which are recognizable as having some common, identifying character. Always identifiable from the inside, they are also used for exterior reference if visible from the outside. Most people structure their city to some extent in this way, with individual differences as to whether paths or districts*

are the dominant elements. It seems to depend not only upon the individual but also upon the given city.

4. Nodes, Nodes are points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling. They may be primarily junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as a street-corner hangout or an enclosed square. Some of these concentration nodes are the focus and epitome of a district, over which their influence radiates and of which they stand as a symbol. They may be called cores. Many nodes, of course, partake of the nature of both junctions and concentrations. The concept of node is related to the concept of path since junctions are typically the convergence of paths, events on the journey. It is similarly related to the concept of district since cores are typically the intensive foci of districts, their polarizing center. In any event, some nodal points are to be found in almost every image, and in certain cases, they may be the dominant feature.

5. Landmarks. Landmarks are another type of point-reference, but in this case, the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, or mountain. Their use involves the singling our of one element from a host of possibilities. Some landmarks are distant ones, typically seen from many angles and distances, over the tops of smaller elements, and used as radial references. They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. Such are isolated towers, golden domes, great hills. Even a mobile point, like the sun, whose motion is sufficiently slow and regular, may be employed. Other landmarks are primarily local, being visible only in restricted localities and from certain approaches. These are the innumerable signs, storefronts, trees, doorknobs, and other urban derail,

which fill in the image of most observers. They are frequently used clues of identity and even of structure, and seem to be increasingly relied upon as a journey becomes more and more familiar." (Lynch, 1960, p.47-48)

He tested the theory in three American cities; Boston, Los Angeles, and Jersey City to understand user's perception and the mental image of the city that they live in. "*Lynch was interested in showing misfits between what people need/want and what they get in the American city today*." (Wood, 1973, p.65). As a new perspective in the field, the five elements were not identified in terms of a physical categorization but as a perceptual one. Lynch was not pioneering only with the 5-Element frame he proposed but the way he interpreted the data was also reformist. He analyzed the data to understand the legibility and imageability of city places as well as the success of methods being used through presenting and comparing output maps for each part of the research (Figure 2.7).

Besides reporting quantitative outputs like "mentioning frequencies" of elements or places, he also processed the collected data through content analysis. With the help of content analysis, he reported that, for the case of nodes an example, people sometimes tend to define thematic concentrations while sometimes just transportation junctions. In some further studies following Lynch's traces and focusing on the "urban form" examined the functions of each of the five element types in order to reflect a mental map and defined fewer elements (e.g. Stea, 1969 ; Norberg-Schulz, 1971).

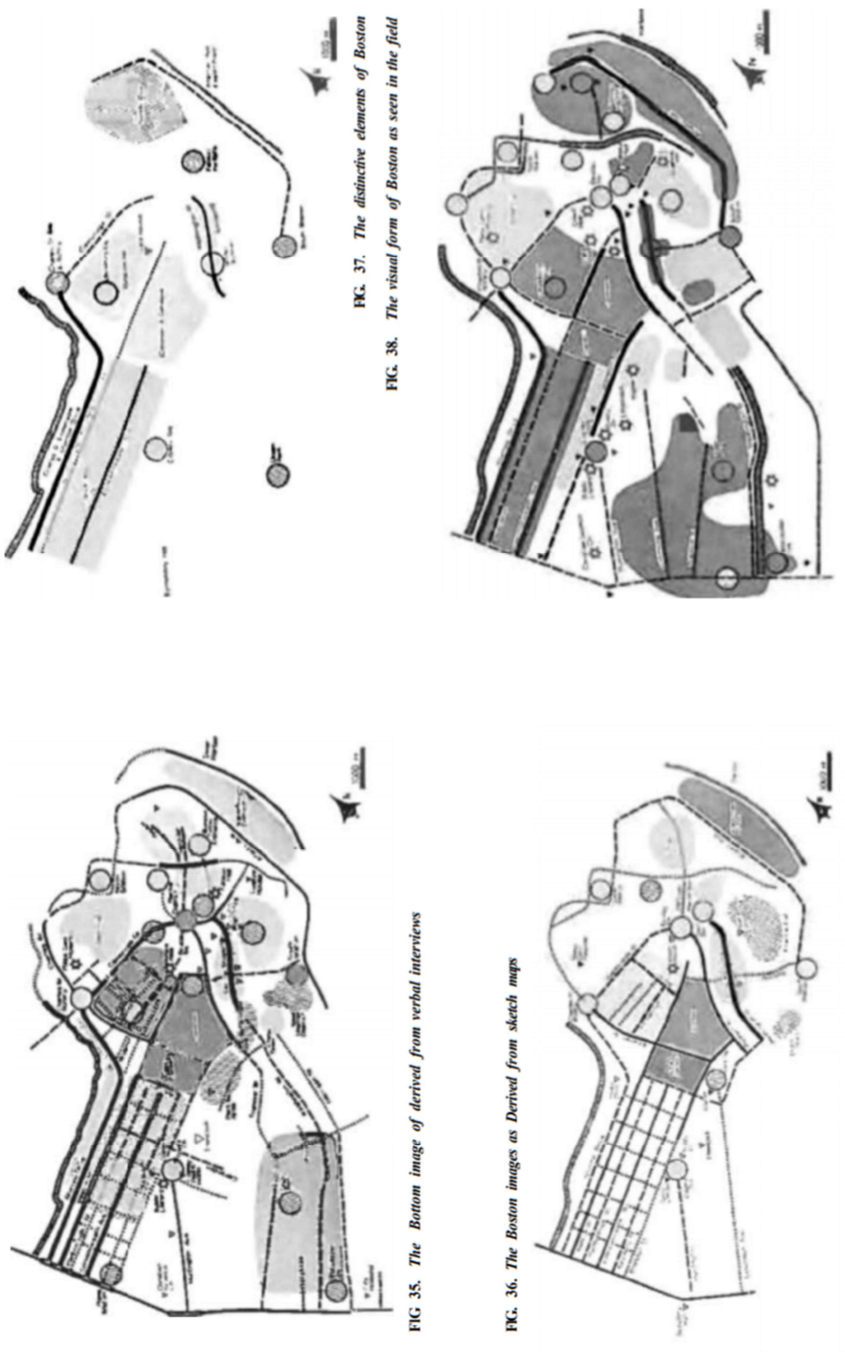


Figure 2.7 Boston City Maps Produced Through Different Methods

(Source: Lynch, 1960, p.146-147)

2.3.2. Following Studies

After Kevin Lynch (1960) many other scholars conducted urban imageability studies on different cities with different perspectives. Saarinen in his work on Chicago City which he followed a similar method of Lynch's but asked city users to fill in maps which had pre-defined borders, found that right images were highly dependant on the abundance of urban experiences (Saarinen, 1969 cited in Göregenli, 2018). Francescato and Mebane (1973) studied on two Italian cities; Rome and Milan by asking similar types of questions as Lynch used. Acknowledging Saarinen's findings of relativity between the level of familiarity and imageability, Francescato and Mebane's findings brought the issue to another level, and they asked why and how were people mentioning places which they do not even use. They indicated that further studies were needed to explain such behaviour. Soon after, Beck and Wood (1976) defined a series of factors affecting participants urban image as a result of their studies on Montreal. The factors were listed as: Subject variables (length of residence, travel experience, personality, short-term memory), touring variables (characteristic travel mode), environmental variables (complexity of urban form), and map variables (familiarity with and attitude toward conventional maps, type of mental map called for by investigator) (Beck & Wood, 1976). Stokols and Altman, during their studies on Paris, examined the cognitive maps of the city on both scales; the individual and the society attributing the differences to historical and cultural factors besides the architectural and geographical ones (Stokols and Altman, 1987 cited in Göregenli, 2018). Montgomery (1998) claimed that the importance of each Lynchian element varies among different groups of city-dwellers. While landmarks would be dominant in newer dwellers maps, paths would be better described by more experienced ones (Eraydın, 2007).

A comparison done by Downs and Stea (1973) shows the dominance of each element type being reflected at Lynch's (1960), De Jonge's (1962), Gulick's (1963), Saarinen's (1969), Klein's (1967), Appleyard's (1969), and Stea and Wood's (1970) studies which reflects drastic differences among each city (Figure 2.8).

Principal investigator and year published	City	Interview Sample (Number and Predominant Type)	Importance of Urban Elements					Investigator's Comments
			Landmarks	Nodes	Paths	Edges	Districts	
K. Lynch (1960)	Boston (United States)	30 (Professional, managerial)	●	○	○	○	●	One strong edge; distinctive districts, confusing paths; understand structure.
	Jersey City (US)	15 (Professional, managerial)			○			Lack of character; formlessness; low imageability.
	Los Angeles (US)	15 (Professional, managerial)	○	○	●			Less sharp image, visually faceless, but active, ecologically ordered
D. Jonge (1962)	Amsterdam (Netherlands)	25 (Wives of skilled and while-collar workers)		●	●			A very strong image; strong predominance of main elements; spider web structure.
	Rotterdam (Netherlands)	22 (Wives of skilled and while-collar workers)	○	○	○			Over-all image weaker; buildings seen more clearly; no clear boundaries.
	The Hague (Netherlands)	25 (Wives of skilled and while-collar workers)	○		○		○	No wide straight path; separate elements and buildings; vague as to boundaries.
J. Gulick (1963)	Tripoli (Lebanon): entire city	35 (Students, upper middle class)		○	○		●	Stresses districts geographically distinctive or nodes; buildings not a major focus.
T.F. Saarinen (1969)	Chicago (US)	42 Area workers 18 Suburban students 12 University students	●		● ●		● ○	Tightly defined areas with internal detail. Border areas.
			●		●	○	●	Border areas and external landmarks.
H. Klein (1967)	Karlsruhe (Federal Republic of Germany)		●	●	○			Rational; striking landmarks; highly linear; imaged center moving westward.
D. Appleyard (a969)	Giudad Guayana (Venezuela): entire city			○			●	Little "common" urban knowledge of city; higher for local areas; higher for lower income population.
D. Stea and Wood (1970)	Mexico City: city and center		●	○	●		●	Edges almost entirely absent; strong domination by major paths; district landmarks.
	Puebla(Mexico): city and center		●	●				Streets extremely regular highly legible but uninteresting.
	Guanajuato (Mexico): city and center		●	●	○			Highly irregular; unstructured; bi-nodal.
	San Cristobal las Casas (Mexico): city adn center		●	○	○			Legible city; clear and strong pattern of spatial activity.

Figure 2.8 Cognitive Mapping Researches on Different Cities

(Source: Downs and Stea, 1973 cited in Mohsenin, 2011, p.26)

Moreover, Eraydın (2007) in her master thesis, organized sets of elements defined by different scholars and their Lynchian correspondences (Figure 2.9). While two scholars; Norberg-Schulz's (1971) and Stea's (1969) works were supervened upon Lynch's, the column on which she matches Lynchian elements and Gestaltian principles is remarkable. She related Lynch's path and edge elements with the

"elements of continuity" of Gestalt psychology, acknowledging that continuous elements are being perceived as a whole by people while defining landmarks as the Gestaltian "dissimilar elements"; unexpected distinctions. And lastly; she explained districts with the proximity and similarity principles (Eraydın, 2007). While Stea (1969) defined four elements; paths, boundaries, points and barriers, Norberg-Schulz's set was containing three elements. Just like Lynch and Stea, Norberg-Schulz (1971) also defined paths as connection axis like; places (corresponding to Lynch's nodes & landmarks) as urban areas holding a special characteristic and domains (corresponding to Lynch's districts) as places consisted of similar elements (Eraydın, 2007).

Kevin Lynch	Norberg-Schulz	David Stea	Gestalt Psychology
Path	Path	Path	Elements of continuity
Edge	—	Boundary	Elements of continuity
Node	Place	Point	—
Landmark	Place	—	Dissimilar elements
District	Domain	—	Good contour proximity and similarity of elements
		Barrier	

Figure 2.9 Urban Image Element Sets Correspondance Table

(Source: Eraydın, 2007, p.59)

Finally, in addition to studies that differentiate from Lynch in terms of element sets, evaluation type, cases and samples, the foundation that he grounded his theory on; the "visual" imageability" was also revisited. The fact that Lynch only focused on the visual sense and ignored hearing or smelling became another leeway for the following studies (web.2). While the potentials of sounds in terms of strengthening a landmark was shortly mentioned by him, the potential of sounds in terms of creating a landmark itself has not been considered in his precursor work (Offenhuber & Auinger, 2011). Therefore; Michael Southworth (1969), a former student of Lynch's was the one to focus on sound-environmental perception relation and studied identifiability of places through the soundscape (Figure 2.10). His work on sonic mental maps has been accepted as the *"sonic equivalent of the Lynchian notion of imageability"* (Offenhuber & Auinger, 2011).

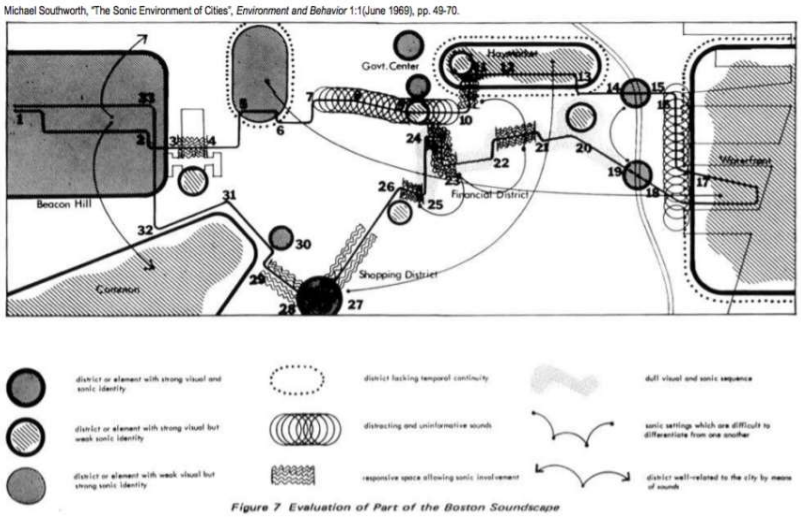


Figure 2.10 Evaluation of Boston Soundscape

(Source: Southworth, 1969, p.66)

2.3.3. Cognitive Mapping Types and Methods

As explained before, the main challenge in cognitive sciences is the complexity of understanding people's perception. To cope with that during cognitive mapping studies, self-reports and observation have been pointed out as two main methods to understand mental images (Mohsenin, 2011). The first one; self-reports might be in many different forms with their own risks in terms of bias creation. That's why the questions to be asked or the protocol to be followed or visual/sonic materials to be presented to support the process stands as possible crucial factors. On the other hand, observation can be conducted through collecting behavioural data which requires a more passive role to be held by the researcher.

Self-reports can be applied in verbal, written or visual forms. Asking participants to draw their own cognitive maps or asking them to explain a route they would take to go somewhere from a specific point etc. are some examples for that method (Mohsenin, 2011). Thagard (2005) believes that *"Pictorial representations capture visual and spatial information in a much more usable form than lengthy verbal descriptions"*. This is one of the main reasons that many scholars have preferred to have participants to represent their maps directly through sketch mapping. However, sketch mapping also can limit the participant in some cases. Lynch (1960) pointed out, similarity of the data collected from sketch maps and verbal interviews/questionnaires could be significantly low in some cases. He observed that some of the components were drawn less than they were verbally mentioned. Especially things which were accepted as "hard-to-draw" were highly avoided.

Dalton and Bafna (2003) argue the difference in selectivity. They refer to the Lynch's comparison of three maps: one which the participants sort and recognise photographs, second one which is constructed through sketch maps, and the third one which is presented through verbal interviews. While the verbally produced maps provide the lowest level of selectivity with most number of elements, the end-results of photo-sorting inquiries provide the highest level of selectivity with the fewest number of elements. They discuss the reason of those differences as follows;

> *"We argue that the difference of selectivity indicates very clearly the role of overall context in the imageability of the city—that inhabitants recall elements, not primarily because they are visually distinctive as such, but only within the context of a particular route or situation. The first two maps were clearly constructed from situations in which the inhabitants recalled elements in particular contexts. […] Another important point to note is the difference between the verbal and the sketch maps. The sketch map, Lynch finds, is more selective than the one verbal one; however, some elements that occur on the sketch map are not found on the verbal one. This can only happen if those elements are not intrinsically visually distinctive, but are crucial within an overall wayfinding structure."* (Dalton & Bafna, 2003, p.59.5)

However, some like Linden and Sheehy (2004) remarks that both methods generate similar results. All in all, regarding self-reporting, it is possible to reveal that there are two contradictory opinions in the literature. One discusses about conducting the self-reporting sessions after a pre-field coverage to enhance participants awareness about the environment, whereas other suggests conducting self-reporting without a pre-study which will result in completely memory-based reflections.

Besides the piling-up-knowledge adding on Lynch's work for the last 60 years, it is not that easy anymore to assume that people find their ways with the help of references they grasp and mental maps they create. In the age of mobile devices, most of us do not find our ways by ourselves, but more likely with the help of digital navigation. How does that fact change our perception, and how can researchers frame their studies in order to understand the perceptual differences caused by guided and non-guided travel within a city? Michiel de Lange from The Mobile City independent research group discusses the issue in their web blog. He asks another question by raising his concern: "Are locative services undermining the potential for exploration and unexpected encounters with new places and people, when our movements are guided and goal-oriented?" as another concern (web.2).

Besides the self-reports, there are different methods that observation can not be applied. While analogue techniques (e.g. Figure 2.11) have been used for many years in order to observe peoples' behaviour in urban environments, new time-effective techniques are becoming available to collect behavioral data today with the help of new technological advances like bluetooth signalization (Figure 2.12), virtual reality, eye tracking, and social data analytics.

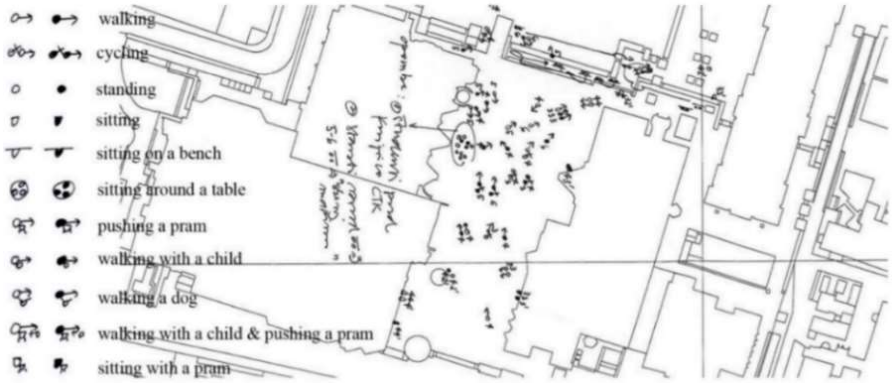


Figure 2.11 Observation of Open-air Activities in Trg Republike

(Source: Golicnik, 2005, p.118)

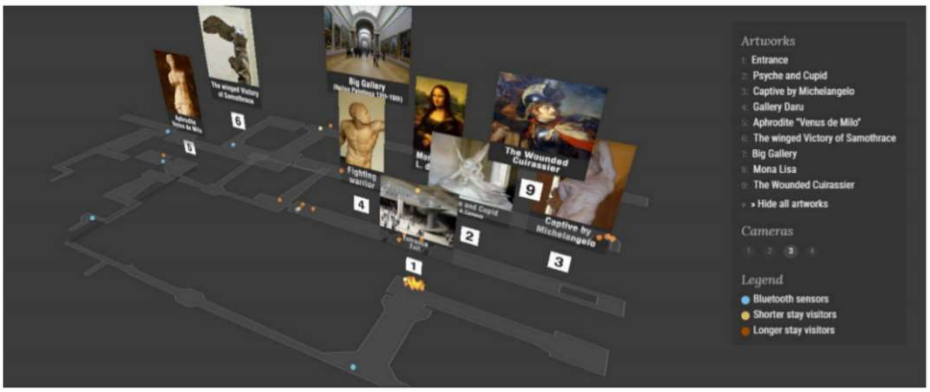


Figure 2.12 Behavioral Mapping using Bluetooth Data in Louvre

Source: (web.3, captured from video)

As an example, virtual environments are used to observe how people move in environments which do not even exist; demolished or even not-yet-built. Besides observing the actual movement, eye-tracking or neurological recording technologies also enable scientists to understand what engages someone's attention better or first. In that case, a study, conducted by Tesseract Center for Immersive Environments and Game Design of the University of Arkansas, is one of the attention-grabbing studies which aim to understand behavioral patterns and spatial memory in the ancient city of Pompeii through VR simulations while also catching neurological responses with the aid of EEG headsets (Figure 2.13)

Figure 2.13 Cognitive Mapping in VR Pompeii

(Source: web.4)

Nowadays, using open social media data to understand in which places people perform certain activities is another method which has been widely discussed as a behavioural data collection tool. With the social media revolution, the publicly shared big data has an enormous potential to be analyzed in order to establish a real-time understanding of city places. Figures 2.14 and 2.15 show a study by the Urban Design Lab of Columbia University focusing on public space usage in New York through Twitter data.

Figure 2.14. Geo-Spatial Twitter Data Mapping in Manhattan

(Source: web.5)

Figure 2.15 Tweet Mapping According to Dominant Topics in Bryant Park

(Source: Uguccioni, 2016, p.27)

To sum up, although cognitive mapping is a few decades old phenomena, with its multidisciplinary nature, it still contains high potentials of raising new discussions.

CHAPTER 3

GAMING

3.1. Introduction

> "Play is the highest form of research." -Albert Einstein
>
> "The creation of something new is not accomplished by the intellect but by the play instinct." -Carl Jung

Human starts perceiving and even interacting through playing at childhood ages (Dehghan, 2015). Not only the human but even animals have a tendency to turn daily activities into games, and that is quite an initial habit. In this chapter, the historical development of board games as well as the "serious games" will be explained and some ideas and theories on game design will be introduced.

3.2. Board Games

While talking about "play" or "game" the scope includes many different forms of existence. One of those forms is games which are generally being played with multiple players and consisted of physical and visual elements (generally on a baseboard). They are called board games or table-top (Yayalar, 2016). According to Yayalar (2016), by 2008 June more than 35,000 board games were listed in the boardgamegeek.com online database, which dramatically increased three times and reached almost 107,000 by 2019 June. Besides the rising popularity of board games in the last few decades, it has a longer history than that.

Currently discovered game pieces dating back to B.C. 3100 from Ancient Egypt show that humanity has been entertaining through the medium of play for longer periods of history than we could have guessed in the modern era. Although archaeological findings offer a basis to understand the game development until now, we still do not have certain knowledge about the history of some primitive games like Mangala which assumed to be one of the earliest examples of board games made out of ordinary objects found in nature (Cengiz, 2008). Long before the invention of electricity and machinery, laborers were working for fewer hours and having more leisure time than we are having now in today's world. That was giving them enough free time to engage in sports, arts and other cultural activities like playing games for entertainment. To give some ancient examples; Figure 3.1 shows the oldest board game ever known called Senet which was found in the tomb of Tutankhamon (3500 BC) and a scene showing people playing Senet.

Figure 3.1 Left: Senet Game, Right: A Scene showing people playing Senet

(Source: web.6)

Figure 3.2 shows pieces of an ancient Sumerian game called The Royal Game of Ur which is one of the most significant examples among many others (Bethke, 2003).

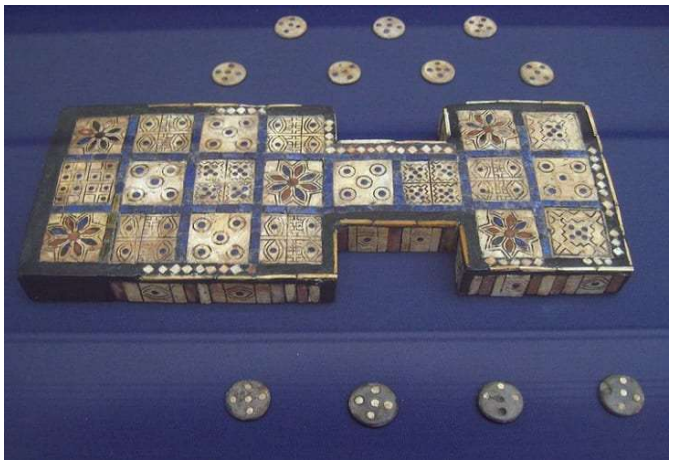


Figure 3.2 The Royal Game of Ur, 2600-2400 BC

(Source: web.7)

Widely popular table-top games of today's world like Chess, Backgammon or Go have also been entertaining people for more than a thousand years while evolving through time. For instance; chess, as we know today, was evolved from Chaturanga; an ancient Indian game reflecting the hierarchy in the Indian Army (Murray, 1913; Yayalar, 2016). Likewise, Backgammon also evolved through the change of particular rules of the game called Nard through the change of particular rules (Parlett, 1999; Yayalar 2016).

With the effects of industrial revolution and rise of mass production technologies by the 18th century, board games started to be rethought and most of the ones that we are playing today were designed after those developments in pressing and machinery in the 19th century; making board games more accessible for the middle-income class as well. By 1930s mass game production companies in the US like Milton Bradley and Parker Brothers (which became a brand of Hasbro later) brought board games into the houses. Besides the developments in the US. In the same period, especially with the bans to make and play war-like games in the post World War II period, games started to promise new concepts in Germany and followingly all Europe, which introduced

family games to a mass population similar to the US case (Hawkinson, 2013). Games like Monopoly (Figure 3.3) and Checkered Game of Life (Figure 3.4) were some of the most popular games of that times which are still world-wide popular with their modern versions (Figure 3.5).

Figure 3.3 Vintage Monopoly Game (1937-1940)

(Source: web.8)

Figure 3.4 Checkered Game of Life

(Source: web.9)

Figure 3.5 Modern Version of the Game of Life by Hasbro

(Source: web.10)

Starting by the second half of the 1970s, with the introduction and proliferation of affordable personal computers like Commodore-64 (Figure 3.6) and rise of video games followingly, board games were first pushed into the background until mid-1990s. Soon after, the widespread usage of the internet allowed board game lovers to unite on online platforms like Board Game Designers Forum (bgdf.com) or Board Game Geek (boardgamegeek.com) to discuss and share information (Cengiz, 2008).

Figure 3.6 A 1985 Dated Video Game for Commodore 64

(Source: web.11)

Despite its long history, the literature or systemization efforts about games are only a few decades old. The book; Homo Ludens (1938) written by cultural historian Johan Huizinga can be counted as one of the earliest academic approaches on games. In his book, he discusses the culture and game relation throughout history (Huizinga,1938). He pointed out to games as the core of many human actions like language, law, art, and even philosophy. Tan (2014) refers to Huizinga's approach in her doctoral thesis and states: "*According to Huizinga, play is fundamental to human society and occurs among many species...*" (p.121).

Although Huizinga (1938) opened a new field in the literature, not many studies have followed his lead until the 1960s. It is widely accepted that U.S. Army who had been using war simulation games for training purposes was one of the main institutions which influenced researchers to treat gaming as a discipline during the 1960s (Halter, 2006).

As stated by Richard Duke (1995) in "Gaming: An Emergent Discipline" article;

> *"By the late 1960s, gaming had begun to take on some of the characteristics associated with the early development of a discipline. The East Coast War Games Council (vintage 1961) had been co-opted by gamers with a broader than military view into becoming the National Gaming Council. […] Another manifestation of the emergent professionalism of gaming was the publication of Simulation & Games in March 1970 by Sage Publications; this source has continued unbroken since that time."* (p.430)

It would not take so long for the term "serious games" to emerge after those professionalism efforts for gaming.

3.3. Serious Games

Playing games is getting more and more common among different demographical groups. Games are not targetting only "power-gamers" who were identified as *"typically young males fond of First-Person 3D immersive experiences"* anymore (De Gloria, Bellotti, Berta & Lavagnino, 2014, p.). Only 11% of the target group happen to consist of power-gamers while the rest represent many different player profiles which are increasing in number each day. That demographical change is being possible surely by the creation of new interaction methods and approaches to games (Berta, Bellotti, van der Spek & Winkler, 2016).

One of those approaches; "Serious Games" is a recent term which was first defined almost 50 years ago by an American researcher; Clark Abt in his 1970 dated book titled same as the term itself. Since then, the medium has been gaining an increasing worldwide interest in the game industry, especially in the last 20 years. A study conducted by Alvarez, Alvarez, Djaouti and Michaud (2010) found that t ilişkihe global Serious Games market was worth 1.5 billion € in 2010 whilst it has been increasing acceleratingly day by day.

Although it is clearly a trending topic; it would not be wrong to say that still not really covered as a scientific field while the available literature is still quite limited (Poplin, 2011). However, this can be a result of the fact that a clear, single definition for "Serious Games" phenomenon still has not been agreed upon in the academic environments. While it is concerning many different groups who are focusing on a variety of aspects, each group has a considerably different perception about the term. That's why, it would be better to understand what the term itself actually stands for. It consists of two words; "Serious" and "Games", which seem to have two contradictory meanings. In the Cambridge Online Dictionary, the first definition of the word "Game" says: *"an entertaining activity or sport, especially one played by children, or the equipment needed for such an activity"* followed by another definition underneath; *"something that is not treated seriously"* (web.12). Parallel to Cambridge Dictionary, games are commonly accepted and known as activities being done for fun and entertainment. On the other hand, the word "Serious" stands for a complete negative meaning of fun and even entertainment. Because of that lexical opposition, Michael and Chen (2006) refer to Serious Games as an oxymoron. That label has been accepted and used by others as well (Djaouti, Alvarez, Jessel & Rampnoux, 2011; Michael and Chen, 2006). But, how can something be both serious and a game at the same time?

That adversing concept dates back to ancient times. Humanity has been using fun for different kinds of serious purposes for longer periods than that we would have guessed and it could be traced back to Renaissance times. In the "*Origins of Serious Games*" article, authors assert: "*Neo-Platonists used the term "serio ludere" to refer to the use of light-hearted humor in literature dealing with serious matters" (Manning, 2004). A similar idea can be found in the Swedish novel "Den allvarsamma leken", whose English title is The Serious Game (Soderberg, 2001). Written in 1912, this novel tackles the delicate topic of adultery. The 'playful' side of cheating is put in opposition to the 'serious' consequences of adultery.*" (Djaouti et al., 2011, p.2). As an additional instance, between the years of 1996-1997, an art exhibition which links video games

and contemporary art displayed at the Barbican Art Gallery was named as Serious Games.

Despite the old undiscovered relation of fun and seriousness, how to identify a goal "serious" through a "fun" process is still a discussion topic. For instance, while some scholars define clear distinctions between non-serious and serious games, some others reflect a more flexible habit when explaining the seriousness of a game. In other words, many games that are being listed as serious ones would not be included in that category by some other.

3.3.1. Differences of Serious Games from Non-Serious Ones

Abt, distinguishes serious games from non-serious games by stating: "*Games may be played seriously or casually. We are concerned with serious games in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement. This does not mean that serious games are not or should not be entertaining.*" (Abt, 1970, p.95). As indicated, he sees serious games as educational games which will be discussed in the following parts. But the first attention-catching part in his definition is the idea that fun and the primary serious aim should not be in conflict but should be contributing to each other through the gameplay.

Similar to Abt, serious games are defined as "entertaining games with non-entertainment goals" by the webpage of Social Impact Games while there was no clue presented about any kind of educational purposes (Social Impact Games, 2008; Ratan & Ritterfeld, 2009) Prensky (2003), Zyda (2005) and Bellotti, Berta and De Gloria (2010) also point out to similar definition. Serious Games Initiative's co-founder, Ben Sawyer adds that "serious" in "serious games" expresses the main goal of the game, why it was created and has nothing related to the content of the game (Michael & Chen, 2006). Raph Koster, in A Theory of Fun for Game Design (2005), refers to the fun as a side effect when something new is learned and experienced, not the goal itself.

However, a survey conducted by Michael and Chen (2006) in their search for the fun-seriousness relationship in games indicated that more than 80 percent of 63 respondents which were consisted of serious game designers and developers, educators and researchers found "element of fun" whether as an important or a very important aspect for serious games (Figure 3.7). Authors note that fun is not something to be put in a game, but it is an outcome. Something which would be considered as fun would be so serious to another someone in serious games (Michael and Chen, 2006).

Figure 3.7 Serious Games Survey Results

(Source: Michael and Chen, 2006, p.20)

Susi et al. (2015) refer to The Serious Games Showcase and Challenge (sgschallenge.ist.ucf.edu), and the 2006 I/ITSEC Conference (Interservice/Industry Training, Simulation, and Education Conference), and view their "game" and "serious game" definitions:

> "*Entries will be considered a game if they involve an assigned challenge and employ a compelling form of positive and/or negative reward system. Entries will be considered a serious game if they use the gaming attributes described*

above to overcome a designated problem or deficiency, and provide appropriate feedback to the user about their efforts."

Although the fun aspect and enjoyment do not seem to be emphasized in this definition, the Conference's general description involves it better and indicates:

"*...it is important to clearly define the problem or need that is being addressed, as well as the gaming or game technology solution involved. It is equally important that your entry be not only technologically sound in its development, delivery and user interface, but also engaging, enjoyable, and easy to use; providing a challenging and rewarding experience to the user.*"

According to those definitions, serious games should be aiming to overcome a problem and bring a benefit to the player in addition to the game's general definition. Game developers should always keep the differences between games and serious games in their mind (Michael & Chen, 2006). It would be needed to change their mind-set from the knowledge and experience they have from the commercial arena.

Susi et al. (2015) present the differences between serious and entertaining games in four topics; Task vs. Rich Experience, Focus, Simulations, and Communication in Figure 3.8 Taking the table that they present into the account, entertainment games focus on fun with rich experience in a simplified process through perfect communication. Differently, serious games focus mainly on the learning aspect (task) focusing on problem-solving supported by assumptions through a non-perfect but natural communication.

	Serious games	Entertainment games
Task vs. rich experience	Problem solving in focus	Rich experiences preferred
Focus	Important elements of learning,	To have fun
Simulations	Assumptions necessary for workable simulations	Simplified simulation processes
Communication	Should reflect natural (i.e., non-perfect) communication	Communication is often perfect

Figure 3.8 Differences Between Serious Games and Pure Entertainment Games

(Source: Susi et al., 2015, p.6)

While there are a variety of different definitions for serious games; many different terms point to the concept of serious games as well. Ben Sawyer; co-director of Serious Games Initiative and Peter Smith from University of Central Florida lists; simulations, educational games, social impact games, virtual reality, persuasive games, games for change, alternative purpose games, games for good, edutainment, synthetic learning environments, digital game-based learning, game-based "X" and immersive learning as terms which mean same as the serious games (Ulicsak, 2010).

The number of different approaches and perspectives cannot be ignored, but it can be admitted that most of the definitions agree on one matter; serious games are more than entertainment. In that sense, the most basic definition of serious games can be expressed as; games with purposes and creation motivations other than fun and entertainment as their primary purpose. That also does not mean they should not be fun but they should not be solely for fun. They can be serving to specified educational, organizational, research-based, etc. functionalities. Michael and Chen (2006) summarize that relationship by stating; "*In serious games, 'fun' takes a backseat.*".

Nevertheless, "*identifying an exact definition of serious games is neither a straightforward nor pragmatic endeavor. The simplest solution to this problem is to*

treat every game that has been called a serious game as a serious game." as Ratan and Ritterfeld (2009) quoted (p.11).

3.3.2. Forms of Existence

Besides the definitional discussions, another dispute about the phenomenon is its form of existence. In the literature, there is a major common tendency about referring only to the digital forms while defining serious games. That might be a result of the U.S. Army's role considering that the rise of the research on the issue was highly influenced by training simulations being used by the army as mentioned in the previous sections. However, "serious games" is a wider umbrella which includes more than only digital forms such as card games, board games or math-related games (Abt, 1970) and its form of existence highly depends on the primary motivation. As an example; Djaouti et al. give an example from Jansiewicz (1973)'s "*The New Alexandria Simulation: A Serious Game of State and Local Politics*" book where he has chosen to design a physical game to teach about political mechanisms in the US. According to him, Jansiewics kept the game as a non-digital one because of the opinion that human interaction is the only way to transmit complicated political systems Jansiewicz, 1973 cited in Djaouti et al., 2011;).

While differing these two existential forms, it should be mentioned that they might also inspire each other. Kosa & Yılmaz (2017) gives Fluxx example to such case; a physical game which got developed in digital forms afterwards. Vice versa is also possible while the most outstanding example case would be the World of Warcraft, which became highly popular in the physical version after the digital one as well (Hawkinson, 2013).

Today, with the emergence of multi-media and mixed-media practices, games are also being re-thought. It even does not make sense to spare digital gaming forms from tangible ones anymore. Hybrid relationships of digital and physical mediums offer

new patterns of interaction and communication through gaming. To name an example; “Hybrid Monopoly” designed by Park (2017) is a cyber-physical board game including both environments; a physical board and a digital screen powered by Android system; bi-directionally functioning in response to the moves and manipulations applied (Figure 3.9). Although the examples given above were not identified as serious games by their creators, developments and findings are valid for serious ones as well.

Figure 3.9 Hybrid Monopoly Game

(Source: Park, 2017)

3.3.3. Aims of Usage

There are a variety of aims that a serious game can be focusing on. Michael and Chen’s (2006) categorization of serious games according to the main goal of the game includes; military, governmental, educational, corporate, healthcare, political, religious, art games while each game can apply to multiple categories and the category list can be extended. To give a few examples, marketing games, promotion games, research or social interaction games are also some other which are commonly existing in the literature.

3.3.3.1. Educational Games

While talking of serious goals of a game, there is another viable dominancy of narrowing the scope to the educational games in the literature which was first addressed by Abt (1970). Marc Prensky; founder of an education through gaming company; "Games2train" remarks that games should be fun primarily but they should also encourage the learning activity (Prensky, 2001). Similarly, Michael and Chen (2006) believe that the main aim of serious games is getting the players to learn while playing and enjoying and there is a considerable crowd of scholars sharing the same thought.

Board games specially developed with the spread of public schools during the late 19th century in the USA. In that period, the game industry built up their commercial campaigns on the need of educational board games for well-educated kids for the future of a democratic, moral country (Cengiz, 2008). The concept; which gaming helps to the development of multiple numbers of different skills of the player is being called as "edutainment". The term refers to "*any form of education that also seeks to entertain*" (Michael & Chen, 2006, p.24). While talking about educational games, Trivial Pursuit might be the first example which would flash in many people's mind if not some other gamified quizzes. However, Hawkinson (2013) thinks learning activity is beyond only remembering some facts to challenge each other in order to win.

Squire and Jenkins (2003) claim that kids should be able to interact, create, experiment and share through educational games like they do at school corridors and games can surely support learning activities through supporting the thought of different possibilities and correlations accordingly. Different types of games would support a variety of skills. Letter blocks to enhance coordination abilities and alphabet learning, puzzles for psychomotor skills, questioning games for history/science teaching, story-based ones for ethical or moral education, team games for strategic skills and many more (Cengiz, 2008; Braden, 1988; Mitchell and Savill-Smith, 2004). Besides the ones focusing on children education, there are also examples being used in universities

like a pharmacy game developed by Tyler M. Rose to support students learning about metabolic pathways (Rose, 2011; Hawkinson, 2013).

While a game can be developed just for entertaining purposes, it is also possible that unseen serious advantages may occur out of that "fun". For example, abilities like mental rotation can get improved by games like Tetris (DeLisi and Wolford, 2002). Moreover, those advantages are not only limited to the educational ones but some others as well like violent games, which can have a positive impact to reduce one's disappointment (Susi, Johannesson, & Backlund, 2015).

3.3.3.2. Research-Based Games

For some games, instead of the player, the game creator can be the beneficiary in terms of research-based purposes as well. Possible advantages of gaming as a research method has been discussed by many researchers, including; Coulton (2015), Fullerton, Swain and Hoffman (2008), Bogost (2007), Abt (1970), Coulton, Burnett & Gradinar (2016).

In her doctoral thesis on gaming as an urban design method issue, Ekim Tan (2014) exemplifies the games that are being used for research purposes. For instance, creating a communication platform which brings different actors together to solve issues like energy saving while considering both social and economical sustainability or solving medical puzzles with the help of millions of players (e.g. fold.it) are only two examples to name. Like the fold.it project, for computer sciences or medical problems, the human ability of problem-solving can play a crucial role for such issues which would not be solved through softwares.

Besides the positive sciences, research possibilities through gaming in social fields also deserve to be considered. The medium of gaming can provide a fertile environment for the researcher in order to support the understanding process of psychological aspects. Moreover, gaming can provide such experiences to the

participants which are hard to live through because of a variety of constraints like time budget etc. (Corti, 2006; Squire & Jenkins, 2003; Susi et al., 2015).

3.3.3.3. Urban Games

Usage of games in urban planning practices is an emerging trend, especially for the last few decades. However, the history of games on urban environments dates back to 1900s. *The Landlord's Game* which was introduced in 1904 with the aim of illustrating the need for social reform was a very early example of games which are focusing on urban issues (Stephens, 2016). After the stock market crash in 1929, *Monopoly* got released to the market as a developed version of *The Landlord's Game* and became world-wide popular. Since then, many games have been developed with real-estate concepts. However, games that are primarily concentrating on direct urban planning concepts came into forth by the 1970s (Wilson, 1975). Since then many different games with urban design concepts have been developed like *Big City* (1999, Figure 3.10) or *Urban Village* (2007) (Stephens, 2016).

Figure 3.10 "Big City" Board Game

(Source: Stephens, 2016, p.261)

Besides the board games, one of the initial digital games with urban planning themes; SimCity was released in 1989 (Poplin, 2011), (Figure 3.11). The main aim of the game was creating an optimal urban environment in terms of issues like spatial planning, resource distribution, population regulation and there was no focus on competing or winning the game (Nijholt, 2017). PlastiCity, Super City, The Grepolis Game are some other examples of digital urban games which were designed for entertainment purposes (Poplin, 2011).

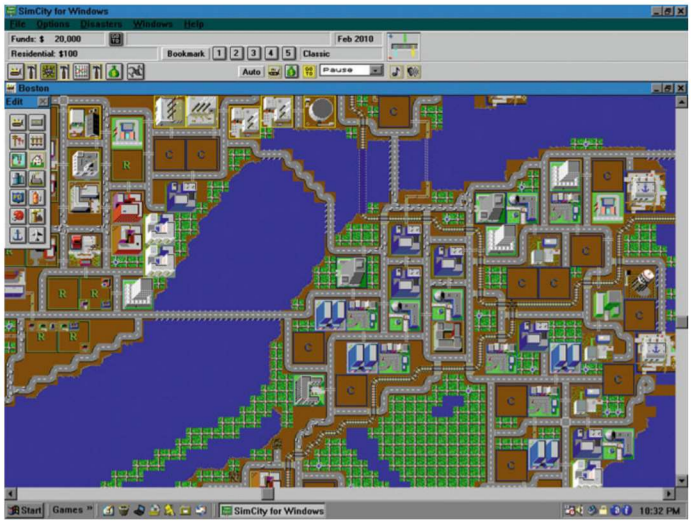


Figure 3.11 "SimCity" Computer Game

(Source: Stephens, 2016, p.268)

However, in regards to games' high potential of problem-solving and the rise of the serious gaming concept, today gaming is being widely used as a pragmatic tool in the urban design and planning practices as well as other fields which were mentioned in the previous sections (e.g. military, educational). Schouten, Ferri and de Lange (2017) list different applications of games in urban contexts as:

"*These playful applications range from (1) Involving urbanites in the actual planning process of the city (Tan and Portugali 2012), (2) Engaging them in collective urban issues like air pollution, vacancy (de Lange 2014), (3) Engaging them with fellow citizens as a way to create more playful interactions and build trust between strangers (e.g., Kars Alfrink's Koppelkiek; 99 tiny games in UK), (4) Creating meaningful memories via playful poetic experiences (Rieser 2012), or (5) Play as critical tool, e.g., procedural rhetoric that allow people to reflect on future of their cities, or play/games as ways to imagine possible alternatives (Flanagan 2009).*" (p.24)

Besides the other application areas, a significant portion of the urban game studies currently approaches to gaming as a consensus ground to enable participants to make decisions through role-playing within bottom-up frames and take responsibility in the city production processes. Tan (2014) widely discusses the issue in her book called *Negotiation and Design for the Self-Organizing City*, and underlines gaming's ability as a generative method for multi-agent and self-organising settlements. While there are some efforts on designing contextless games to be applied in different environments, many of the studies also focus on specific problematic areas to be re-designed or upgraded (e.g. Pop-up Pest). Nowadays, the most important progress in the field is municipalities' recent efforts in including the city users in the decision-making processes through gaming, even though it is not a direct participation method.

3.4. Game Design Process

Abt defines games through specifying none-games. He indicates; "*...what is not a game? Things are not games. Intrinsically noncompetitive processes, such as production lines, are not games. Predetermined procedures are not games. While all*

games simulate something from the real world, not all simulations are games." (Abt, 1970, p.9).

On the other hand, when we review the list of characteristics that Huizinga (1938) reported, we can easily catch the similarities of his "play" and Abt's "game" explanations.

As he reports:

1) Play is voluntary
2) Play is not real life
3) Play is immersive and motivating
4) Play happens in a specific time period and place
5) Play bases on rules
6) Play is a social environment

While he asserts that play should be separate from real life, that does not mean play or game should not be simulating real life. In fact, many of the games are being influenced by real-life situations. As an example, Hawkinson (2013) explains a board game which was specifically designed to help people with the citizenship exams to migrate to the US. The gameplay was designed as a replicate of the real interview.

However, Huizinga (1938) names the physical/conceptual area that a game is being played as; "magic circle". He remarks that a magic circle is a complete another context which rules of the real world does not apply, which has its own rules and laws designed piece-by-piece (Figure 3.12).

Figure 3.12 Huizinga's Magic Circle of a Game

(Source: web.14)

In order to design a prospering game, the first step to be taken is planning a holistic development process step by step. Kortmann and Hartveld (2009) present a systematic process consisted of four phases; Scope, Design, Build and Test (Figure 3.13). Scoping phase is the part where the main aim and the overall process is being planned which will be followed by the design phase where the rules, form of existence, gameplay, interaction decisions etc. are being decided and created to reach the main aim. Before going further after the scope and design phases, the process should be checked to understand the level of success until that time which should be resulting in going back to the possibly problematic preceding phase if the design is not functioning successfully. The same process of testing is valid also right after the build and test phases where the designed game gets prototyped and playtested. That repetitive process is crucial in order to improve the game by detecting and evaluating the errors, weaknesses or potentials (Kortmann & Harteveld, 2009).

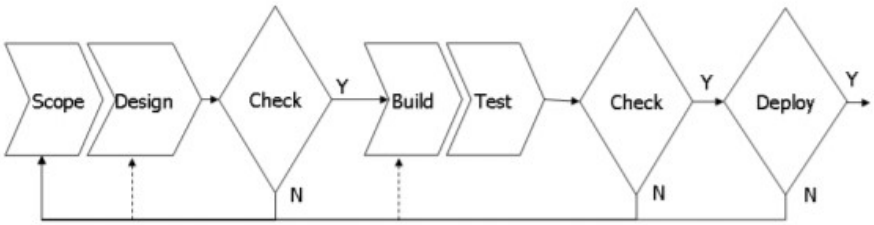


Figure 3.13 Kortmann and Harteveld's Game Design Process

(Source: Kortmann & Harteveld, 2009)

3.4.1. F + MDA Framework

Although there are many different frames being developed to identify "layers" of game design, "*MDA*" of Hunicke, LeBlanc and Zubek (2004) and "*Elemental Tetrad*" of Schell (2008) are the most outstanding and referred ones. MDA introduced by Hunicke et al. (2004) is a systematic framework to elucidate a multi-component artifact; games. It is a game development methodology through defining three linked components of game consumption and production; Mechanics, Dynamics and Aesthetics as shown in the Figure 3.14 Mechanics is basically the guide of the game including rules, goals etc. while dynamics are the arisen circumstances with the effect of different dynamic features. Lastly, aesthetics was explained as the fun that arises as a result of those dynamics previously mentioned.

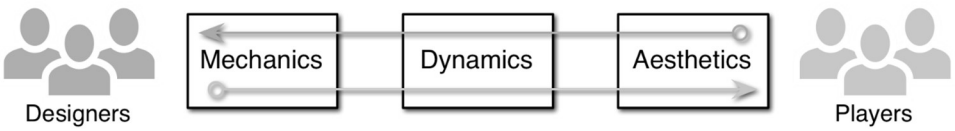


Figure 3.14 MDA Framework

Hunicke et al. explain the relationship of elements by examining that a card game might have mechanics like shuffling, betting, trick-taking etc. Those mechanical actions, would certainly result in players start bluffing as a dynamic response, in order to compete with each other whereas the competition is the main aesthetic value.

The framework points out to two groups of subjects while researching about games. The first group is game developers or designers who create the game to be consumed by the other group; the players. They indicate that the perspective of these two different groups cannot be the same. From a designer's point of view, the mechanics lead to dynamics and followingly aesthetics while the player sees the chain completely the other way around. Designer develops a game through identifying particular objectives, procedures and rules and then obtain unpredicted dynamic behaviours occurred in response to those mechanics. As a result of that interaction, players will have certain feelings about the game which is called aesthetics. Each of the MDA elements is being subject to other ones. As an example, a competitive game would be successful only if the players got excited and persuaded to beat each other. However, players consume games aesthetically first, dynamics are the reason behind that feelings emerged as aesthetics and mechanics are the pathways in order to create dynamics.

While Elemental Tetrad of Schell's (2008) replaces the "Dynamics" with the "Story", it also includes a fourth element; "technology" which has never mentioned by Hunicke et al. (2004). Therefore, the aspect of physical being for board games needs to be additionally explained. Thus, a combination of both has been decided to be used in this research which will be called: "T+MDA".

3.4.1.1. Technology

As Schell (2008) also reports, technology for game design does not necessarily mean any kind of high-tech computer program or digital equipment but more likely

any kind of tool that is used to produce and represent the game. By saying tools; the game board, papers, cards, dices, tokens etc.; any kinds of material can be imagined for the case of board games (Schell, 2008). Technology of a game should be supporting aim of the game, gameplay and surely the manual practicality as well with its handiness and clear graphic design.

3.4.1.2. Mechanics

Mechanics are basically decided functions to control and lead the gameplay or in other words, elements that structure and guide the game. Analyzing the mechanics of games is not an easy task since it includes many issues (Hawkinson, 2013). While talking about mechanics, the scope is not only limited to rules, but also every kind of decision made to lead the process and any function to affect players behavior and interaction.

While defining mechanics, the "Formal" elements of FDD framework defined by Fullerton et al. (2008) can also be considered. In the FDD, formal elements were listed as players, objective, rules, procedures, resources, conflict, boundaries, and outcome. While all of them can be accepted as parts of the game mechanics, in this study, we will only stress on players, rules objectives and procedures as more generic titles.

Objective:

Game objectives can differ from player to player or can be the same for everyone while each player might also have the right to choose one or even a few among several. Besides the main goal, there might also be supporting sub-goals to reach the main ones. All those decisions to be made by the designer depends on other mechanics of the game structure. Fullerton et al. (2008) refer to a few possible objective types defined and used by other scholars as:

Capture; to get or ruin other players' belongings while defending for the same thread. E.g. Chess

Chase; to follow other player(s) to capture or remove E.g. Fox and Geese

Race; to become first to achieve an objective or to reach a spot. E.g. Ludo King

Alignment; to place gaming pieces in order or in a spatial configuration. E.g. Tic-Tac-Toe

Rescue or escape; to have a specific element saved. E.g. Emergency Rescue: Firefighters

Construction; to build or manage a system of pieces E.g. Settlers of Catan

Exploration; to discover and search in order to achieve specific elements E.g. Tikal

Forbidden act; to avoid particular actions or moves which would depend on motor skills or flexibility E.g. Operation

Solution; to become first to solve a specific problem or puzzle E.g. Myst

Outwit; to obtain and process knowledge about something to beat others E.g. Survivor

Figure 3.15 Example Games According to Objectives of Fullerton et al. (2008)

From Left to Right, First Row: Chess, Fox and Geese, Ludo King, Tic-Tac-Toe
From Left to Right, Second Row: Emergency Rescue: Firefighters, Settlers of Catan, Tikal
From Left to Right, Third Row: Operation, Myst, Survivor

(Source: web.15)

Players:

Number of players is one of the primary decisions to be taken care of. While a game can require a definite number of players, some might offer a range.

Role of players might vary for each game and theme. While all the players of one game can hold the same role, they can be differentiated within the same game as

well to be working in a team and task sharing. Besides the predefined roles, Bartle (1996) explains the four basic player types that would arise during games. He lists: achievers, explorers, socializers and killers. Although they are also player roles, they are mostly dependant on the player's personality and knowledge which could not be foreseen. That's why Bartle's categorization should not be included under mechanical elements buy dynamic ones.

Interaction patterns are to define if the players will be competing, cooperating or both at the same time, in groups or individuals would be listed in seven categories:

1) Single player vs game
2) Single player vs player
3) Multiple individual players vs game
4) Multiple individual players vs each other (Multilateral competition)
5) Multiple players together vs other player (Unilateral competition)
6) Multiple players together vs game (Cooperative play)
7) Multiple players together vs multiple players together (Team competition)

Rules:

Abt (1970) emphasized that "*…a game is a context with rules among adversaries trying to win objectives.*" (p.7). He clearly addresses rules as limits of the context, being applied equally to all players.

While explaining rules, Parlett (1999) points out to two types of games considering whether play process was directed or non-directed; formal or non-formal. According to him, in order to create a formal; directed game, set of procedures and rules are obligatory on the path to an enjoyable winning state. While rules are equally valid to everyone, that fact should not lead to any monotonous or similar gaming experiences. As a major example, while rules are simply certain and equally applied to everybody for the game of chess for many decades, player's interaction in terms of each move as

a response to another one creates unpredictable complexity of game systems (Tan, 2014). That complexity is actually the success factor of the developer who managed to provide a balanced, controlled instability. In order to achieve such success, there are few considerations a developer should take care of. Firstly, all the rules are generally being presented and explained through instruction/information sheets which supported with graphics and infographics. Too many rules presented through those info sheets have a high probability to confuse or bore players (Fullerton et al., 2008). Additionally, especially for the serious games, when rebundant amount of restrictions or rules are being presented, the main serious goal of the game would be way too visible which would result in loss of interest and attention of the player (Hawkinson, 2013).

> "*In general, it is important to keep in mind that the more complex your rules are, the more demands you will place on the players to comprehend them.*" (Fullerton et al., 2008, p.71).

On the other hand, that does not mean rules should be left unstated or defectively explained which would cause players to lose the meaning of the game and interest in the end as well. Each rule should be elaborately established and minimized in accordance with the game structure. On top of that, each of the rules should be successfully presented to the player in order to avoid having them "*feel cheated by the consequences of certain rules.*" (Fullerton, 2008, p.68). On the other hand, if a player discovers a way to exploit the game to easily win, while other players might feel cheated, the player would get bored because of losing the sense of challenge too. Lastly, Abt (1970) thinks that games can not be prospering if "*...the players do not understand its rules, their objectives in the game, the consequences of their action, and the reason for these consequences.*" (p.115).

Fullerton et al. (2008) introduces three concepts of rules according to their major effects on the gameplay:

Rules Defining Objects and Concepts: Each of the physical objects in board games should and do have an appointed meaning generally defined by rule sets which should be carefully understood by players to be able to internalize and interpret. Those objects differentiating from each other in terms of their roles in the game should also differentiate visually with features like color, shape, position etc. Similarly, concepts should be also uniquely developed for a game and framed with sets of rules. In order to define objects and concepts, it is a crucial point to evaluate their success of simpleness for players to perceive and understand besides the distinctness (Fullerton et al., 2008).

Rules Restricting Actions: Rules that are developed in order to support players' experience in terms of leading them to not make mistakes or senseless moves can be conceptualized as rules which restrict actions. Fullerton et al. (2008) calls such situations as 'potential loopholes' to be foreseen by the developer. "*In chess, the rule that 'a player cannot move their king into check' keeps players from losing the game by accident.*" (Fullerton et al., 2008, p.69-70).

Rules Determining Effects: Lastly, rules that are conditioned by the realization of a certain aspect are called rules that determine effects. These type of rules mostly function with "if" situations like; if a player reaches the last circle, the next player would get a right to remove a token (Fullerton et al., 2008).

Besides the sub-topics listed above, Hawkinson (2013) presents a holistic list of mechanics adapted from Gamification.org which includes motivational elements like points or bonuses, interaction patterns like community collaboration, content elements like levels as well as objectives like discovery. That kind of a listing also proves how broad the term is (Figure 3.16).

Figure 3.16 Gamification Mechanics

(Source: Hawkinson, 2013, Captured from p.323)

Lastly, not singular rules but actions which players perform within singular rules in order to reach the objective are called procedures. Fullerton et al. (2008, p.66) again lists four types which would be valid for almost all games as:

1) *Starting action: How to put a game into play.*
2) *Progression of action: Ongoing procedures after the starting action.*
3) *Special actions: Available conditional to other elements or game state.*
4) *Resolving actions: Bring gameplay to a close.*

3.4.1.3. Dynamics

Dynamics are arisen responses to game mechanics. Even though mechanics consist of planned and decided features, what kind of behaviours would occur while performing it cannot be certain in some cases. Therefore, dynamics would provoke many consequences. Designer should explore possible dynamics and strategies to happen during playtesting phases to be able to develop the game in a reversible process where mechanics are re-visited in response to the arisen dynamics. All the

possibilities which would cause any kind of errors and block the gameplay should be thought in depth and limited with game mechanics if needed.

At that point, the well-known Chaos Theory of Lorenz (1963) perfectly explains how the dynamics function through pre-defined mechanics as acknowledged by Levy (2003);

> "*One of the major achievements of chaos theory is its ability to demonstrate how a simple set of deterministic relationships can produce patterned yet unpredictable outcomes.*" (p.168)

As Levy (2003) points out, each action affects another future action and situation which creates endless number of possibilities as in the example of chess mentioned above. Although it has been played for many decades with the same sets of rules, the result still can not be foreseen from the beginning. Dynamics; decisions of players, the interaction that arise as a result of those decisions creates a butterfly effect.

Dorman (2012) acknowledges about how chaos should be applied within a game:

> "*A true chaotic system will seem random and meaningless to most observers, whereas in games it helps if the player can make sense of what is going on. Where rules push games towards chaos by introducing dynamic behavior, levels pull games back towards order by imposing structure. If games are pulled too far back, they become games of progression where the spatial structure dominates the rules and little dynamic play remains*." (Dorman, 2012, p.14)

As Hawkinson (2013) argues, games cannot be appreciated as a system of perfectly designed rule sets. More likely, they are the experiences (aesthetics) those rules and all mechanics create. All those aesthetic experiences are being acquired through the interaction between players and rules.

Hawkinson (2013) presents player and game-based dynamics as two main categories which player combines during the gaming as shown in Figure 3.17. Luck, strategy and skill-knowledge are the three attributes of player-based dynamics which should be properly framed by the designer in order to enable players to keep a balance between them. For instance, if a game over-depends on luck factor than the conscious decisions and strategies, it would result in player's boredom who does not feel effective during the game. Similarly, so many different actions being available or circumstances that cannot be clearly foreseen would also create numerous dynamics which has a risky probability of having the players feel that they got lost in the flow of the game.

Figure 3.17 Gamification Dynamics

(Source: Hawkinson, 2013, Captured from p.320)

3.4.1.4. Aesthetics

Aesthetics; the final level for the designer and the start for the game player. Aesthetics is basically the joy and feelings; the emotional response players experience while playing the game. Due to the complexity of emotional responses, the knowledge we have about the cognition of game players is still quite limited. (Squire, Giovanetto & Devane, 2005).

While the element of fun has been pointed out to explain aesthetics, it includes many different aspects. Several concepts of aesthetic goals are listed in Figure 3.18 below although they are not limited to only those. Moreover, each game is not limited to only one feeling but multiple aesthetic features.

Figure 3.18 Aesthetic Gaming Goals

(Source: Hunicke et al., 2004, Captured from the text)

Bartle (1996, p.2-3) defined a player taxonomy basing on MUDs; Multi-User-Dungeons or Multi-User-Adventure Games and after evaluating player behaviors within the game, listed four things that players enjoy while playing MUDs as:

1. Achievement within the game context.
2. Exploration of the game.

3. Socializing with others.
4. Imposition upon others.

Those four sources of joy are therefore characters that a player puts on during the game; being an achiever, an explorer, a socializer or a killer according to their main interests within the acting-interacting and players-world (Figure 3.19). For instance, a player who is more interested in the “players” and “acting” are listed as killers since they focus on how to distress and attack someone. Socializers are the other group focusing on “players” in addition to their focus on “interacting” instead of “acting” as killers do. They care more about the people that they play with and what they say. Game is just an interaction tool for them. On the other hand, achievers and explorers are the ones who focus on the “game world” instead of the players themselves. While explorers are more into “interacting” and they try to interact with the game mechanics, trying to understand its features, bugs and the system; achievers care more about acting to win, to gain something, to achieve.

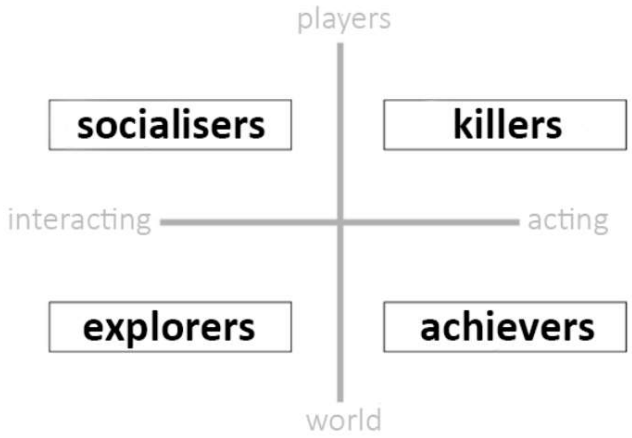


Figure 3.19 Player Taxonomy of Bartle (1996)

Later on, XEODesign company owned by Nicole Lazzaro conducted a research between 2003-2004 to understand people's motivation while playing games. As a result of that process, a framework has been offered to explain the main keys of fun and the dynamics that lead to fun. As well as the common emotions like fear, surprise, disgust, naches/kvell, fiero, schadenfreude, wonder; unusual ones like excitement, frustration, amusement and sensory pleasure have been introduced by observing people while playing; through their facial expressions, body language etc.

Similar to Bartle's approach, four types of play/player styles; "*4 Fun Keys*" were identified within a two-dimensional cartesian graph under directions of structured-open ended and real world-game world (Figure 3.20-3.21). 4 styles between those can be introduced as:

People Fun; raises by competition, cooperation, communication etc. with the sense of being with friends or socializing.
Easy Fun; raises by exploration, fantasy, creativity etc. with high-interest and curiosity.
Hard Fun; raises by challenge against goals, obstacles strategies etc. in order to achieve/win.
Serious Fun; raises by repetition, rhythm collection etc. while focusing on the purpose.

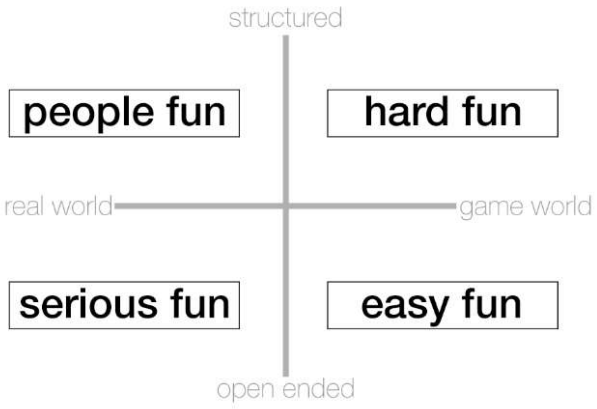


Figure 3.20 "4 Keys 2 Fun" Simplified

Figure 3.21 "4 Keys 2 Fun"

(Source: Lazzaro, 2004)

Another theory, the theory of flow revealed by Csikszentmihalyi (1990) explains the notion of engagement through the relation of difficulty of the game and ability of the players. According to the theory; if the game is too hard, the player gets anxious and frustrated. On the other hand, if the player ability is higher than the game's difficulty, it results in boredom. It suggests that these two features need to be in balance and

should not be beyond each other in order to create an enjoyable gameplay which players feel like time just “flow”s (Figure 3.22).

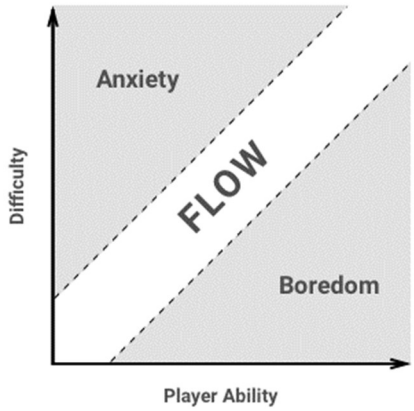


Figure 3.22 The Flow Theory of Csikszentmihalyi (1990)

(Source: Roungas, 2016, p.4)

However, besides the main qualifications of gaming and challenges of the game design process, developing a serious game requires additional priorities and stresses than designing an entertainment game. Especially for the case of research-based games, while one of the main aims is collecting data, avoiding possible biases which would be caused by the gameplay is an important issue. At that point, the game rhetoric and the playability should not be in conflict but should be supporting each other. Additionally, as discussed while defining the serious games, the aspect of fun also should not be ignored since it is the main motivating factor to engage participants and encourage them to keep playing it or in other words; keep providing data. If the fun is absent or the game is unpleasant, it would not be expected to get valid reliable data. Developer should be decisive to design a meaningful game answering all the planned targets. Different than the entertaining games, serious games should be depending on the conscious decisions of players while randomness would not be really appreciated (Michael & Chen, 2006; Susi et al., 2015). There are not many other discussions on

that opinion but if the relationship of the gameplay and serious purpose has been very well developed, some randomness during the game might not affect the player's conscious decisions or the main goal to be achieved.

CHAPTER 4

METHODOLOGY

4.1. Introduction

This chapter introduces the research methodology, which was followed during this thesis study. It includes the rationale of the research process, aims and research questions, the developed experimental research method, overall application process of that method, and followed protocols, as well as the roadmap that was followed to interpret and evaluate the process and the results.

4.2. Rationale, Aims and Research Questions

The main goal while conducting this study has been designing and proposing a new tool to understand the users' environmental perception in a collective manner and then testing its performance and potential through the application of case studies. It was aimed to understand if this new method can be a valuable and reliable input for urban designers; seeking for user-sourced perceptional information.

As mentioned in Chapter 2, there have been many spatial cognitive mapping studies being applied for some years since Lynch (1960). Nevertheless, most of the techniques are focusing on the end-results of those mapping processes which were created by overlapping individual images. Therefore, they are able to reflect common urban images but it has not been possible to understand participants' daily spatial experiences and the meaning of the space accordingly. How could a tool collect that kind of qualitative data to explore participants behaviour, perspective, perception, experience, and feelings?

Kevin Lynch (1960) analyzes environmental image by defining three main components in his book, *The Image of The City,* which was explained in the second chapter of this thesis and will be used as a theoretical basis for this study. He states:

> "*An environmental image may be analyzed into three components: identity, structure, and meaning. […] A workable image requires first the identification of an object, which implies its distinction from other things, its recognition as a separable entity. This is called identity […] Second, the image must include the spatial or pattern relation of the object to the observer and to other objects. Finally, this object must have some meaning for the observer, whether practical or emotional. Meaning is also a relation, but quite a different one from spatial or pattern relation. Thus, an image useful for making an exit requires the recognition of a door as a distinct entity, of its spatial relation to the observer, and its meaning as a hole for getting out. These are not truly separable. The visual recognition of a door is matted together with its meaning as a door."*

The "meaning" is not really separable from identity and structure, however it is not easily affected by physical changes to be considered by urban designers. He defines the "meaning" as a more individual component which would not provide an overall understanding of the samples and concentrates more on the ability of wayfinding (Lynch, 1960).

> *"To begin with, the question of meaning in the city is a complicated one. Group images of meaning are less likely to be consistent at this level than are the perceptions of entity and relationship. Meaning, moreover, is not so easily influenced by physical manipulation as are these other two components. If it is our purpose to build cities for the enjoyment of vast numbers of people of widely diverse background—and cities which will also be adaptable to future purposes—we may even be wise to concentrate on the physical clarity of the image and to allow meaning to develop without our direct guidance. The image of the Manhattan skyline may stand for vitality, power, decadence, mystery,*

congestion, greatness, or what you will, but in each case, that sharp picture crystallizes and reinforces the meaning. So various are the individual meanings of a city, even while its form may be easily communicable, that it appears possible to separate meaning from form, at least in the early stages of analysis. This study will, therefore, concentrate on the identity and structure of city images." (Lynch, 1960)

While developing this study, his decision was found debatable. In which way could the meaning of the space be collected? Moreover, how could it be understood and interpreted by the professionals? Could it be valuable to take into account while searching for the city image?

While talking of the meaning, Nasar's (1990) discussions about evaluative maps were also taken into account which he indicates that imageability can not be separated from feelings. People memorize spaces that they have attachment which is sourced by specific emotions and experiences. He gives reference to works of Appleyard (1976), Harrison and Howard (1972) and Evans, Smith and Pezdak (1982); all pointing out to the importance of evaluativeness while building a mental city image. Thus, he offered a likeability scale of "most liked-liked-liked\disliked-disliked-most disliked areas". His mentality is adopted to be used experimentally by dividing the likeability into two feelings; cosiness and inspiringness. Those two feelings are chosen to distinct if a person reflects a positive feeling about the space because there is no disturbance (a cosy place) or if it is liked because it sparks joy to the user (an inspirational place).

However, in order to understand the meaning of the space through both, feelings and experiences, group discussions or private interviews can seem to be a solution, but which kinds of questions would encourage participants to unveil such knowledge? Besides that, the other very crucial challenge about both of those methods is not only getting the participant involved and encouraged but also keeping them involved during the meeting and avoiding the loss of motivation as much as possible.

At that point, gamification/serious gaming takes the stage. While studies prove that students generally lose interest after 15 minutes at the school, how video games would keep the player engaged for two to four hours is being highly discussed (Michael & Chen, 2006). Just like students, research participants may get bored and tend to talk less after a while during an interview or group discussion as well. That situation would result in collecting a little or even wrong information which poses a high risk in terms of reliability and validity of the study. In order to propose a solution to this challenge, triggering the motivation of participants during the data collection process is found to be the primary goal. Thus, with the awareness of its motivational aspects, gamification/serious gaming was decided to be the solution.

Not only that, but the aim of proposing a "consensus-ground" to be able to collect collectively produced data was the second one of two main challenges. It has been observed by many studies that games have significant power to enhance communication and interaction among players as mentioned in Chapter 2. With that reason, a board game where multiple players can exchange opinion can contribute to the aim of understanding a collective memory meanwhile not threating uniqueness of the individual experience as well. While individuals have their own images about the environment, there is a considerable alignment between people with similar cultural, economical, etc. backgrounds (Lynch, 1960). While Lynch also agreed on that idea, nevertheless he collected the data from individually-conducted techniques instead of a focus on interaction creation. Also, through a serious gaming method, instead of the researcher or the research instrument digging for more data from the participant, the interaction among players can take on that role too. To answer all those needs, "Can a serious game; a playful environment to provide maximized interaction and motivation among players be successful to understand people's perception and experience about urban space?" became the main research question of the study. Thus, Co-gnito was specifically designed to combine the use of gamification principles to structure the collaborative mapping process in engaging and expressive ways.

As Michael and Chen (2006) indicate, what one person considers as fun would be something serious to someone else. Using serious gaming as a research tool would work the same way. What the player considers as fun might be very serious to the beneficiary; the researcher. In this study, that kind of a role has been played by presenting a fun and enjoyable environment to participants and maximizing the scientific benefit through the gameplay for the researcher's sake. Moreover, relying on the nature of qualitative research, social theory of reflexivity suggests that; cause and effect are in a circular interconverting relationship. “Cause and effect” like “research and game” thus, “the researcher and the participant” are in a circular interconventing relationship as in Figure 4.1.

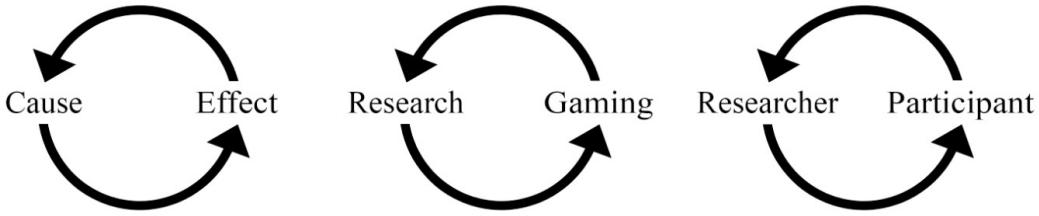


Figure 4.1 Logic of Theory of Flexibility Influenced by Michael & Chen (2006)

4.3. Co-gnito as a Serious Game to Understand Urban Perception

Game design is mostly about “*what is left out as much as what is put in*” as Kent Quirk claims (Michael & Chen, 2006). To focus on the main serious aim, defining the game frame is an important process in order to collect reliable, targetted data. At the beginning phases of the design study, the previously explained main goals of the Co-gnito game are listed in three matters.

Designing a game;

1) to create an environmental cognitive map
   through a board game.
2) to enhance collectivity and interaction
   through mechanics of the game.
3) to understand the meaning aspect
   through storytelling.

Co-gnito was designed at the Research[x]Design Lab of Department of Architecture at KU Leuven with the support of Prof. Dr. Andrew Vande Moere, Doctoral Researchers Georgia Panagiotidou and Eslam Nofal. It is a gamified cognitive mapping method; transmissing environmental knowledge from ones to others' mind while using Kevin Lynch's Image of the City theory and 5 image elements it presents. Designing a serious board game brings new discussions and possibilities to Lynch's theory. Instead of understanding individual perceptions, it is aimed to design and test a collective method which can be categorized under "consensual mental map" of Wood (1973) as explained in Chapter 2.

The game design was realized under 2 aspects ; the Technology and the Mechanics with respect to Hunicke et al.'s (2004) MDA framework (Mechanics, Dynamics, Aesthetics) plus its Technology as a board game.

4.3.1. Physical Design (Technology)

During his studies on three American cities, as one of the three methods that Lynch (1960) applied; he asked participants to draw their mental maps on a piece of paper which reveals two main representational issues; limitation of participants drawing ability and the physical limitation of the paper. In the discussion part of his book, Lynch discusses about players who tend to avoid drawing specific places when it is hard to draw because of a formal, relational or oriental confusion or uncertainness.

Tovi Fenster also discusses about probable results of participants who have limited abilities of drawing even though the existence of an abstract legend provided by the researcher (Fenster, 2009).

A second issue which is also somehow linked to the first one was mentioned as:

> "*Faced with a blank sheet of paper, a pencil and the vast complexity of some specified environment, how do you proceed? First of all, how is your confidence about drawing anything? Do you draw a line or two and then sigh that since you never could draw at all, how can you map? And hand your paper in mostly blank? Or do you proceed to draw a main street, add a couple of cross streets, put in a couple of landmarks, and then – 'Oh, my! I've forgotten all of the neighborhood which goes in there between… But I don't have room…' and start to struggle valiantly with the eraser on the end of the pencil? Or do you exert yourself desperately only to be crushed in the end by problems of varying scale ('This part is bigger than it should be.') or inadequate symbolism ('I could not think of a symbol for the Building, so I left it off.') or orientation ('I never could figure out where north was, so think the map is o.k., but you may have to turn it.')*" (Wood, 1973, p.68)

As a response to such issues, Co-gnito was designed as a flexible physical object which allows participants to behave in a lego-alike dynamic manner. Thus, besides being a game, it stands also as a "data physicalization" tool which can be defined as "*a physical artifact whose geometry or material properties encode data.*" (Jansen & Dragicevic, 2013, p.3228).

Humans have been representing the data in physical forms for thousands of years. For instance, Sumerians were using clay tokens to represent quantitative data more than 7000 years ago; even before the invention of writing (Jansen et al., 2015). However, with the recent advances in the production and representation techniques, "data physicalization" became an emerging research field in response to different artistic and functional aims (Zhao & Moere, 2008).

The physical representation of data has a potential to bring perceptual, cognitive and societal benefits in addition to the ones that visual representation offers (Jansen et al., 2015). One of those is ability of perceiving the abstracted data from different distances and perspectives to be able to detect different relations among different variables. Jansen et al. (2015) calls that as "active perception" and states:

> "*A major benefit of physicalizations is that they better exploit our active perception skills. […] For example, a physical object like a hand-sized physicalization can be visually inspected by turning it around, by moving it closer, or by taking it apart. A large-scale physicalization can be explored by walking around.*" (Jansen et al., 2015)

For the case of Co-gnito, the active perception was a crucial aspect due to the game's collective character. Thus, Co-gnito was designed to fulfil the obligation of providing a tool to enable players understanding each other's scales, perspectives, and spatial orientations easily through a tangible medium.

Figure 4.2 Co-gnito Game Logo

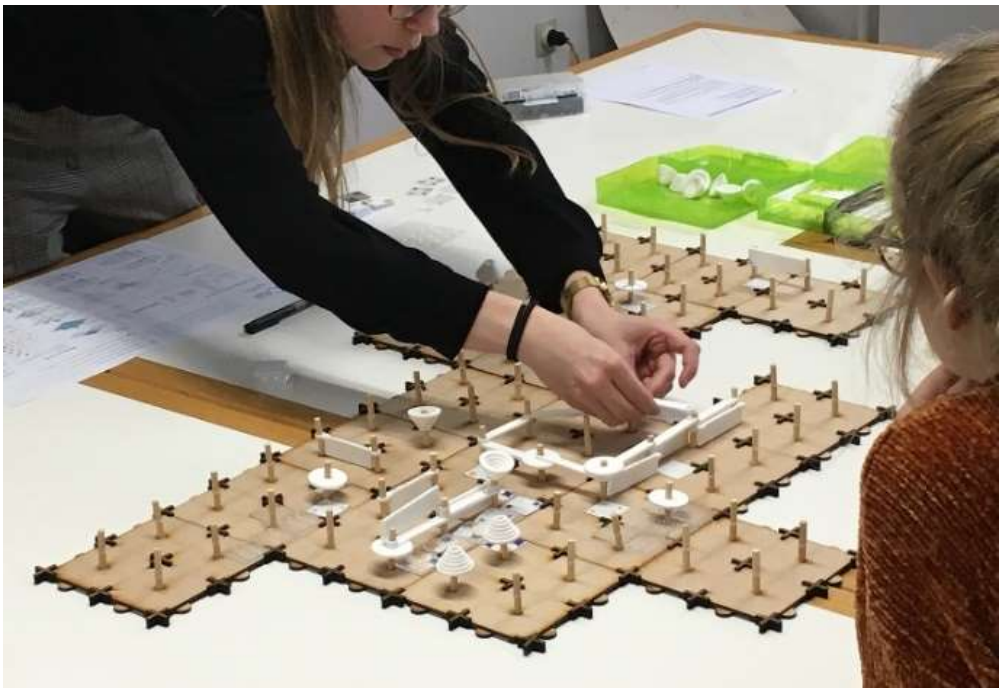


Figure 4.3 A Scene from the Co-gnito Game

Downs and Stea (1977) introduce four decisions to be made during a mental mapping-representation process; the aim of the representation, the perspective, the scale and the way of symbolization. To construct a mental map, abstracting the information in the mind is one of the primary issues. In this section, 4 categories of abstract, modular and interlocking physical structures are introduced. Those categories are designed as a minimalist concept with respect to the functional distinction represented through color contrasts and apparent forms. The profound knowledge suggests that game graphics and tangibles should be successfully representing different roles, tasks or subjects etc and underline the mechanics to be followed by endearing games while avoiding overshading the gameplay and main objectives (Yayalar, 2016). While taking those suggestions into account, game technology of Co-gnito was produced via rapid prototyping methods out of paper, plexiglass and MDF boards through laser cutting aiming to make it easily manufacturable for everyone to be used in further researches.

Figure 4.4 Visually Inspirational Game of Race to the Treasure

(Source: web.16)

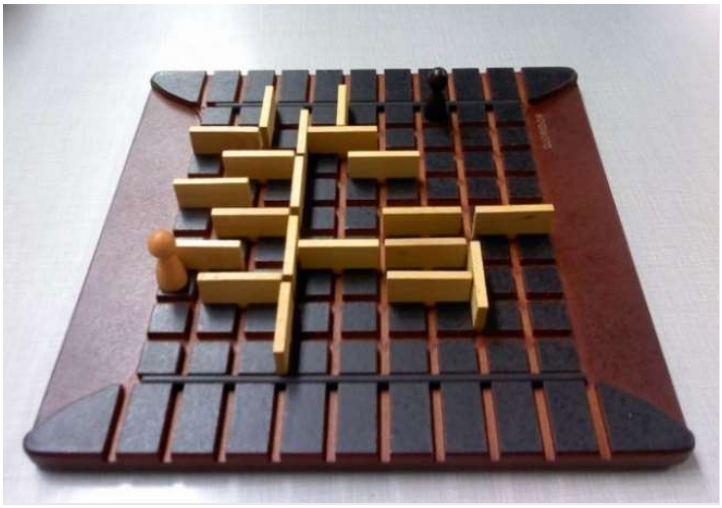


Figure 4.5 Physically Inspirational Game of Quoridor

(Source: web.17)

The first category is the base structure which is a tabula rasa to place the other 3 categories on top as in an x-y coordinate of spatial locations. Base structures are MDF square plates with 4 wooden sticks placed within the grid system. Although it was designed as one big square board to represent whole selected urban space in the

beginning, during the pilot gaming sessions it was observed that players tend to bend real distances and define their own mental distances (Figure 4.6). Hence, freeing the player's scale was decided to be one of the main representational issues while designing Co-gnito which was also discussed by Wood (1973). Thus, boards were re-produced as smaller modular pieces (tiles) to be attached to each other whenever needed during gaming (Figure 4.7). They were designed with 2-way notches on the sides to enable attaching the squares to each other like a puzzle and creating a complete base form (Figure 4.8). Another aspect that was discovered during pilot studies was in order to speed up the start of the game, 9 tiles in a 3x3 format were presented on the table before the game starts.

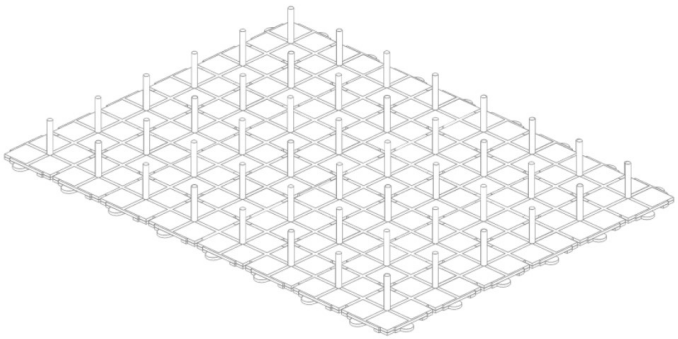


Figure 4.6 Primary Board Design Before Pilot Studies

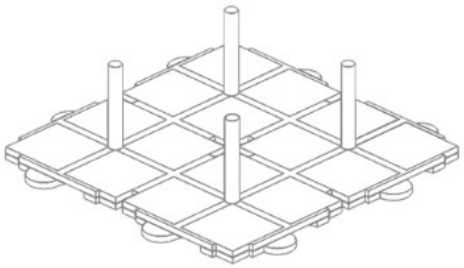


Figure 4.7 Final Modular Board Design (Tiles)

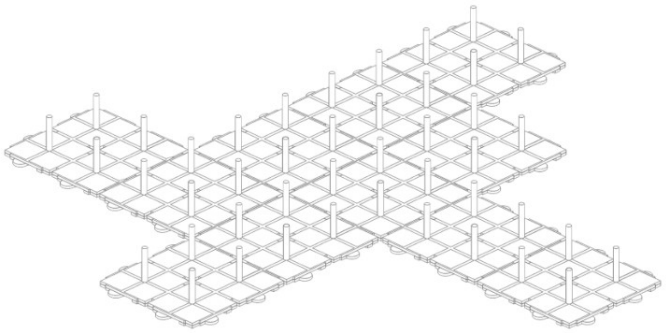


Figure 4.8 Final Attached Modular Board (Tiles)

In addition to the base tiles, the second category is named as image tokens which meant to abstractly represent Kevin Lynch's 5 City Image Elements (paths, nodes, edges, districts, landmarks) to be placed on sticks of the base structure through the holes in order to create a mental urban image map in a tangible way (Figure 4.9). 2 different sizes for linear elements; edge and path tokens are designed to enable both diagonal and straight usage and district elements are designed with different pattern engravings to represent different districts which are grouped into 6 pieces of the same pattern to define an urban space ranging from one to six squares of size. The district patterns do not represent a function or a character but they were designed to let the players be able to differentiate two different districts next to each other through ascribing meanings to the patterns as shown in Figure 4.10. These 5 elements were not only designed as singular pieces but also with the consideration of creating a complex map of integrated elements. Therefore, physical and spatial relations that might occur among them was also tangibly studied.

Figure 4.9 Tokens Left to Right: Landmark, Node, Path, Edge, District

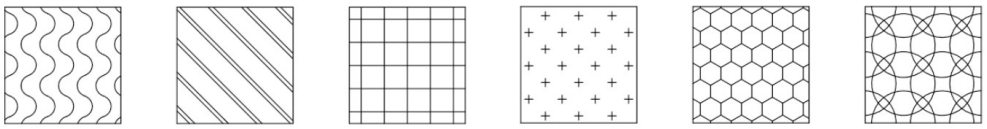


Figure 4.10 Different Textures of District Elements to Define Different Areas

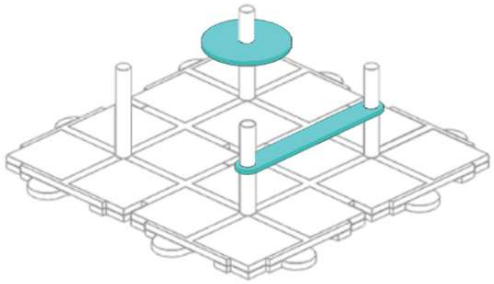


Figure 4.11 Placing Image Tokens

The third category is feeling cards which aim to represent 2 different feelings in a likert-scale form. While blue shapes stand for inspiringness, yellows stand for coziness of the environment (Figure 4.13). Degrees of emotional strength was offered to range from level zero to three, from non-shapes to the biggest shapes. Participants were asked to match degrees for both of the feelings and then choose the combination card to represent a specific space and to be placed on the square spots of baseboards

(Figure 4.12). In the end, it has been aimed to create a data visualization of a feeling map represented through the flow of patterns.

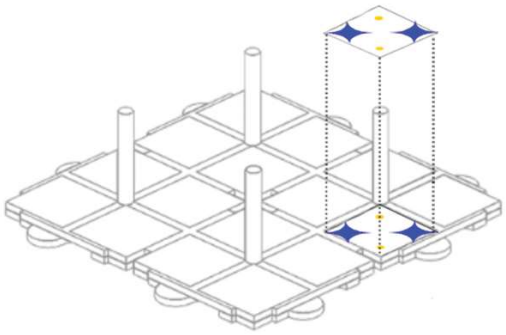


Figure 4.12 Placing Feeling Cards

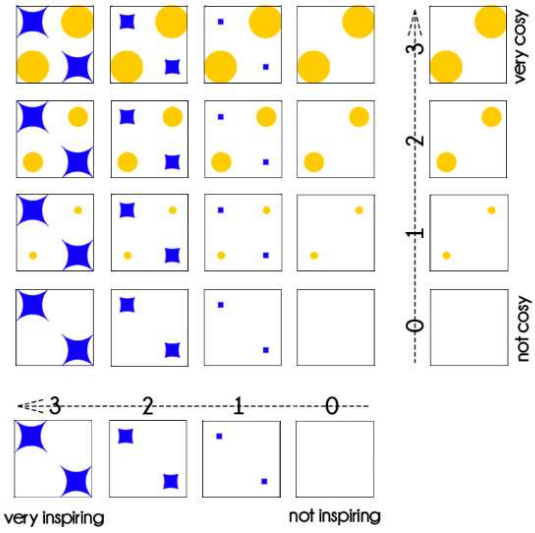


Figure 4.13 Feeling Cards Explanation Graphic

Lastly, the fourth category is point crosses (Figure 4.14). Crosses are the "achievement" pieces in order to win the game which does not present any spatial meaning. Three types of point crosses are presented as; reds, greens and minuses (Figure 4.15). While achieving the green and red ones add on to the same colored team

members score, minus crosses decrease it. All the points were placed as facing down on the board at the beginning which will be turned up to be achieved during the game. Rules about scoring will be introduced in detail below; in the mechanics section.

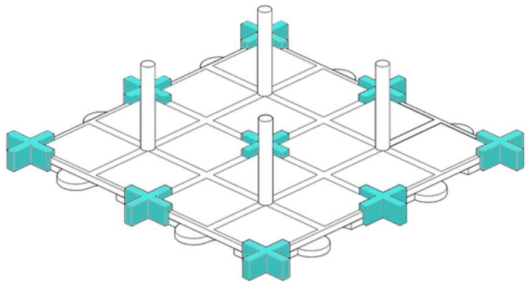


Figure 4.14 Point Crosses Placed on Modular Boards

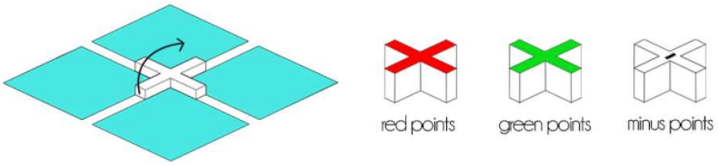


Figure 4.15 Faced Down & Up (3 Types; Red, Green, Minus) Point Crosses

4.3.2. Conceptual Design (Mechanics)

The mechanics of Co-gnito will be explained under four titles; with respect to the formal elements introduced by Fullerton et al. (2008); explained in the literature review chapter. The objective, players, rules, and conflict... While the section below will be presented from the developer's point of view, Figure 4.16 shows how all the mechanics were communicated to the players through an introduction sheet.

Objective: Co-gnito aims to build a collective mental map to understand not only the structure and identity of the space but also its meaning and experiences. Thus, players were are asked to tell their own stories; moments and incidents within an

urban environment in a when-what-why format and think of the environment which they occurred, identify them with Lynch's 5 element tokens and lastly represent those on the game board to earn points. During this overall process, two major objectives outstand; to "construct" on the benefit of researchers and to "compete" on the benefit of players.

Players: Co-gnito is designed to be played by four players in groups of two; the greens and the reds. The winner state is identified in two levels; (a) winning as a team first, (b) winning individually afterwards. In other words, even if a player has the highest score, s/he cannot win if his/her team does not lead the game. This 2-level winning situation which includes two types of interaction patterns; "Multiple players together against multiple players together" and "Multiple individual players against each other" was developed as a challenge to the aesthetic aspects of the competition. By that way, while players were expected to individually compete, they were also asked to collaborate in solidarity.

Rules: In the beginning of the game, an adequate number of gaming pieces and 46 base tiles are presented on the table which the game will take place. The game starts with 9 (3x3) attached modular tiles on the table as a start-base and 4 players sitting around it. Wood (1973) acknowledges that the maps which are created from center to the edge gives better results and therefore suggests to place a reference point in the center of a page before the mapping session. With reference to Wood (1973) a marking symbol of a specific; well-known spot of the context was placed and players were informed about the orientation. By placing that well-known reference point, it was aimed to encourage the first player to decide where to start and how to orientate. The reference points were selected among geographically central locations for the selected contexts. Then, players get divided into green and red teams in an order of; green-red-green-red and the game session starts with a randomly chosen player then continues in the clockwise order.

CO-gnito

Aim of the Game

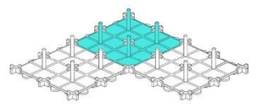
There is a campus redesign scheme taking place and in order to make it more participatory, the designers want to be able to see the view of the campus through people that live/work/commute there. CO-gnito aims to create an input; an overview to the urban designers about users perception and mental image of the campus. To achieve that goal, CO-gnito proposes a game-alike collective mental mapping method through storytelling while using Kevin Lynch's Image of the City Theory and elements

Storytelling in the Campus

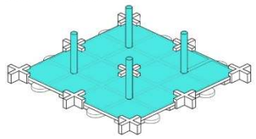
Once Last week Last month 2 years ago On christmas day On the first day of uni.	I	heard… thought… noticed… was feeling … was sleeping… was having lunch… have fallen down…	So, I consider	this as a / an	path edge node landmark district	because	I am… it was… it felt like… people always… it has been… there was a…
experience			image			meaning	

Steps

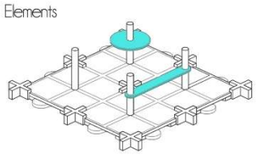
Attachable Boards



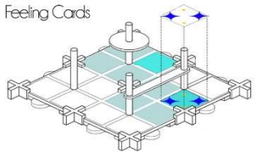
Board Structure



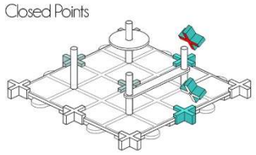
Elements



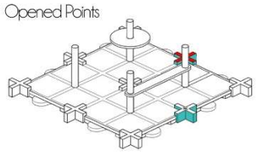
Feeling Cards



Closed Points



Opened Points



5 Image of the City Elements

Landmark: Point-references, defined physical objects..
Buildings, signs stores, landscape elements, iconic points etc.

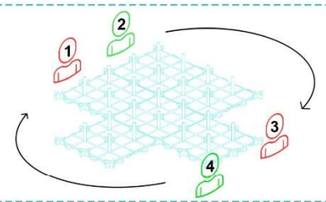
Node: Strategic spots, intensive foci points, concentration cores..
Junctions, breaks in transportation, moments of shift etc.

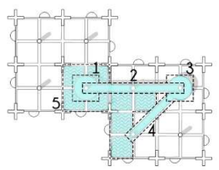
Path: Channels along which you customarily occasionally or potentially move..
Streets, walkways, transit lines, canals, railroads etc.

Edge: Boundaries between two phases, linear breaks in continuity..
Shores, railroad cuts, edges of development, walls, urban gaps etc.

District: Medium-to-large sections of the city; recognizable with a comon

Gaming Process





*5 elements to be used on each turn.

*Up to 6 district tokens = 1 element

*Continous path or edge tokens = 1 element

1st round

-Open
-Collect

1
- Put 5 elements on each turn.
- Put non-limited num. of cards
- Choose up to 3 neighbour points.
- **Open** closed points.
- **Collect** (-) points, leave color points

2
- Put 5 elements on each turn.
- Put non-limited num. of cards
- Choose up to 3 neighbour points.
- **Collect** already open **green** points
- Close an already open **red** point
- **Open** closed points.
- **Collect** (-) points, leave color points

2nd round

-Open & Collect

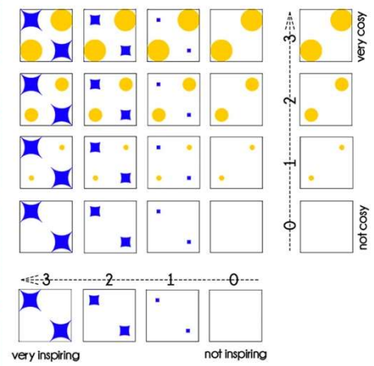
1
- Put 5 elements on each turn.
- Put non-limited num. of cards
- Choose up to 3 neighbour points.
- **Open** closed points.
- **Collect** (-) points & **red** points
- Leave **green** points closed again.

2
- Put 5 elements on each turn.
- Put non-limited num. of cards
- Choose up to 3 neighbour points.
- **Open** closed points.
- **Collect** (-) points & **green** points
- Leave **red** points closed again.

Feeling Cards

Mix & Match

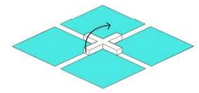
Overlap 2 layers of feeling cards; acprding to the strength scale from not cosy to very cosy and not inspirational to very inspirational. Place them around your elements.



Point Types

Closed Points

Put feeling cards open the neighbour points.



Opened Points

red points
to be collected by players 1&3

green points
to be collected by players 2&4

minus points
to be collected by all players

1st **Round:** Open all, collect minus, leave color points to be taken next time.

2nd **Round:** Open all, collect minus and your own color points.

The Winner!

Which Team Has Most of the Team Colors?	Who Has the Highest Score?
7 🔴 1 🟢 1 3 10 🔴 3 🟢 2 4	Winner 6 🔴 -2 🟢 = 4 2 4 🔴 -1 🟢 = 3 4

Figure **Hata! Belgede belirtilen stilde metne rastlanmadı.**.1 Introduction Sheet

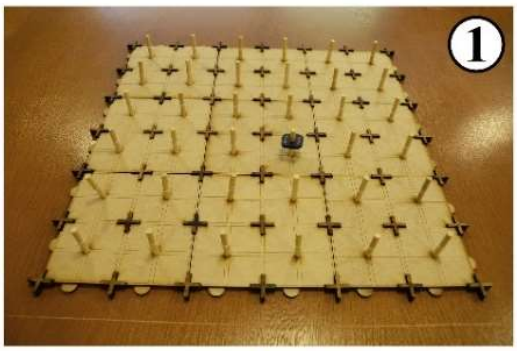


Figure 4.17 Beginning of the Game (3x3 tiles + 1 reference point)

During each turn, each player is asked to tell one "story" that they have experienced in the given urban context and think of the environment that the game takes place, such as the METU or the Arenberg Campuses. Then, players were again asked to place 5 tokens among elements of landmarks, nodes, edges, paths and districts; regardless of any type limitations within that story-space. "Regardless of type limitations" means while a player can place for instance; "3 nodes-1 path-1 edge" s/he can also place "1 node-1 landmark-2 district(set)-1 edge" as long as there are 5 tokens for each turn. Additionally, multiple linear elements (paths, edges) are counted as singular ones to enhance the density and complexity in terms of network creation. During this phase of storytelling and token building; the major anticipated problem was ending up having made-up stories and randomly put tokens. To answer that challenge, in the very beginning of the game session, players were explained about the interactive aspect of the game, which is to say, while telling a story and identifying image elements, players need to convince each other. If another player does not agree or thinks that it is a made-up story, he/she has a right to ask about details, to understand which space it was, what happened, distances between mentioned points, orientation, etc. without dictating or putting pressure but with a cooperative approach. In the literature, there are a few numbers of discussions about the main focus of storytelling games. Some scholars indicate that, the joy raises from storytelling games is not majorly based on the sense of competition but the social aspect of it; listening, sharing, agreeing or rejecting. This kind of fun which would be categorized under "people fun" of Lazzaro's (2004) or the fun that a "Socializer" of Bartle's (1996) enjoy, has been found very valuable since

one of the aims of the game was collecting verbal qualitative data of people's experiences and perception. Discussions among players would increase the level of understanding of the researcher through transmission of knowledge from one player's mind to another one's mind.

After placing 5 tokens that are perceived within the story, feeling cards need to be placed on the adjacent squares of the placed tokens. Feeling cards are not limited to any number. However, placing more feeling cards leads to more comprehensive feeling maps. As explained in the physical design section, feeling cards represent 2 types of spatial feelings; inspiringness and coziness. These two feelings might seem similar or one depending to another. However, considering the discussions that Nasar (1990) brought, by asking how cosy a space is,, Co-gnito game aims to understand if a game player feels safe and comfortable in this particular environment. Besides, by asking how inspiring a space is, this game also aims to gather data about places which spark joy to people.

The last phase is the one where players get to earn points. There are two types of procedures for this phase. In the beginning, it is aimed to have interconnecting stories creating a central pattern in order to enhance interaction among players through sharing experiences about same/close areas. For that purpose, during the first 2 rounds (8 stories), when a feeling card is put around one of the crosses, the player has a right to turn the cross up. However, he/she can touch only 3 crosses for each turn (either to get it or to turn it up). Thus, 3 crosses among the ones which are being adjecent to a feeling card should be selected. After turning a cross up; if it is a minus, the player needs to take it. However, if it is a colored one, it needs to be left (turned up). In the next turns, a person from the same colored team as the cross will be able to get it, if puts a feeling card around it. And players from the other colored team can not get it in any case. For the next 2 rounds/8 stories, the process works differently. While no one can take any already-open crosses which are left from the previous rounds, players will still be able to choose 3 crosses for each turn and get them directly without waiting

for more turns. If the cross is colored same as the opponent team's color, it still needs to be taken and put out of the game. That second procedure type aims to branch the map from the center to the edges to cover an extensive area (Figure 4.18).

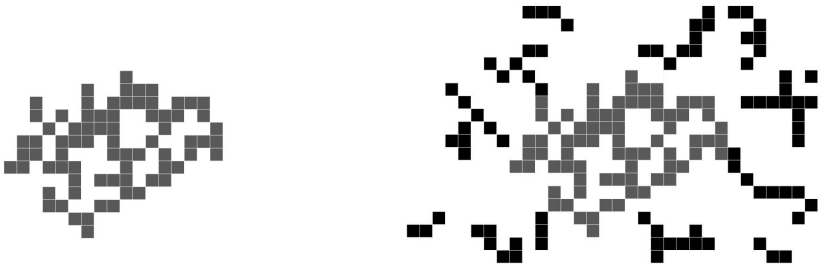


Figure 4.18 Left: Abstracted Central Pattern Strategy of Round 1 & 2
Right: Abstracted Branching Strategy of Round 3 & 4

So, for each story/turn each player is allowed to put +5 image tokens (5 tokens + multiple continuous tokens) and they are allowed to touch only 3 crosses among the ones that they touch with feeling cards. So, in order to earn points, at least 3 feelings cards need to be put while the maximum number is not defined. As explained before; "5+ tokens=3 crosses" rule was set up to enable players develop strategies against each other's movements to balance luck-strategy combination since the green, red and minus crosses are randomly distributed on game boards.

Besides the colored point crosses adding on the score, the minus ones were presented to keep the competition alive. As Hunicke et al. (2004) comments, "*If the player doesn't see a clear winning condition, or feels like they cannot possibly win, the game is suddenly a lot less interesting.*" (p.3). In order to avoid such a result when one team is outpointing, the possibility of opening multiple minuses would be promising especially during the last round. This issue is also highly related to the strategy-luck balance.

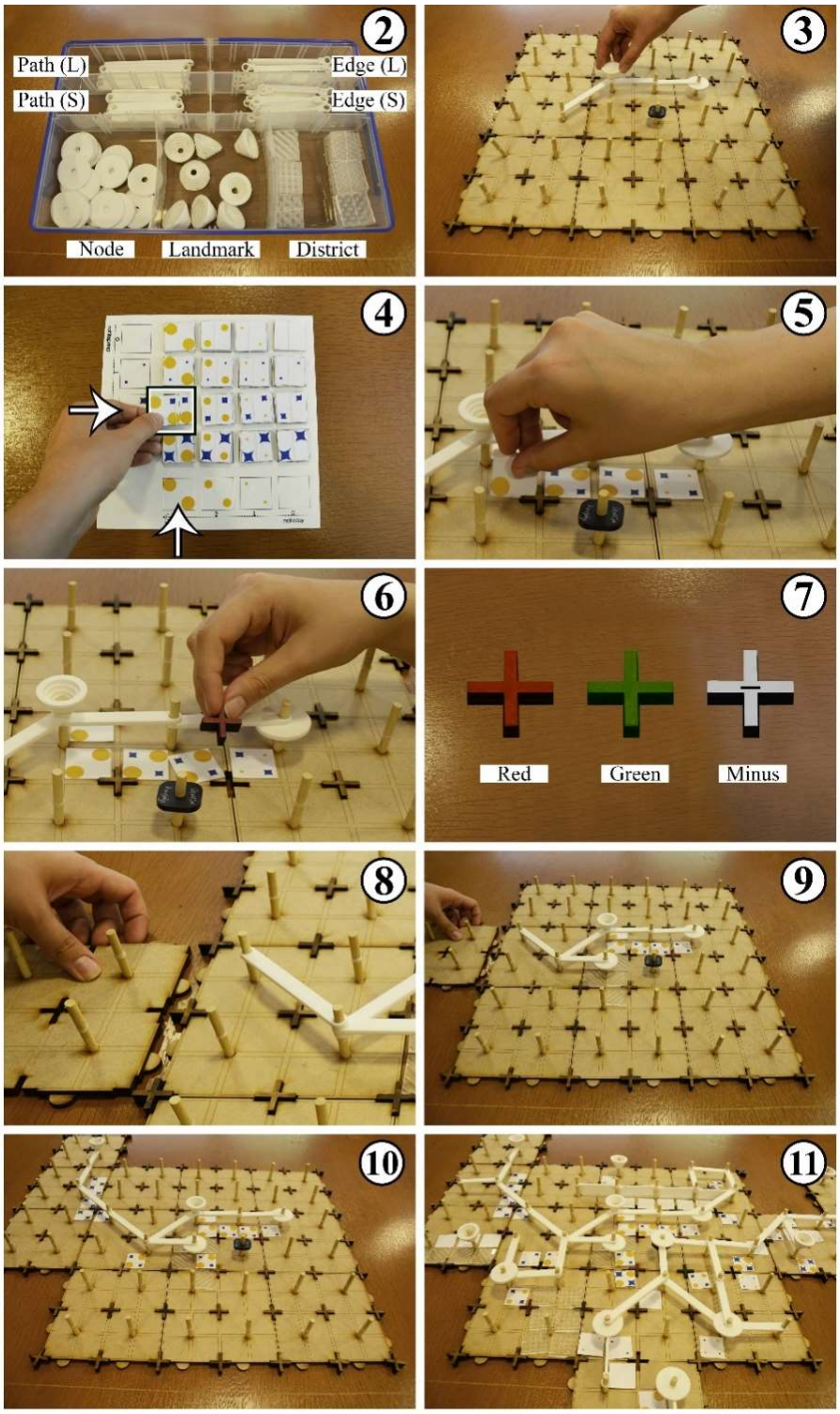


Figure 4.19 Construction Process During the Game

Regarding the physical design of the game, limiting the spatial locations and distances within a grid system would be a discussion topic while it was a conscious design decision in order to encourage participants to avoid being certain or purely realistic about representing their mental map by providing an abstracted base as well as the imageability elements.

Figure 4.19 shows the main actions and situations during the gameplay:

1. See Figure 4.17
2. Adequate number of tokens are represented in divided boxes.
3. The first player starts with telling a story and then places 5 tokens on board.
4. Player matches 2 feeling degrees and takes a feeling card out.
5. The player places feeling cards on squares next to tokens that she/he put.
6. Player chooses 3 crosses for each turn to be physically touched whether to turn them up or to take already turned ones.
7. 3 types of crosses are presented; red, green and minus.
8. & 9. Player thinks locations of his/her story won't fit on the already put base, attached more tiles.
10. Players attach their stories and tokens.
11. Players keep building and extending.

4.4. Research Process & Protocols

4.4.1. Context Selection

The study was first conducted in a university campus; Campus Arenberg in Leuven, Belgium in response to a real redesign process going on. The game was designed and planned with the aim of evaluating its performance to provide input to the designers about users' perception about the campus. Afterwards, a second campus; the METU in Ankara, Turkey was selected to be studied with the same scenario but a fictional

version, assuming that a redesign process will be applied to METU Campus as well. Although Lynch's (1960) studies were based on bigger scales compared to both campuses, his approach while defining imageability elements were universally applicable to many different scales as he also suggests; "*It would be equally interesting to apply these methods to environments of different scale or function than cities: a building, for example, or a landscape; a transportation system, or a valley region.*" (Lynch, 1960, p.757). With that knowledge, in this thesis, university campuses are acknowledged as micro-cities which includes residential, commercial, cultural/sport/leisure, educational functions. Thus, both of the case areas were chosen according to the existence of those functions.

Moreover, working on two different contexts created an opportunity to evaluate the performance of the game better in terms of being able to make comparisons to understand if some issues were raised because of the cultural/context-based differences or the game itself . At that point, Lynch should be referred one more time by remembering the part which he indicates: "*As planning becomes a worldwide discipline, and planners are drawn into the business of making plans for people of other countries, it becomes necessary to make sure that what has been found in America is not simply a derivation of local culture. How does an Indian look at his city, or an Italian?*" (Lynch, 1960, p.757). Both of the case campuses will be described in detail under Chapter 5.

4.4.2. Sampling

All the players were selected among ongoing campus user students (Undergrad., Grad. and PhD) through convenience sampling method for both of the contexts. In order to reach potential participants, announcement posters were shared on online social media groups of student unions and also physically distributed around campuses. Thus, groups were created among volunteering students.

Table 4.1 Sampling Table for Players

	Player	Age	Gender	Department	Years in the campus	Fam.w. Lynch/other mental map. studies
Game 1	Player 1	22	M	Urban Design	5	-
	Player 2	21	F	Urban Design	3.5	-
	Player 3	21	F	Urban Design	3.5	-
	Player 4	22	F	Urban Design	5	-
Game 2	Player 5	22	M	Urban Design	5	-
	Player 6	21	F	Urban Design	4	-
	Player 7	22	M	Urban Design	4	-
	Player 8	22	M	Urban Design	5	-
Game 3	Player 9	24	F	Bioscience	6.5	-
	Player 10	23	F	Computer Sci.	0.5	Lynch
	Player 11	24	F	Informatics	6	-
	Player 12	27	F	Bioscience	3	Other
Game 4	Player 13	22	M	Eng. Language	3.5	-
	Player 14	22	F	Chemical Eng.	3.5	-
	Player 15	22	M	Mechanical Eng.	3.5	-
	Player 16	21	F	Eng. Language	3.5	-
Game 5	Player 17	25	F	Urban Design	7	Other
	Player 18	25	M	Urban Design	1	-
	Player 19	25	F	Architecture	8	Lynch
	Player 20	27	F	Urban Design	4	-
Game 6	Player 21	26	M	Industrial Eng.	7	-
	Player 22	26	F	Architecture	8	Lynch
	Player 23	24	M	Electrical Eng.	7	-
	Player 24	25	M	Modsimmer	6.5	-
Game 7	Player 25	22	M	Business Adm.	3.5	-
	Player 26	27	F	Urban Design	2	Lynch
	Player 27	23	M	Civil Eng.	7	-
	Player 28	31	M	Industrial Design	14	-
Game 8	Player 29	25	F	Architecture	2	-
	Player 30	26	M	Architecture	2.5	-
	Player 31	27	M	Architecture	1	Lynch
	Player 32	25	F	Architecture	7	Lynch

Co-gnito was experimented by 32 participants; i.e., eight groups, each of which consists of four members. 12 (8 female, 4 male, aged 21-27) from Arenberg Campus and 20 (9 female, 11 male, aged 21-31) from METU Campus... The game players in the METU and KUL-Arenberg Campuses have varying experiences in terms of time (years) they have spent in the campus. The time experiences in these campuses among the game players range from 6 months to 14 years. Additionally, 4 of the groups were from the same building and architecture/urban design students, while other 4 were mixed groups from different departments. Lastly, 6 of the players indicated that they are familiar with Lynch's (1960) study and 2 others had knowledge about other mental

mapping studies. Due to the small sample size, it has not been possible to create completely homogenious groups. However, since each of the end-result maps were aimed to be collective representations of sample groups of four (players), it was also interesting to see different results of differently structured groups.

In addition to the players, for the expert interpretation sessions, one or two spatial experts per each game; who has at least 4 years of architecture or city planning education; 14 experts in total; 5 (4 female, 1 male) for Arenberg and 9 (7 female, 2 male) for METU were selected. All the experts were graduates of the case schools thus, previously familiar with the environment.

4.4.3. Procedure

Before the gaming sessions, after welcoming participants in a well-conditioned, quite room and introducing the research, researcher and supervisors; a survey was distributed to the players, regarding their demographical data as gender, age, the department they study in, familiarity with the campus (in years), and then their familiarity with any kinds of mental mapping. After the survey, for the groups who are not familiar with each other, participants were introduced in order to break the "stranger" feeling. That was followed by giving an A3 size introduction sheet to each player and the game was verbally explained meanwhile they follow the instructions from the sheet. Lastly, players were asked for the permission of video recording with multiple cameras and the recording started. As explained to them, each game was planned to have 4 total rounds; 16 stories which were assumed to take approximately two hours. After two hours of gameplay, this time, players were asked to fill in the second part of the survey consisted of open-ended and likert scale questions which seek to understand the user experience. In addition to the survey, players were asked to answer a series of verbal questions regarding their opinions about end-result-map that they have created.

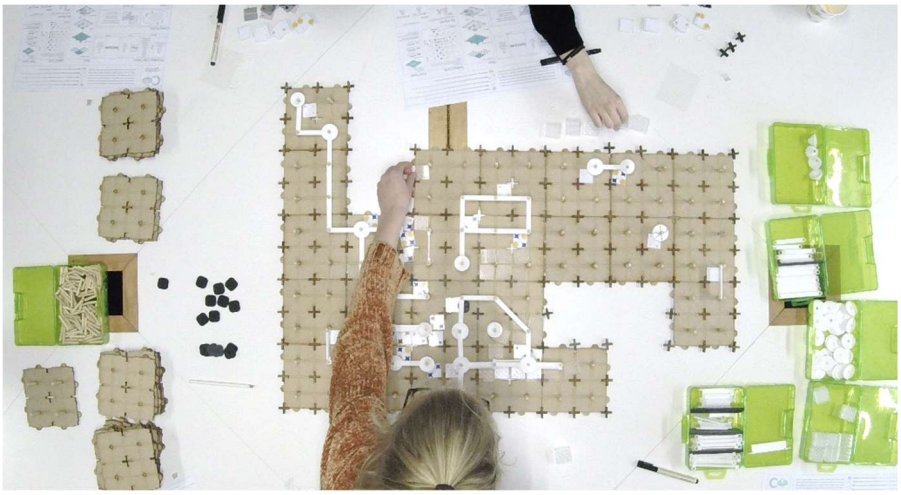


Figure 4.20 Top View of the Table During a Game

Figure 4.21 Side View of the Table During Expert Interpretation

Not only the players but also spatial experts were invited to see the physical end-results of each game after participants left. They were interviewed verbally to see their level of understanding and ability to use that map as an input for a possible redesign process for both of the campuses. Through expert interpretations, it is aimed to see the strength of the tool not only as a cognitive map but also an abstract data physicalization tool. At the end of each game session, after participants leaving the room, one or two urban/architectural experts were invited to the room to evaluate the end-result map.

They were first asked about their mentality about the game and the concept of mental mapping. Later, it was aimed to understand the game's ability to represent urban image elements and spatial relations. After giving needed information about the game, physical elements, and gameplay; experts were asked to identify specific spots and understand the urban layout they see on the map in order to interpret possible reasons behind textures/underexpressed spaces/overexpressed spaces/unexpected situations, etc. Each interpretation session was planned to take 20-25 minutes.

One important discussion about the overall process might be whether getting participants to have a pre-field-coverage session or not. As discussed in the second chapter of this thesis, direct self-reporting reflects a more memory-based image of the individual. In addition to that, with the nature of the game which participants are asked to map the environment through remembering/recalling past experiences and feelings, the gameplay itself covers that issue.

4.4.4. Data Analysis

Evaluation of the collected data through videotape recordings of the process, final maps, written questionnaires and surveys is realized under two main sections and through seven sources. Each evaluation section and sources are explained in detail under Chapters 6 & 7:

1) Evaluations on the mental maps (Chapter 6):
   1a) through stories
   1b) through end-result maps
2) Evaluations on the research tool and procedure (Chapter 7):
   2a) through likert scale questionnaires
   2b) through written surveys
   2c) through researcher's observations during the gaming
   2d) through verbal interviews
   2e) through expert interpretations

CHAPTER 5

CASE CAMPUSES

5.1. Introduction

In this chapter, two case university campuses which were selected to test Co-gnito will be introduced. Historical development, urban layout and spatial characteristics of Arenberg Campus (Leuven, Belgium) and METU Campus (Ankara Turkey) will be explained through maps and photos.

5.2. Arenberg Campus

Arenberg Campus is located in the southwest of the Leuven City, Belgium; 1 km away from the ring road and 3 km away from the city centre. The area is a non-gated, public historical park with a vast forest and the valley of the River Dijle (Van Herck & Leroy, 2008). Campus Arenberg of KU Leuven includes 3 main functions; the science campus, the sports campus, and student housings. Other faculties of the university are located in the city centre and at Campus Gasthuisberg (Figure 5.3).

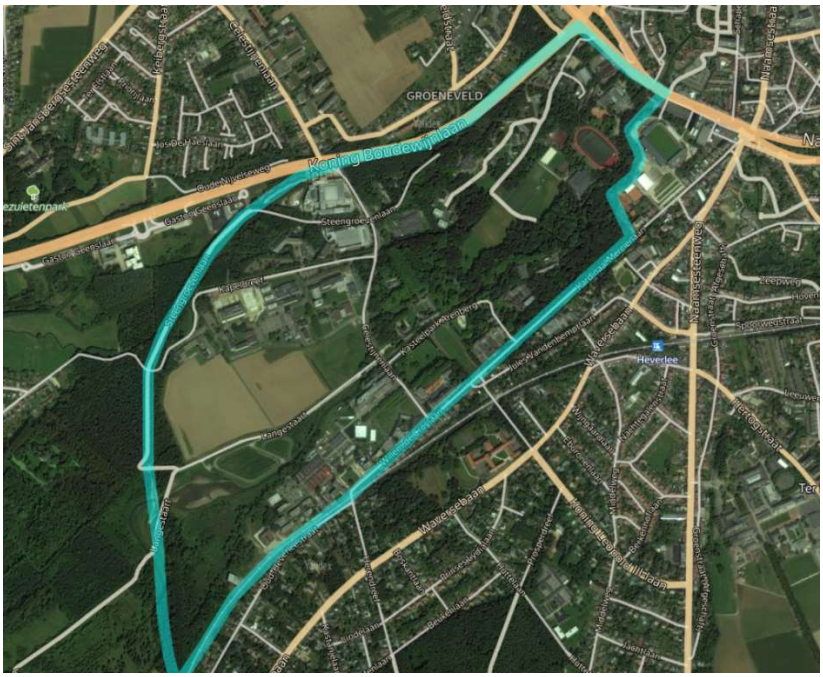


Figure 5.1 Satellite View of the Arenberg Campus

(Source: web.18)

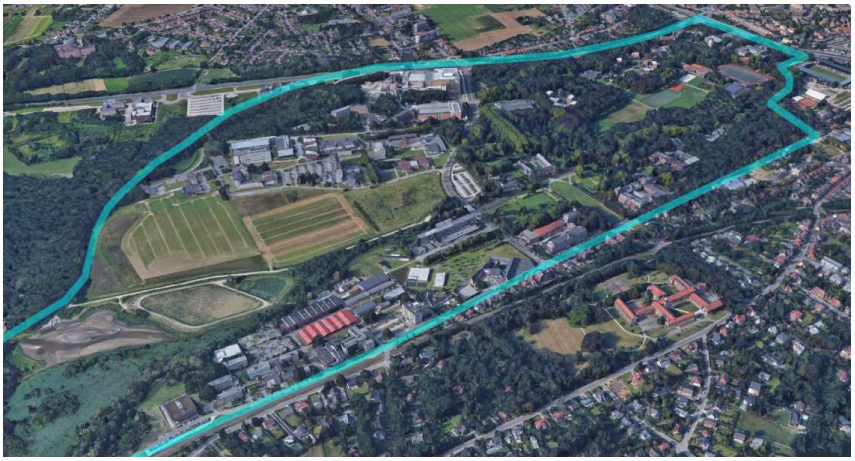


Figure 5.2 Satellite View of the Arenberg Campus

(Source: web.19)

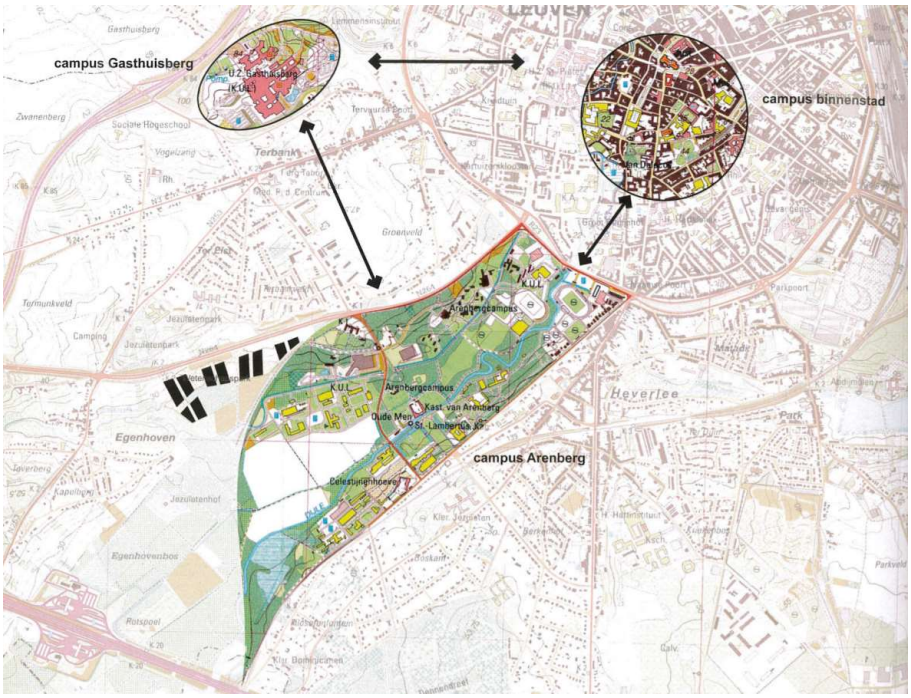


Figure 5.3 Three Campuses of KU Leuven

(Source: (Van Herck & Leroy, 2008)

The campus gets its name from the Arenberg family who had been living in the Arenberg Castle since the 12th century. The castle was sold and demolished in the 1400s, and the current castle was re-built instead in 1515. Later on, it passed back to the Arenberg family in 1612. The castle got occupied by Germans & Austrians during the WWI and became a university property in 1921 as an engineering and natural sciences campus. Today, the Arenberg castle is functioning as the Department of Architecture; the main building of the Engineering Faculty. Another important building; the Celestine Monastery is today being home to the Arenberg Campus Library.

Despite its historical feature, the campus was planned in the 1960s. With the high respect for its ecological and historical values, the layout plan of the university campus

from the 1960s is still partly protected. Today, the campus is extended till the borders of Koning Boudewijnlaan in the northwest, ring road of Tervuursevest in the northeast and Kardinaal Mercierlaan–Willem de Croylaan in the southeast. Dijle and Voer rivers which parallelly run through the campus from the southwest to the northeast with many bridges connecting sides; shape the spatial organisation in the campus.

Currently, the campus is divided into four parts. The sports campus; Arenberg IV is located in the northeast with the faculty buildings, and the courts, and pitches. Behind the sports facilities, student accommodation buildings and the central cafeteria of ALMA are located in the north. These two parts of the Arenberg IV are divided by a pedestrian path along another river; the River of Voer which connects the ring road Tervuursevest to the Celestijnenlaan (Figure 5.4).

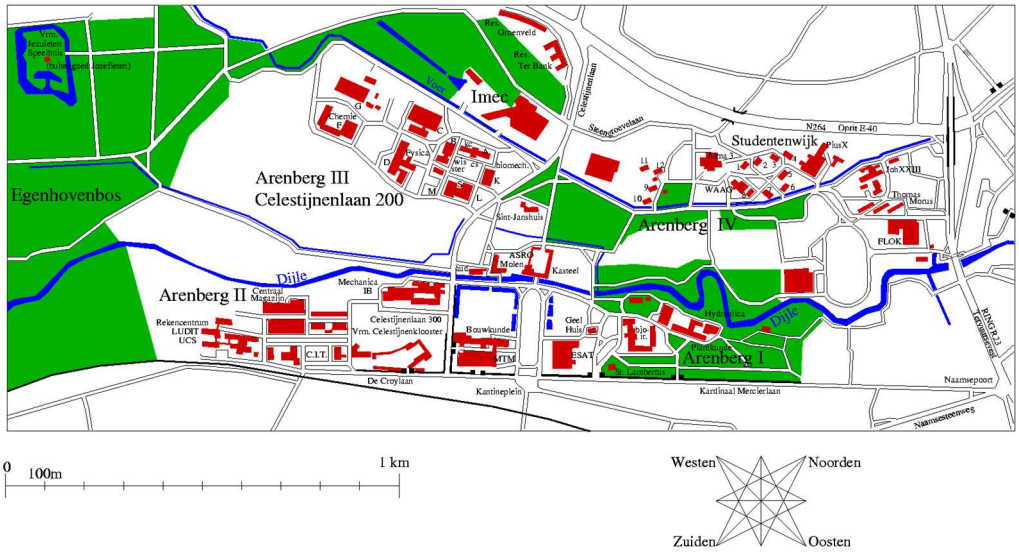


Figure 5.4 Arenberg Campus Map

(Source: web.20)

Figure 5.5 Satellite View of the Arenberg IV

(Source: web.19)

Figure 5.6 Pedestrian/Bicycle Paths Along the River Voer

(Source: web.21)

Figure 5.7 Cafeteria Alma 3, Football Fields and the Student Residences

(Source: web.19)

Figure 5.8 Student Residences

(Source: web.22)

In the southeast, Arenberg I includes Arenberg Castle and some other faculty buildings as well. The Arenberg Castle and the big lawns in front of the castle face the Willem de Croylaan-Kardinaal Mercierlaan and an orthogonal road; Hertog Engelbertlaan (Figure 5.9-5.12). Students and staff who live in the district of Heverlee or the city centre; and walk or cycle to the university campus and generally use either this road or the Kardinaal Mercierlaan. Although the campus is not gated and is open to the public, the woodland along the Kardinaal Mercierlaan is surrounded by old high walls with only 2 doors to enter into the campus (Figure 5.14).

Figure 5.9 Satellite View of the Arenberg I

(Source: web.19)

Figure 5.10 Arenberg Castle

(Source: web.23)

Figure 5.11 River Dijle and the Arenberg Castle in the Far Left

(Source: web.24)

Figure 5.12 The Path from the Mechanical Engineering to the Castle

Between the Dijle and the Ponds (Electrical Engineering at the Far Right)

(Source: web.24)

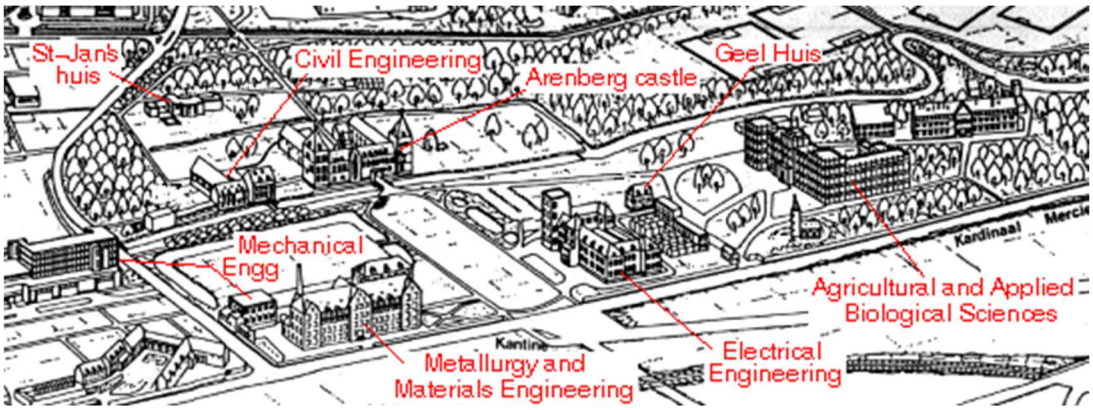


Figure 5.13 Axonometric Illustration of the Castle and Buildings Around

(Source: web.25)

Figure 5.14 Kaardinaal Mercierlaan

(Source: web.24)

Arenberg II and III on the other side of the Celestijnenlaan differentiate from I and IV with their dense built-up fabric and loose nature. Arenberg II is consisted of the Fab-Lab (Mechanical Engineering), campus library, logistic centre, greenhouses, and a few other non-educational buildings. In this part, only the library and the Fab-Lab (Mechanical Engineering) are actively used by the students (Figure 5.15-5.17).

Figure 5.15 Satellite View of the Arenberg II

(Source: web.19)

Figure 5.16 Arenberg Campus Library

(Source: web.24)

Figure 5.17 Mechanical Engineering Building

(Source: web.24)

Arenberg III in the west is a comparatively new part. IMEC (Interuniversity MicroElectronics Center) buildings are placed in the north while the cafeteria of De Moete, Acco Bookshop, Computer Science and Chemistry buildings in the south (Figure 5.18-5.20).

Figure 5.18 Satellite View of the Arenberg III

(Source: web.19)

Figure 5.19 Acco Bookshop, De Moete and Comp. Sci. Buildings at the Back

(Source: web.24)

Today, turning the campus into a bike-only area as well as protecting it against the gentrification or over-development are some of the main tasks on the urban design agenda. According to the Strategic Plan KU Leuven, in 2017, the bike usage of Arenberg III users was reaching 80% for distances less than 5 km and 60% for 5-10

km. Although the majority of the campus has pedestrian and bike dominant paths, there are still some significant safety issues for the cyclists. Moreover, due to the new building stock need, a new urban design process has just started in 2018 after the last one in 2008.

Figure 5.20 IMEC Buildings

(Source: web.24)

5.3. METU Campus

METU was founded in Ankara as the 5th university of the young Turkish Republic to fulfill the technical specialist need in the country. While the planning process was started by 1951, the construction of the physical campus began in 1961 through a design competition. Altuğ and Behruz Çinicis' proposal which won the competition aimed to create a "university city". The university development site was located 5 km away from the modern city centre and surrounded by 3 main highways; Eskişehir Highway in the north, Konya Highway in the west and Ankara Highway in the south.

Figure 5.21 Satellite View of the METU Academic Campus

(Source: web.18)

Figure 5.22 Satellite View of the METU Campus

(Source: web.19)

METU was founded in Ankara as the fifth university of the young Turkish Republic to answer the technical specialist need in the country. While the planning process was started by 1951, the construction of the physical campus began in 1961 through a design competition. Altuğ and Behruz Çinici's proposal which won the competition was aiming to create a "university city". The project was located 5 km away from the modern city centre and surrounded by 3 main highways; Eskişehir Highway in the north, Konya in the west and Ankara in the south.

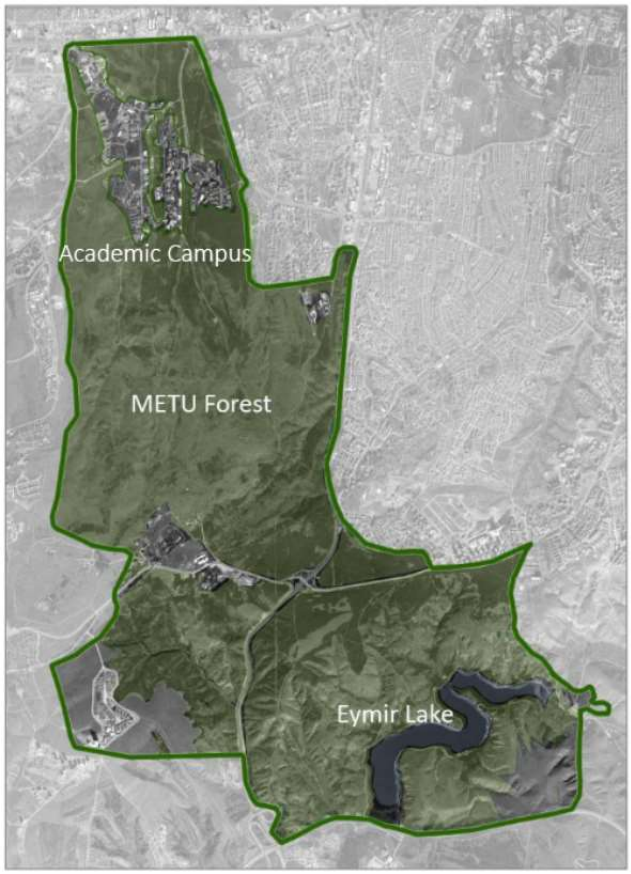


Figure 5.23 METU Campus with the Academic Campus, Forest, and Lake

(Source: Akman, 2016, p.46 (Edited by the Author))

The academic campus of METU is surrounded by a human-made forest which was strategically forested against any kinds of development or occupation threads in the future. The forest is being home to a diverse ecological system with the Lake of Eymir. However, in this study, it will be only focused on the academic campus (Figure 5.23).

According to the design proposal; the academic campus was designed under three main zones; the academic zone consisted of faculty buildings around a pedestrian alley; secondly the centre zone with the library, auditorium and cafeteria; and lastly, the non-academic zone consisted of dormitories, staff apartments, shopping centre and social facilities (Akman, 2016). A vehicular ring road surrounds and supports the centre and the academic zones. The alley and faculty buildings take service through that ring road and its branches which connect the ring road to the car parks of the faculties (Figure 5.24).

Altuğ and Behruz Çinici explain their approach while designing the alley as:

> "*The defining layout of the campus is formed along the pedestrian axis which is the spine of the campus, named as "Alley" by the users. The Alley extends along the ridge from north to south in accordance with the soft terrain topography. Throughout the Alley, academic units are located on the west side and generate education area, while President's Office, The Main Library and Cafeteria take part other side (on the east) and form center. The focus of the intense social activity occurs here and this cultural and intellectual interaction place, the spine, can be named as "Forum" or the main major class of the university in where people are gathering and interacting continuously. There are trees shading in front of the building and water elements arranging microclimate of the environment along the Alley and extensions of the Alley also continue through inside of the buildings. Therefore, a continuity and permeability between inside and outside is provided and the Alley increasingly starts to affect the interior organization of the buildings.*" (Akman, 2016, p.63).

Figure 5.24 Aerial Photo of the Alle

(Source: web.26)

With the construction of METU College, Technopolis, new faculty buildings and new dormitories, the built-up area became wider in time, while still holding on Çinicis' ideology. Today, the campus can be divided into 8 parts according to the main functions. In the map below (Figure 5.25); Orange areas represent the shopping facilities, while pinks stand for the academic buildings, greys for the service buildings, brown for the METU College, light blue for the staff housings, green for the sports facilities, dark blue for the Technopolis and the yellows for the student residences.

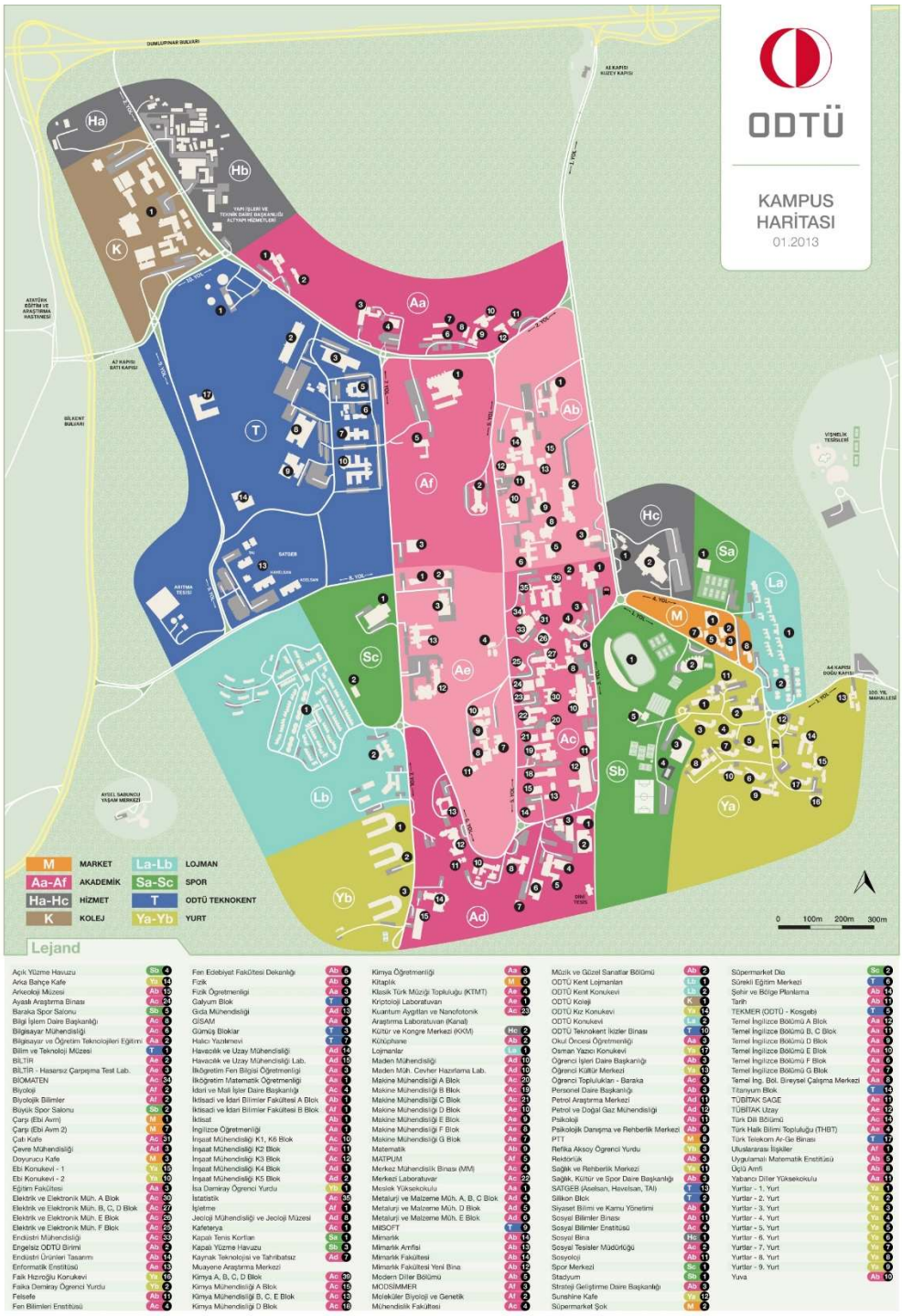


Figure 5.25 METU Campus Map

(Source: web.27)

The academic zone starts with the Preparatory School in the north and ends with Metallurgy Engineering in the south. Majority of the buildings are located around the alle. However, some others like Business Administration and Mechanical Engineering are located on the west side of the circular road. On the axis of the alle, public open spaces like Physic Lawns, Mathematics Lawns, Garden of the Çatı I are generally actively used by the students for their leisure times. Those three spaces can also be defined as meeting spaces in addition to the few others like MM Building, Library, Cafeteria, Architecture Canopy or the Architecture Amphi-theatre… In addition to the buildings and public spaces, open-air sculptures of the campus are also essential spots while meeting someone or explaining a place.

Figure 5.26 Aerial Photo of the Academic Buildings from the Southwest

(Source: web.28)

Figure 5.27 The entrance of the Library

(Source: web.29)

Figure 5.28 Physic Lawns and the Atatürk Sculpture

(Source: web.30)

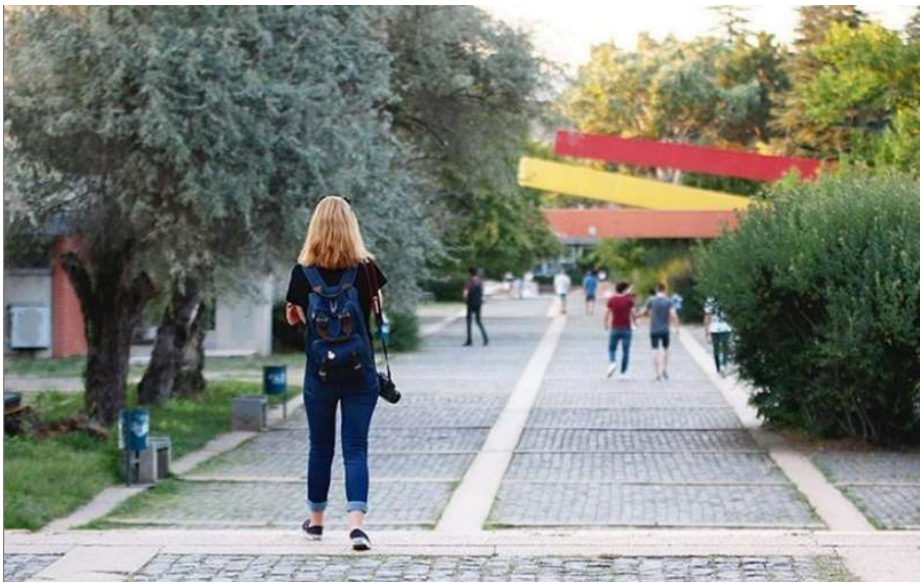


Figure 5.29 The Alley and the “ATA Sculpture”

(Source: web.31)

If we move to the east side of the campus; the Devrim Stadium, Kültür ve Kongre Merkezi (Cultural and Convention Center which is also called “KKM”) and Çarşı (a small shopping building and surrounding buildings serving as cafes, restaurants, supermarket and small shops to serve for daily shıpping needs of the university user) are few spots to be listed as significant structures.

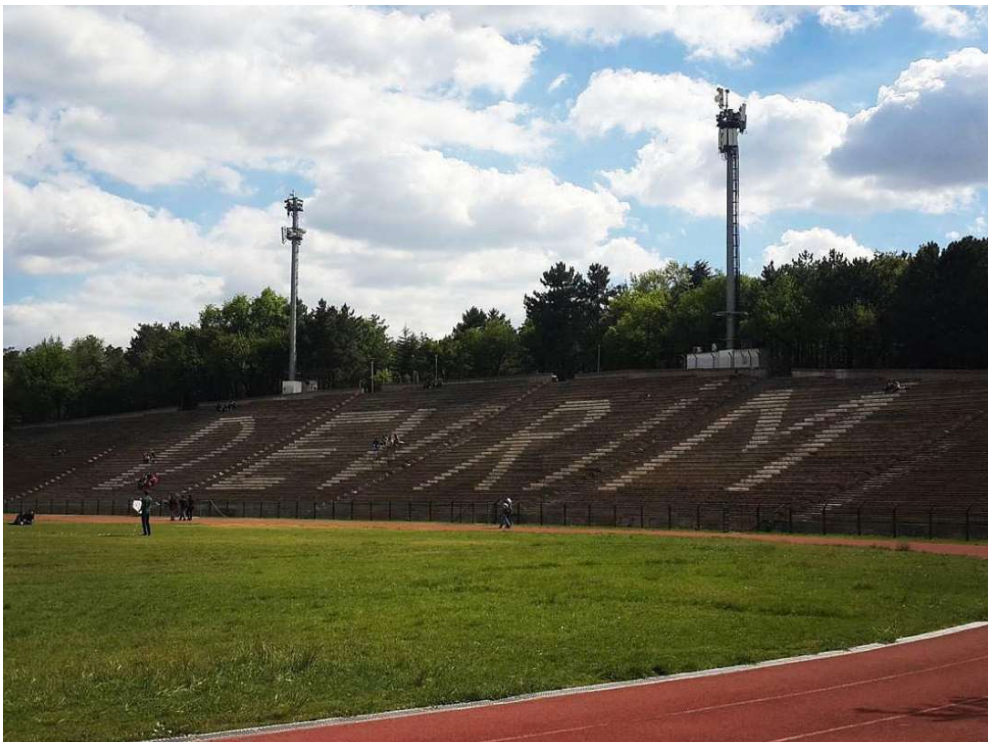


Figure 5.30 Devrim Stadium

(Source: web.32)

Figure 5.31 Path Between the Devrim Stadium and Tennis Courts

(Source: web.24)

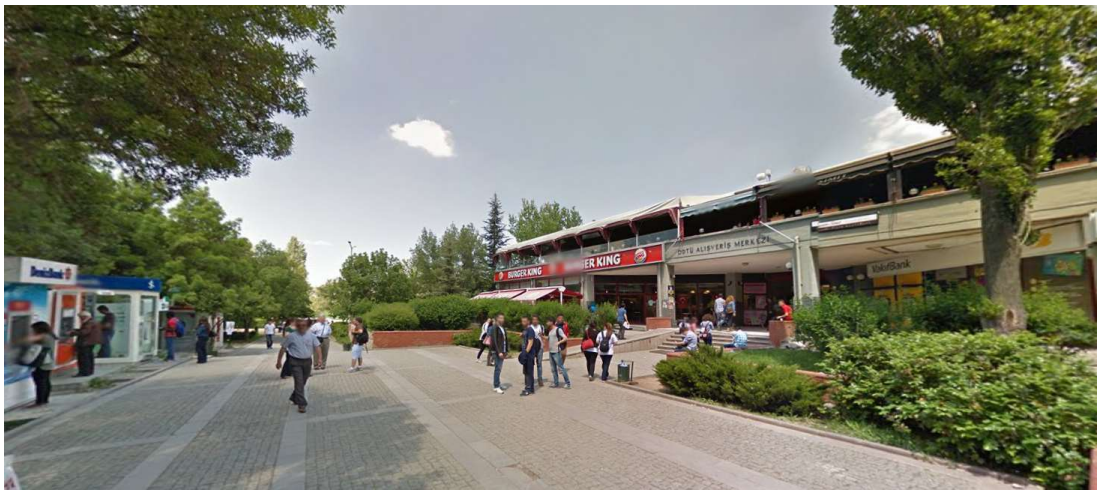


Figure 5.32 The Shopping Center (Çarşı)

(Source: web.24)

Figure 5.33 The Cultural Center (KKM)

(Source: web.33)

In addition to the cultural, sport, and shopping zones; some of the staff housings and student accommodations take place in the east as well as the zone as the west.

Figure 5.34 Satellite View of the Student Dorms in the East

(Source: web.19)

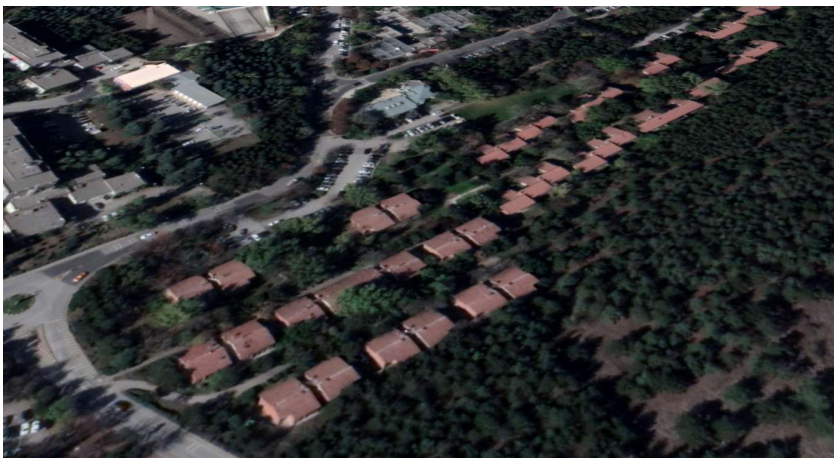


Figure 5.35 Satellite View of the Staff Housings in the East

(Source: web.19)

Figure 5.36 Satellite View of the Student Dorms in the West

(Also, the Staff Housings in the right far)

(Source: web.19)

Zone of Technopolis is located in the east with comparatively new buildings which are still increasing in number in a sparsely wooded area with high-capacity car parks.

Figure 5.37 Aerial View of the Technopolis

(Source: web.34)

The academic, cultural, sport and shopping zones are most frequently used zones by the students. While the academic zone is quite pedestrian dominant, the same can not be said for the sidewalk along to the motorway leading to the cultural/shopping/sport zones. Especially after a traffic accident occurred in 2018 where a pedestrian student was lost, the safety and the sufficiency of the narrow pedestrian paths on the sides of motorways became a hot discussion topic for campus users. With the high private car usage and limited roadway capacity, traffic congestion during peak hours and illegal parking problems are also becoming challenging in addition to the safety problem. The campus is being reached through three main entrance gates while rest of the edges are divided from the city with walls or fences. A1 gate on the Eskişehir Highway (north) has a metro connection to the city centre. That vehicle dominant highway is mainly used by minibuses, people who use the metro, taxis and private cars since its not a safe place to cycle or walk dues to the high volume of fast traffic and lack of sidewalks. Another gate; A4 is in the direction to 100. Yıl residential district where a considerably high number of students live in. Thus, in addition to minibusses, public buses, private cars, and taxis, many students also prefer to walk or cycle to reach A4. The third gate; A7 is situated on the Bilkent way with a lesser capacity of usage mainly used by private cars owned by Technopolis or METU College users. In addition to the minibuses and public busses, the university ring buses also serve within the campus which are mostly used by students to reach dormitories from faculties or the vice versa. While pedestrians are facing some hardnesses which was mentioned above, a study done by Karataş (2015) showed that 68% of the students prefer walking as a first alternative to reach somewhere in the campus. However probably because they do it even while they don't feel safe; in some parts of the campus; many students are observed to use shortcuts through the forest or green areas instead of the sidewalks.

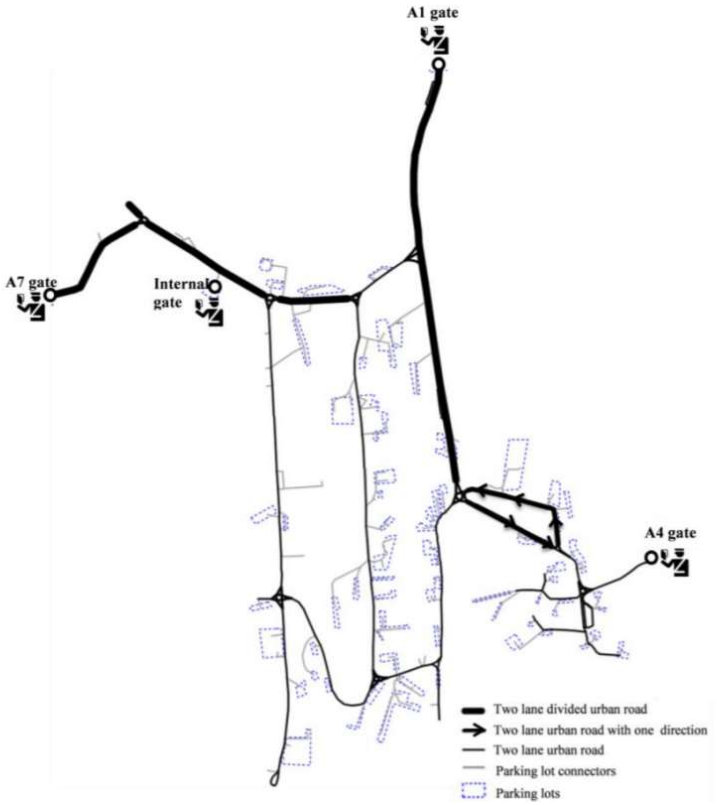


Figure 5.38 METU Campus Road Network

(Source: Altıntaşı, 2013, p.26)

"*At the north of the campus, high-rise business buildings are lining up Eskişehir Highway. At the east, there are government agencies and dense residential areas; at the south, the campus ends up with Gölbaşı district; the university campuses such as Bilkent Campus and Hacettepe Campus andm residential areas takes place in the west. There are four entrance gates to the campus which are A1 and A2 at the north, A4 at the east and A7 at the west.*" (Akman, 2016, p.45)

Figure 5.39 Shortcuts Through the Forest (Left) (Source: web.35)

Figure 5.40 Motorways and the Sidewalks in the Campus (Right) (Source: web.36)

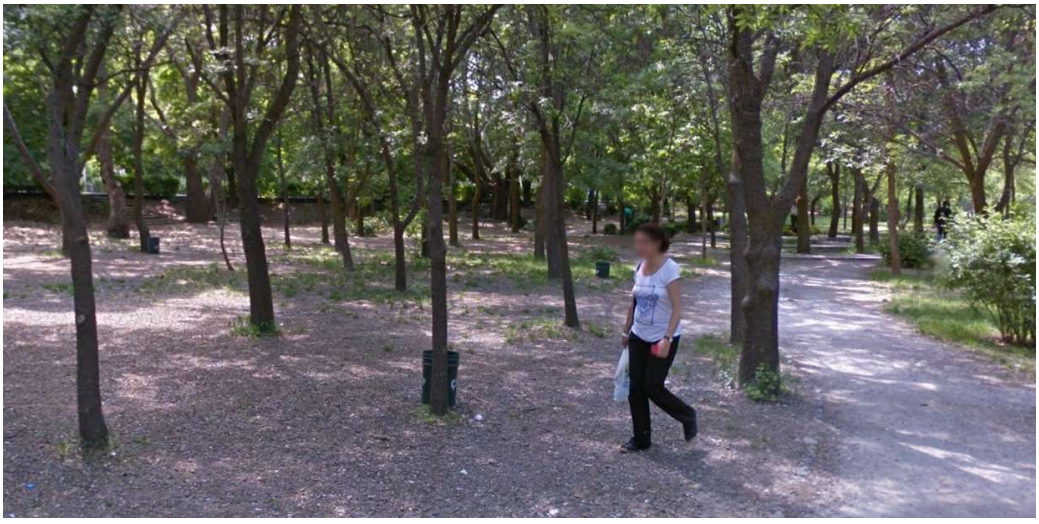


Figure 5.41 A Shortcut from Devrim Intersection to Shopping Center

(Source: web.24)

CHAPTER 6

FINDINGS ON MENTAL MAPS

6.1. Introduction

In this chapter, the urban imageability of each of the case campuses will be evaluated and discussed individually through two sources;

1) The end-result maps that were created through game sessions
2) The stories that were told during the game sessions

Co-gnito is designed as a collective tool which aims to obtain not the individually produced and overlapped maps, but the collectively merged knowledge instead. With that reason, the physicality of each end-result map will be presented individually as a graphical representation of a 4-person(player)-sample, but the findings will be discussed in a holistic manner with sample sizes of 12 (Arenberg) and 20 (METU).

In order to understand the urban image, complexity and the integrity of the maps, the usage rates of elements and mentioning rates of locations are taken into account for each map. Moreover, to understand the "meaning" of the space which was discussed in detail in the second and third chapters, stories of the participants are also analysed. It was aimed to obtain qualitative data about current problems, future potentials and overall dynamics. Concepts that were mentioned the most often are identified and explained in detail.

6.2. Arenberg Campus

6.2.1. General Features

In the context of Arenberg Campus, 12 players played Co-gnito in groups of 4, and 3 different collective mental maps were produced through personal stories. Although

the game was originally designed to be played in 4 rounds and 2 hours, among three groups, only one group was able to complete all 4 of them (equal to 16 stories) in the given time for the case of Arenberg. Other two groups finalised the game after 3 turns and 12 stories due to the time limitation.

The campus covers an area of approximately 1.5 km^2. However, due to the vast woodlands and green fields, especially in the west, only around 0.9 km^2 is being actively used. If we analyse each of the three end-result maps (Figure 6.1), it can be seen that only the third map was able to represent that 0.9 km^2; almost all the areas within the campus; laying from the sports centre and even the Carrefour supermarket in the northeast to the Incubatiecentruum in the west. For the first two maps, the created network was concentrated around the science campus with a slight interest in the Alma-Studentenwijk (student dormitories) and IMEC areas.

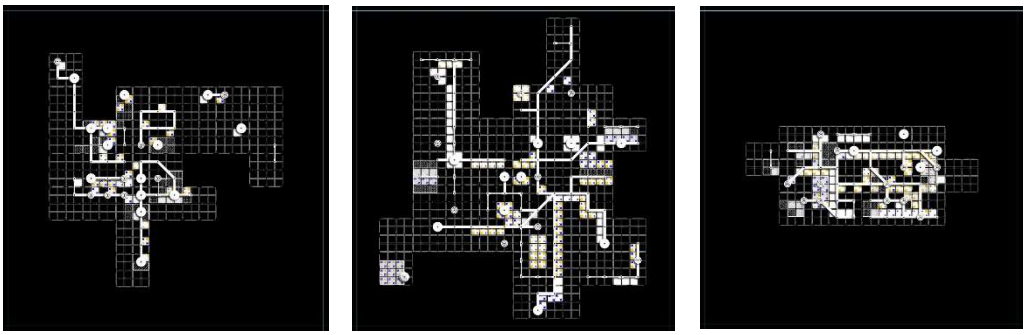


Figure 6.1 End-Result Maps of Three Games on Arenberg Campus

By looking at the three end-result maps, it can be said that they do not reflect a similar urban form (Figure 6.1). However, when these three maps are analysed, it is possible to observe that they do not cover the same size of the campus site. Two of the reasons behind the differences among these three maps are the size of the used baseboard and the level of details accordingly.

Although the second game was the only one being consisted of 4 complete rounds and 16 stories, the map was not able to cover many of the places. At that point, it is essential to remark the number of base tiles that were used during each game. As can be seen from the Table 6.1 below; during the first game, 26 modular base tiles were attached while 2 of them were left untouched without any elements or feeling cards on top. For the second game, 43 tiles were used while 4 of them were untouched. And lastly, the one with the least tiles; 17 tiles were used during the third game without any of them being empty. So, it can be said that the game with the least tiles was the only one being able to present a full coverage of the campus, which is quite an interesting incident. Players of the first two games were observed to indicate more details like landscape features or lighting; as a result of having bigger portions of spaces. On the other hand, while playing within a small base area, at some point the players of the third game felt that they have a limited space to give more details or even to physically place more elements. Thus, they started mentioning furthest spots and stressing to remember their experiences within those areas. This scaling difference was the main feature to affect the complexity and integrity of the maps. At this point, integrity needs to be further discussed whether it depends on covering all the locations that affect the urban image (as in Game 3) or covering all the details of those locations (as in Game 1 and 2).

However, it is important to understand the reason behind having a very small base for the third game. While explaining the possible reason behind that issue, it would be usefull to re-mention the games two-level strategy of “creating a central pattern in order to enhance interaction among players through sharing experiences about same/close areas.” and then “branching the map from the center to the edges cover an extensive area.”. A central reference point; the Castle was presented to the players and was marked with a single black token. By providing that reference point, players were expected to have an advantage in terms of deciding on the locations, orientation and scale; instead of dealing with an empty baseboard. The two-level branching strategy

of the game mechanics was developed also to enable players to control the relational scale and grow their map step by step. However, for case of the third Arenberg Game, the first player decided to tell a story which was starting from the furthest point in the north; the Carrefour Supermarket which is not even a part of the campus. Although the players were explained about the games logic of collectively deciding about distances and locations, nobody questioned the first players decision and the overall scale was suddenly defined through only one story. A very similar incident happened for the METU Campus as well which resulted in the complete opposite situation which will be mentioned in the next section.

Table 6.1 Num. of Stories and Tiles for Each Game (Arenberg)

		Base Tiles		
	Stories	Total Number	Empty	Build
Game 1	12	26	2	24
Game 2	16	43	4	41
Game 3	12	17	0	17

Besides the number of used tiles, the number of each image element per game is presented in the table below and can be seen that there are a few notable differences in terms of element usage during different games (Table 6.2). The most accurate difference was; having a very few nodes and several landmarks at the Game 3; compared to other games. This result can be a reflection of having players being not so certain about differences of nodes and landmarks. Another outstanding point is the abundance of linear elements of paths and edges and the fewness of districts which were used during the second game. Considering the high amount of the base tiles of the same game, it was quite a natural result to have players putting so many paths/edges in order to reach longer distances.

However, when all the elements were counted and divided into the number of told stories, the average number of used elements in each turn seems to be almost the same. Although each player was asked to put 5 elements for each story; the multiple continuous elements (paths and edges) were counted as one element according to the game rules. Thus, the average number of elements which each player used for each story ranged between 6.50 and 6.68 (Table 6.2).

Table 6.2 Num. of Stories and Elements for Each Game (Arenberg)

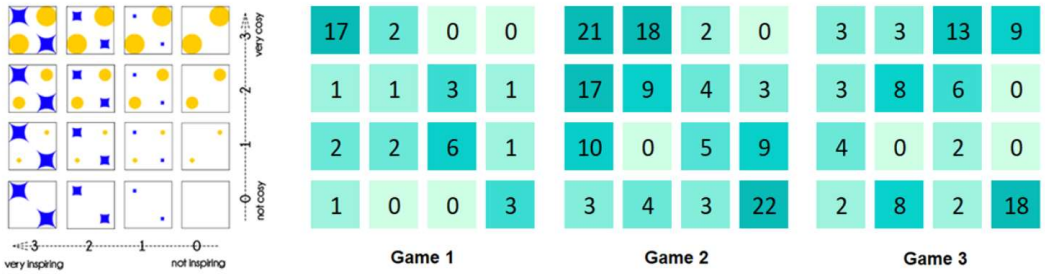
	Stories	Landmark	Node	Path	Edge	District	Tot. Elements	Avg. El. (per story)
Game 1	12	8	14	36	11	9	78	6,50
Game 2	16	10	11	57	24	5	107	6,68
Game 3	12	12	4	39	14	10	79	6,58

Similarly, the feeling cards were also counted for each of the games and their proportions were calculated for each story and each element (Table 6.3 and Table 6.4). If we remember the rule about the feeling cards, while there were no upper limits, players were asked to put at least 3 cards per story to be able to earn points. According to the table below, while feeling cards were only perceived and used as a tool to earn points by the first game's players with an average of 3,33 cards per story, players of the second and third games stressed more on expressing their feelings with averages of 8,12 and 6,75 respectively. Moreover, the average numbers of feeling cards per element was calculated as 0,51;1,21 and 1,02 for each game in order. Thus, it can also be said that players were willing to relate each of the elements that they put with a feeling card during the second and third games.

Table 6.3 Num. of Feeling Cards in Total, Per Story & Per Element (Arenberg)

		Feeling Cards		
	Stories	Number	Per Story	Per Element
Game 1	12	40	3.33	0.51
Game 2	16	130	8.12	1.21
Game 3	12	81	6.75	1.02

Table 6.4 Num. of Each Feeling Card Pattern Per Game (Arenberg)



6.2.2. Content and Extent

All the documented stories have been reviewed, through content analysis and which incidents players memorise and remember to be included in the game as a story is discovered. Among 40 stories in total, while 16 (40%) of them were structured on a moment or an event that was occurred in the campus environment, 24 (60%) of them were structured on a state of movement or a journey that the player has taken within the campus. While 10 stories (25%) were specified with a detail of cycling in the campus, another 6 (15%) indicated that they were walking. Additively, 1 (2.5%) player mentioned a journey of bus + walking combination while another one's (2.5%) was a driving + walking journey. Moreover, 6 (15%) other stories indicated that they were on a journey, but they did not specify their mode of transportation (Table 6.5).

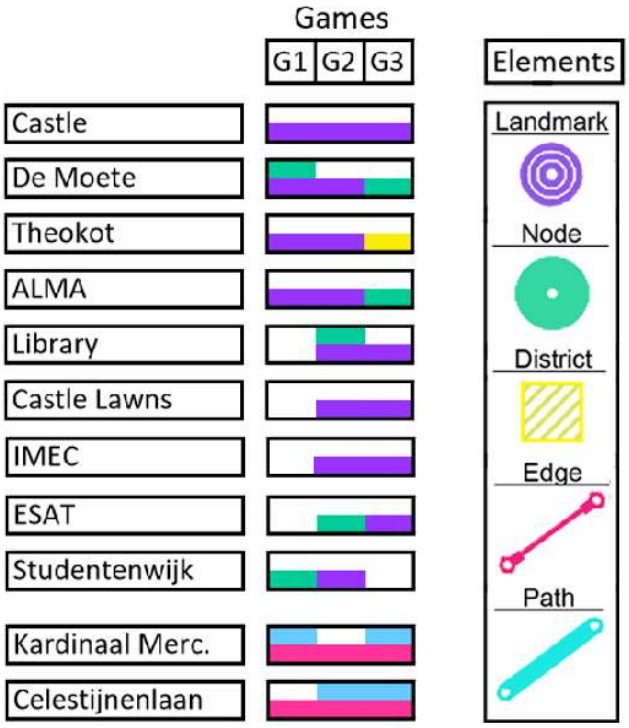
Table 6.5 Incidents that the Stories are Based on (Arenberg)

		Stories	%
	Moment/Event	16	40%
Movement	**Walking**	6	15%
	Cycling	10	25%
	Bus+Walking	1	2,5%
	Driving+Walking	1	2,5%
	Unknown	6	15%
	Total:	40	100%

The Arenberg Castle was the starting reference point for all the games, and all the three groups identified it as a landmark. Since it is a very central and outstanding spot within the campus, there were a few details around the castle like the trees, green areas or parking lots which were identified through the image elements as well.

Some other distinctive points which exist on all of the end-result maps are; De Moete and ALMA; Castle Lawns; Theokot/Material Building; wall along Kardinal Marcierlaan and the Celestijnenlaan. Those major spots are listed in the Table 6.6 below. The table represents types of the image elements that were placed for each of the spots during eah game; Game 1 (G1), Game 2 (G2), and Game 3 (G3). For instance; while the castle was defined with a landmark element during all of the three games, De Moete was defined as a “node” but also as a “landmark” during the first game, only as a landmark during the second game and as a node in the third game.

Table 6.6 Major Represented Spots (Arenberg)



There are only three cafeterias (De Moete, ALMA, Esat) in the campus, and all three of them were highly recognised on the maps whether as a landmark or a node. While ALMA was being described as a big brutalist structure in the middle of a grass field, the stories on ESAT were linked to the green space behind it. Differently, De Moete was mentioned in stories with a variety of concepts such as the bicycle traffic at the junction in front of it, the garden of it, events that it hosts and the computer science area behind it. The wall along the Kardinaal Marcierlaan was one of the hotspots; being mentioned multiple times during all of the games. All the stories about the wall were determining the difference between two sides of it; the congested monotonous street and the silent, natural forest; which are connected through a gate in the wall. While players were introducing the wall as an “edge” they were pointing out to the

gate as a "node"; a transmission spot. During a story one of the players was acknowledging as;

> "*Here there is a gate; a node. An' it's like a shift between two perceptions, here you have the road with cars, when you enter the gate, you feel like you are in a total different world because you enter the forest. So, these are like two different districts. Not cosy this side, more cosy the other side.*" (Player 3, Arenberg Game 1)

For the area of Castle Lawns; the junction between the Castle and the lawns, the star-shaped landscaping near the road, the path along it and even the view of the IMEC behind the castle were mentioned in the stories as parts of the big grass area in front of the castle. Surprisingly, none of the groups defined it as a district but a landmark instead.

The Dijle Valley has been an important reference in the design of the campus throughout the history. The physicality of the water surfaces is shaping the spatial relations of the built structure and the road network in the campus. However, the users represented the both of the rivers (Dijle and Voer) as edges and sometimes paths because they perceived them as linear elements but not as surfaces with the river bank and green areas around it. Some green areas were also introduced as "*nice field but you can not enter because of the water.*". It was also observed that the water surface was being referred mostly during stories which the player moves along it. For instance, the path along the river Voer in front of the ALMA was presented on all of the three maps through the stories of cycling or walking along the river. However, during one story, a player represented only one side of the river bank where the path lays along as a comperatively wide piece of district (Figure 6.2). That was one of the moments that the importance of the storytelling aspect has manifested itself. While the player was mentioning the story that she has experienced on a path along the River Voer, she indicated; "*Two days ago I went to a party at the Alma, and I cycled, and I have noticed that there is a street light here. I thought the street lights were defining the path because you have the river and the path along and other elements around it… This*

path itself is not so cosy because of all the crowd and people passing from everywhere and… But it is inspirational to cycle next to the water, I like it." (Player 6, Arenberg Game 2) and placed feeling cards along the path with the highest degree of inspiringness and the second lowest degree of cosyness. Moreover, she placed some least inspiring and least cosy elements after the lighted area and along the riverside as well. Such a combination of elements and feelings cannot be easily understood through a survey or a questionnare but through encouraging people to talk about it through storytelling. Another element of water; pools in front of the Castle and a small section of the Dijle between the Castle and the Moelen was mentioned a few times as spots to have lunch, to watch dogs, to sunbath; to spend time during good weathers.

As an additional finding in regard to the water surface; during two different games, the Theokot building and the space behind it was reffered to explain how the intervention of recently put steps toward the water changed the character of space positively and created an inspiring environment.

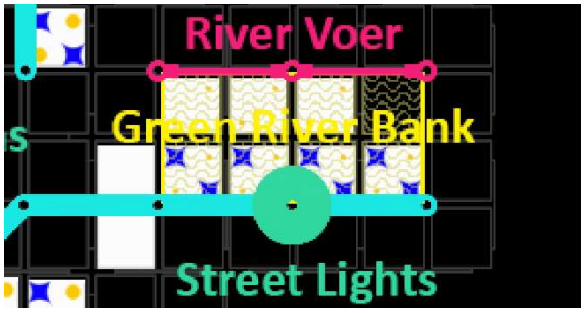


Figure 6.2 River Bank as a "District" (Arenberg)

Another important spot was the Library although it wasn't placed in the first game which the Celestijnenlaan was perceived as the edge; the border of the campus. However, during the Game 2 and Game 3, the Library was accompanied with a district of the buildings which is located on the southwest along the Willem de Croylaan.

Lastly, as an outstanding incident, four different monumental trees were referred to as nodes; for 6 times in total. Two of the players from different game sessions were acknowledging about an event which the area was designed according to two monumental trees and one was stating; "*We did an activity with existence at the grass field next to the castle this side, we used two big trees as marks to place everything around.*" (Player 2, Arenberg Game 1). Although the field was not really recognisable before, a few spatial interventions made the area and even those two trees; important spots referring to the other player who was stating; "*Organised an event with existence. The field, normally you do not recognise it but with the event or a few interventions; just putting the stage or the chairs next to it made it a nice place which we did not notice before.*" (Player 1, Arenberg Game 1)

It is found out that many of the players were referring to overuse, inadequacy and inefficiency of the current infrastructure. Especially the low capacity of paths which can not carry congestion of the vast number of bicycle users anymore… This result also seems to be related to a few other issues like the safety problem especially at the junction points, cyclists being so fast, inefficient street lighting, uncosy crowded and noisy environment or having cars on some pedestrian-dominant paths. All these problematic areas were also mostly underlined through the feeling cards.

Another situation which needs to be mentioned is identifying different parts of a building or a road or a section of river with different image elements; which was occurred for a few times. While the River Dijle was represented with an edge, it was also presented with a path on the tile next to it. That sort of combinations were anticipated and players were asked to think of the mental image instead of the actual physicality of the environment during the introduction phase of the each session. According to Lynch (1960), Banerjee and Southworth (1990), realising and learning the environment completely dependent on the users' interests and their ways of perceiving. As Topçu and Topçu (2012) claim, some people first recognise "structures" in a square whereas some others realize only functions of the structures, such as eating and drinking facilities or places. Their idea can be meaningful if

different peoples' movement motivations are taken into account. The main aim of movement can be different if a person aims to reach somewhere or to enjoy a view or even just to move. The most significant example of the situation was Celestijnenlaan which was identified as an edge in the south and a path in the north by the players of Game 2. The player indicated the reason behind it as; the road was cutting the campus into two parts like an "edge" in the south while he was willing to reach the Mechanical Engineering area or De Moete. But while moving towards the northern part, there was nothing to be reached on the west side, so they were just aiming to reach the IMEC through a "path". Interestingly, players of the Game 3 also built a similar structure for Celestijnenlaan but in a different form. So, it can be said that the players were perceiving the northern part of the road as a narrow corridor without any functions around which shows mental edges do exist on both sides of the road although they were not mentioned by the players. So, the students are not really satisfied with any parts of that road whether in the north or in the south as the feeling cards also prove (Figure 6.3). This finding would be valuable during an urban design process to be able to understand the need of different interventions in different parts of the road.

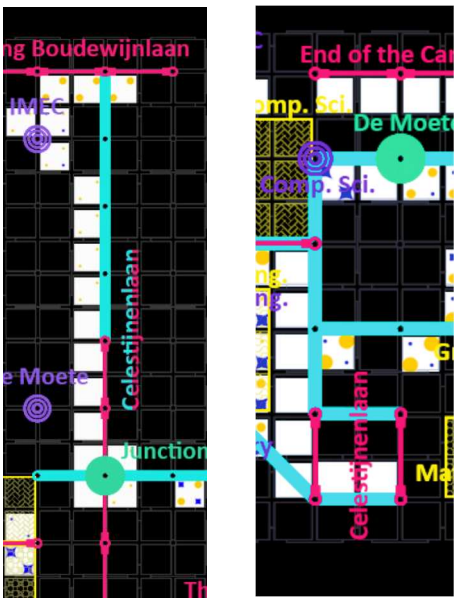


Figure 6.3 Celestijnenlaan of Game 2 and Game 3

Additionaly, since the scaling was also left to the users to reflect not the physical but the mental distances, some of the distances were manipulated unconciously or conciously. Some of the players were even reasoning their decisions of making a place bigger or smaller.

> "*I assume this whole area is the Castle because the castle is the most important building of the campus, so for me it is a very big building.*" (Player 1, Arenberg Game 1)

There were also a few stories which were attributing meanings to locations according to their very own emotional attachments.

> "*...In my first year, the first presentation of the year and of the all university was at the MTM building and I was so nervous. So, I still see it as a landmark.*" (Player 4, Arenberg Game 1)

> "*The Castle was the place where I first saw a PhD thesis defence of a colleague and the room was so beatiful and I was thinking someday it will be me but the years are going. However, the Castle; I find very inspirational because of that reason.*" (Player 11, Arenberg Game 3)

Each of the physically produced maps are represented in the following pages (Figure 6.4-6.15) in four visual forms:

1) to represent the complex network as a whole,
2) to colour-code and separate each element type to understand the relation of them with each other,
3) through specifying locations to understand how do players perceive the campus environment and how do they represent them,
4) to understand the most and least "liked" places through the feeling cards of inspiringness and cosiness.

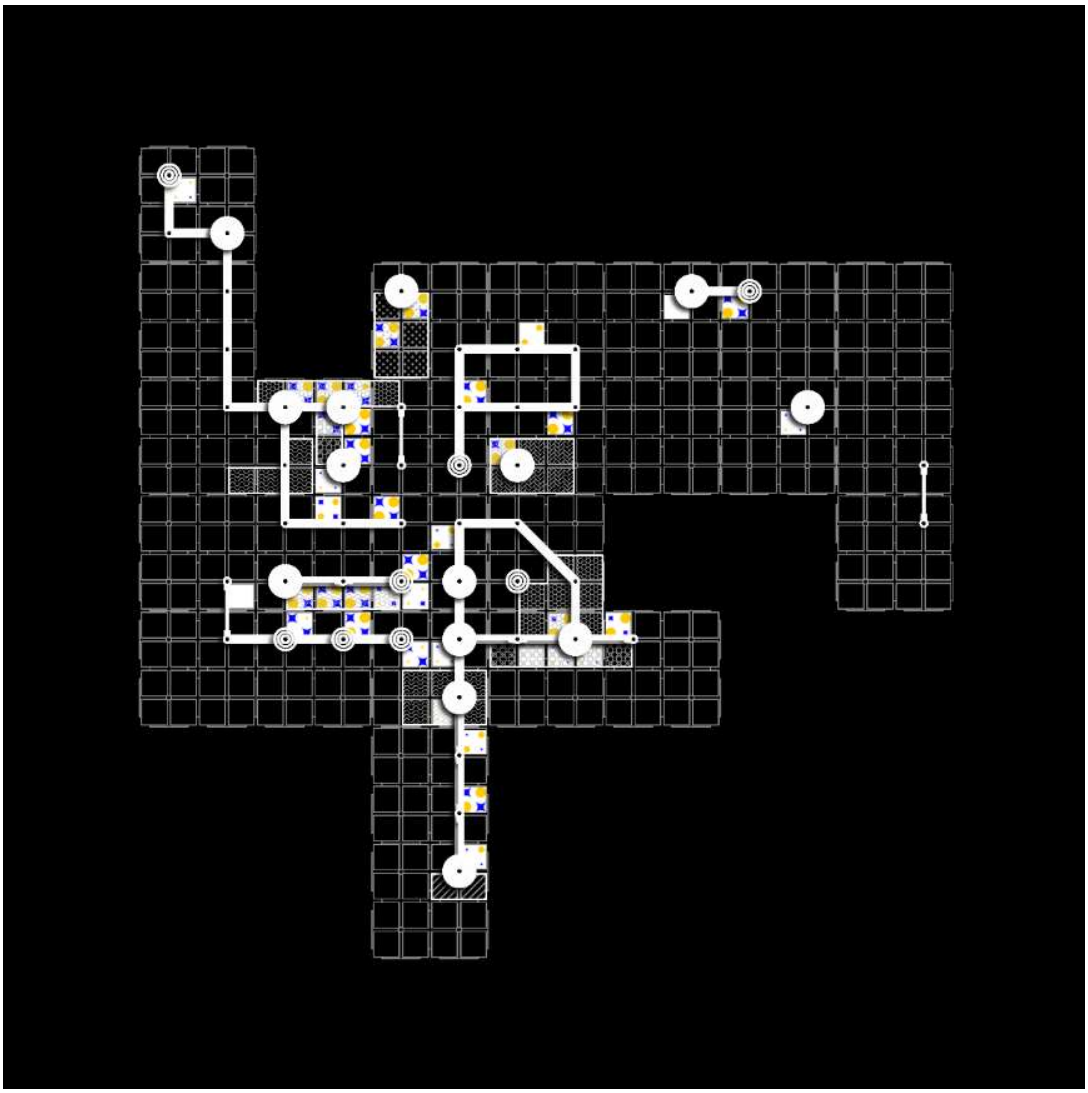


Figure 6.4 End-Result of Arenberg Game 1

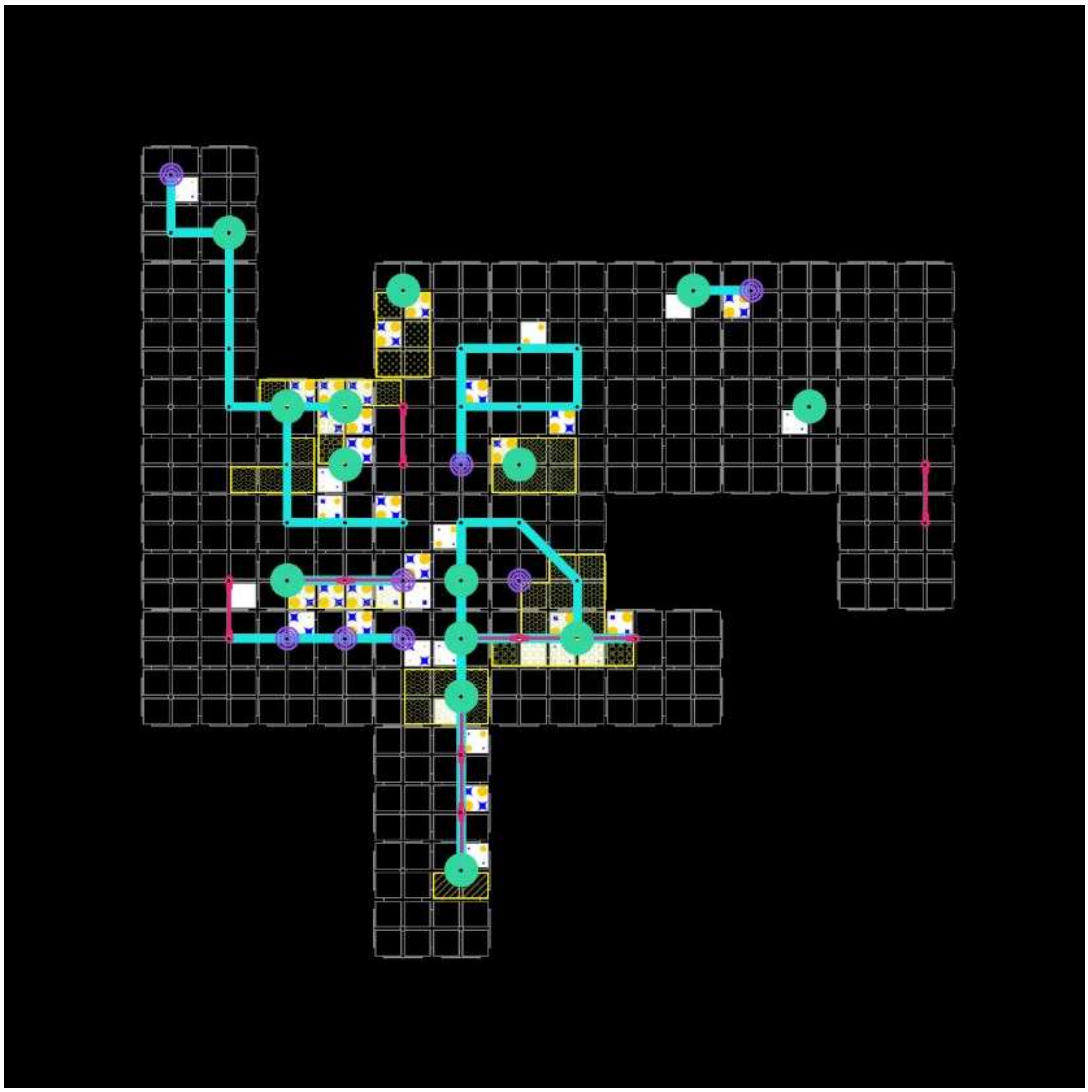


Figure 6.5 Colour-Coded End-Result of Arenberg Game 1 (Top: Northwest)

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

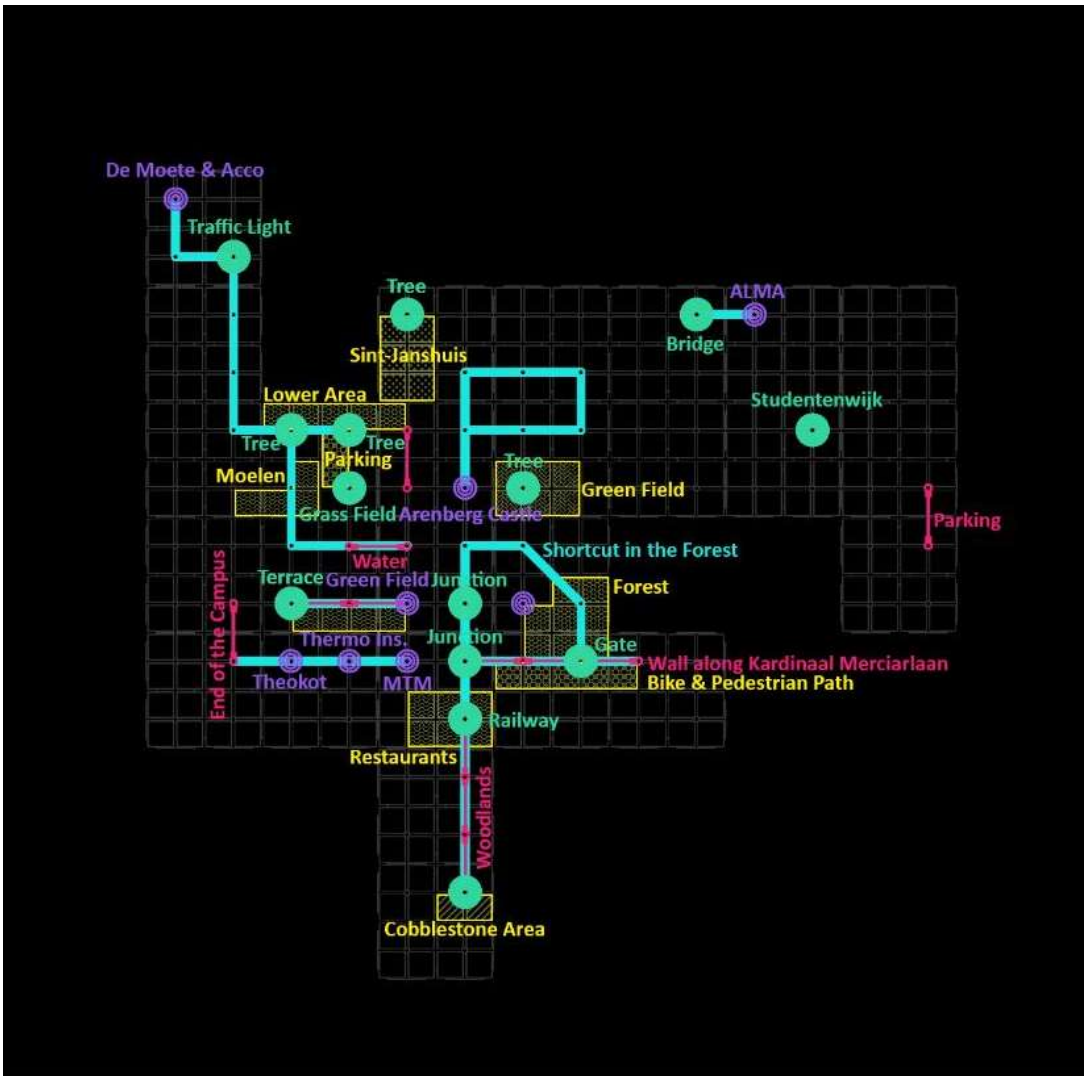


Figure 6.6 Location Specified Image Elements of Arenberg Game 1

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

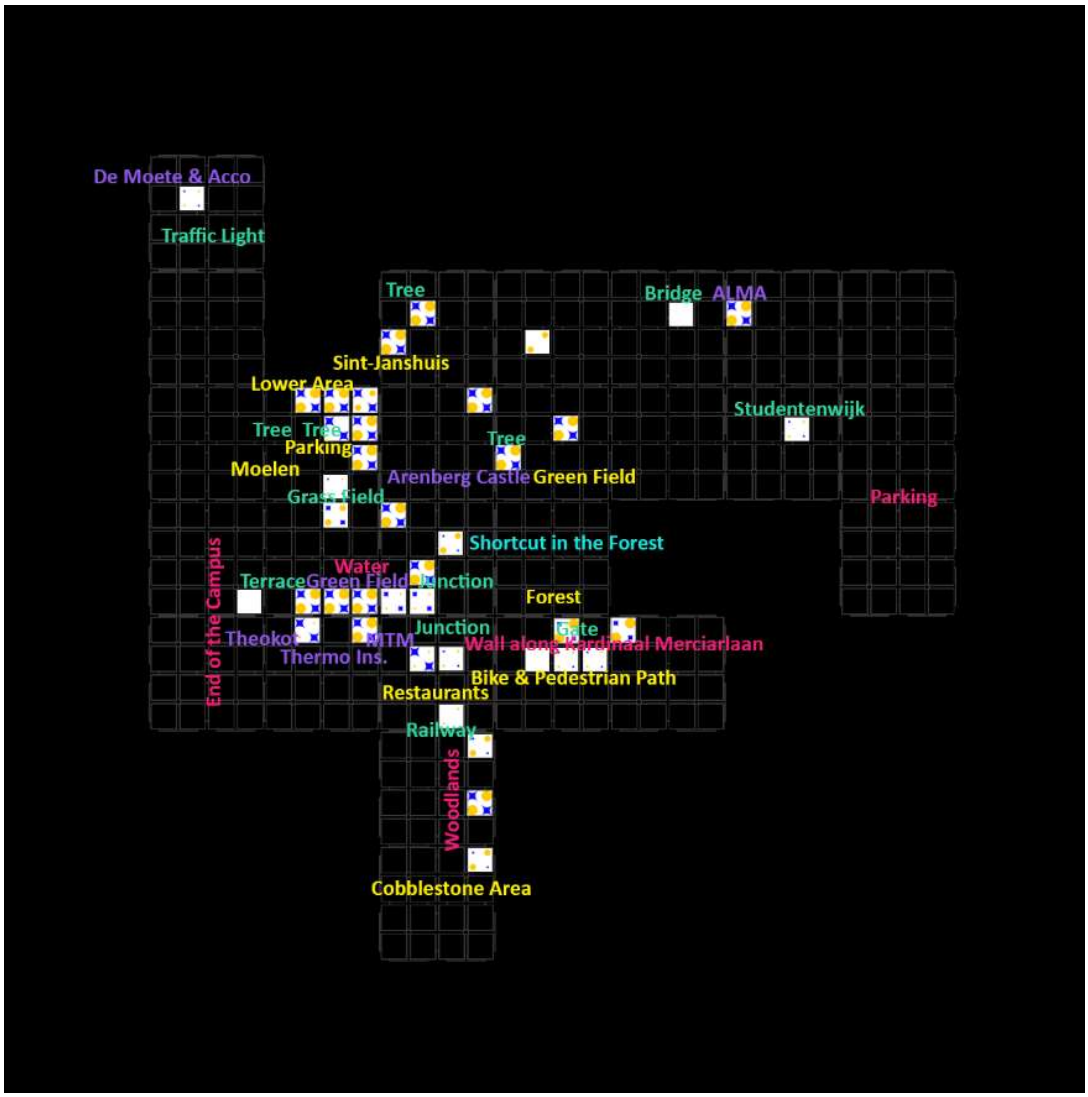


Figure 6.7 Location Specified Feeling Cards of Arenberg Game 1

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

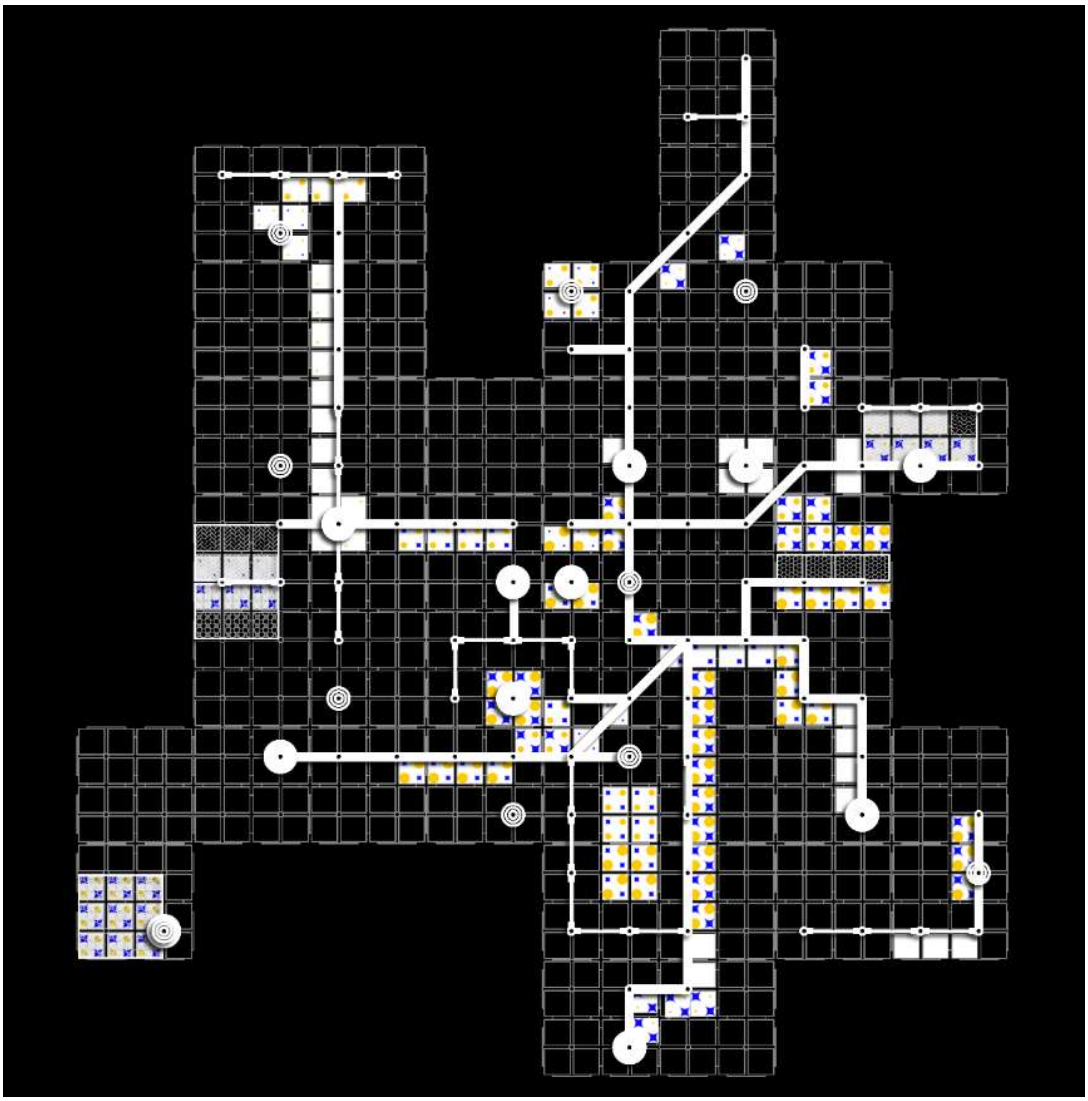


Figure 6.8 End-Result of Arenberg Game 2

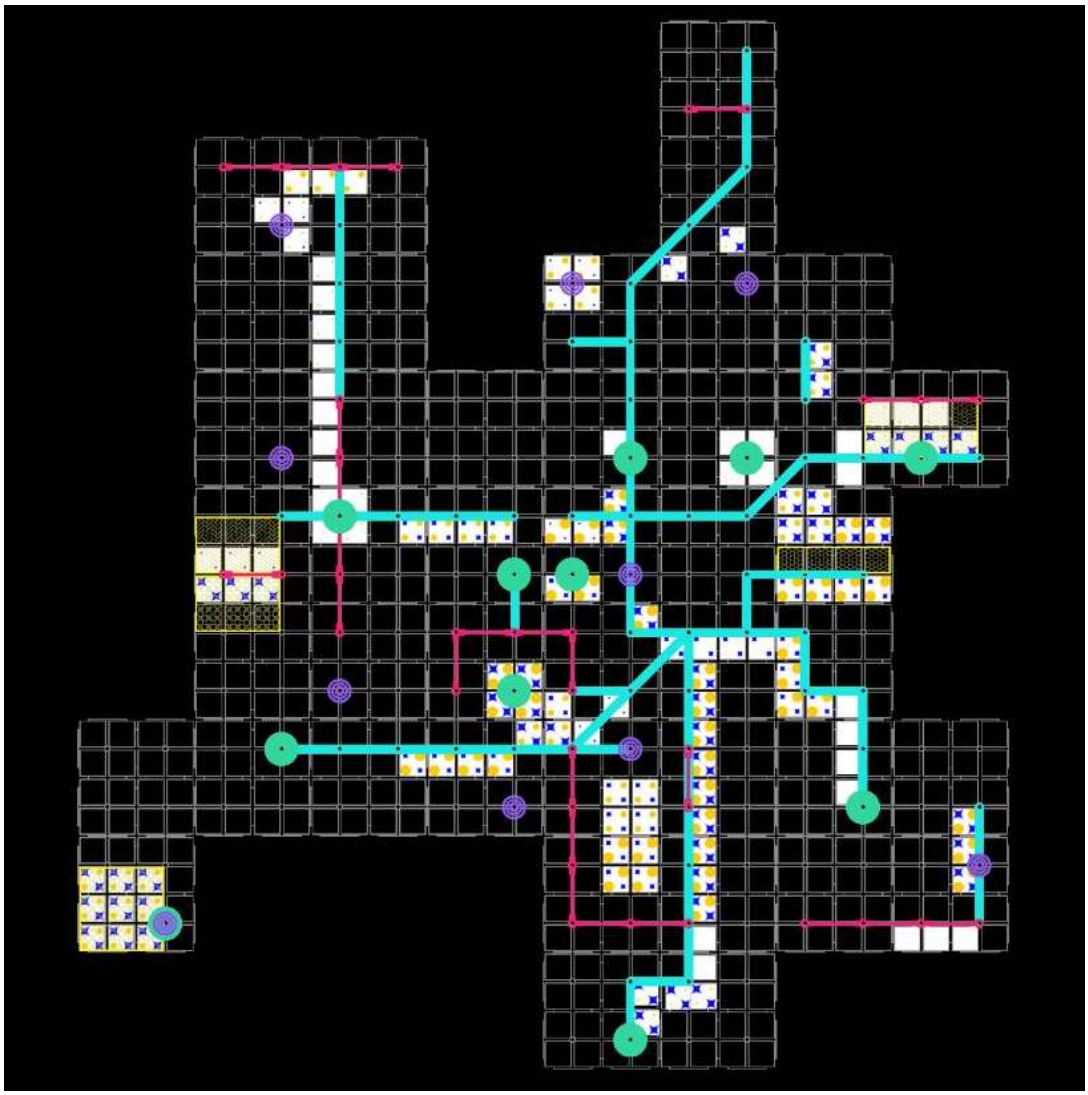


Figure 6.9 Colour-Coded End-Result of Arenberg Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

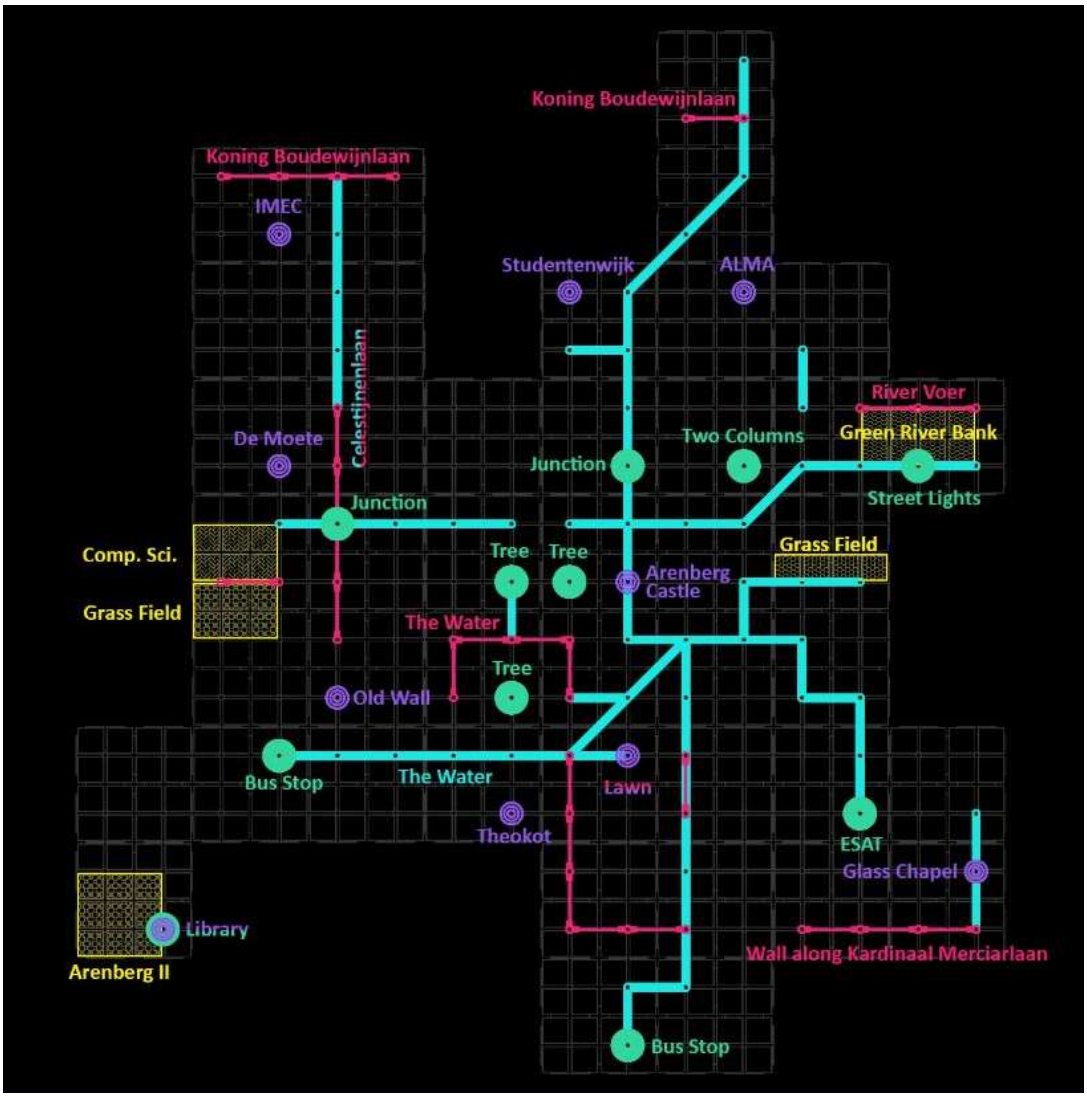


Figure 6.10 Location Specified Image Elements of Arenberg Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

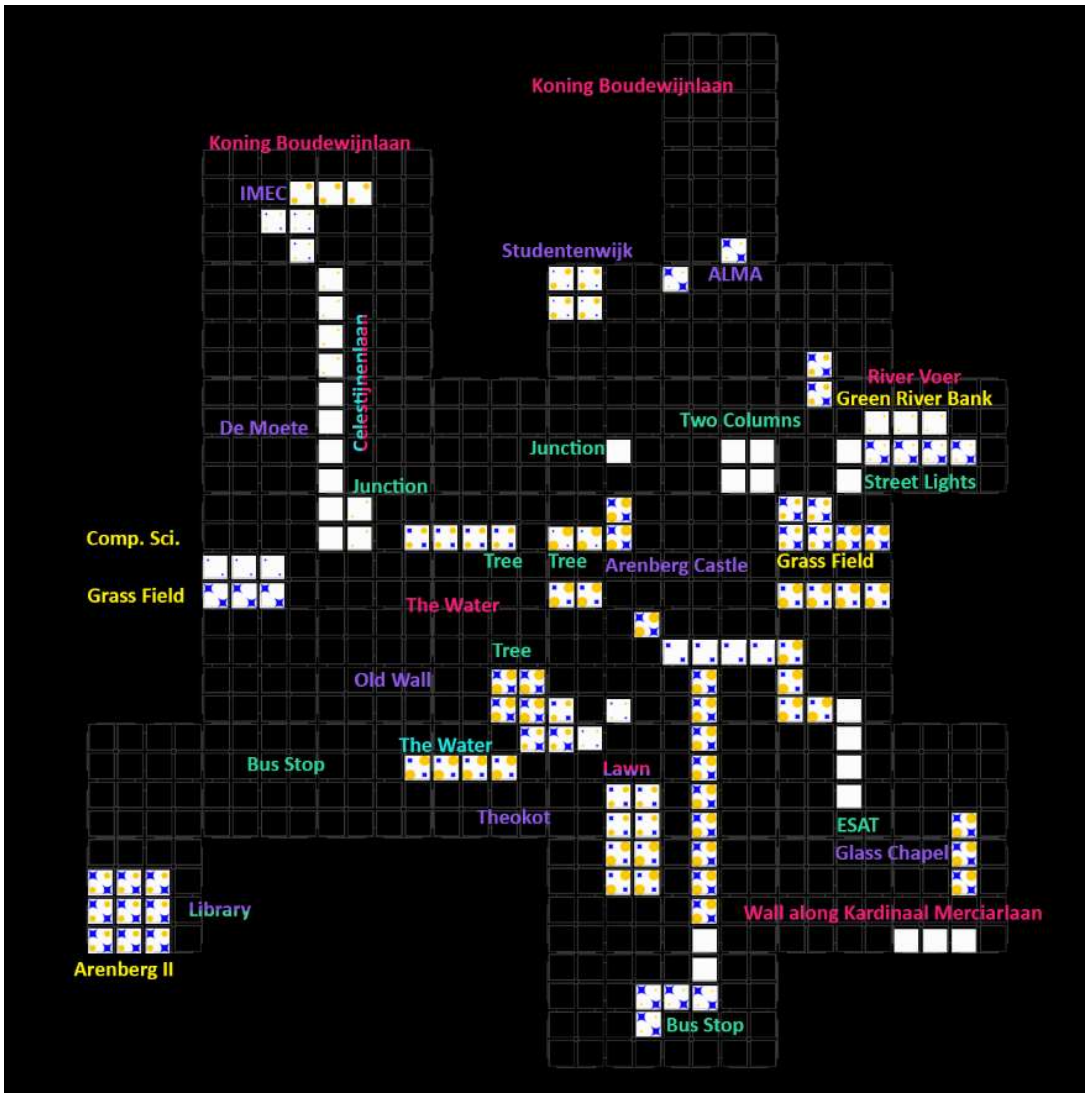


Figure 6.11 Location Specified Feeling Cards of Arenberg Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

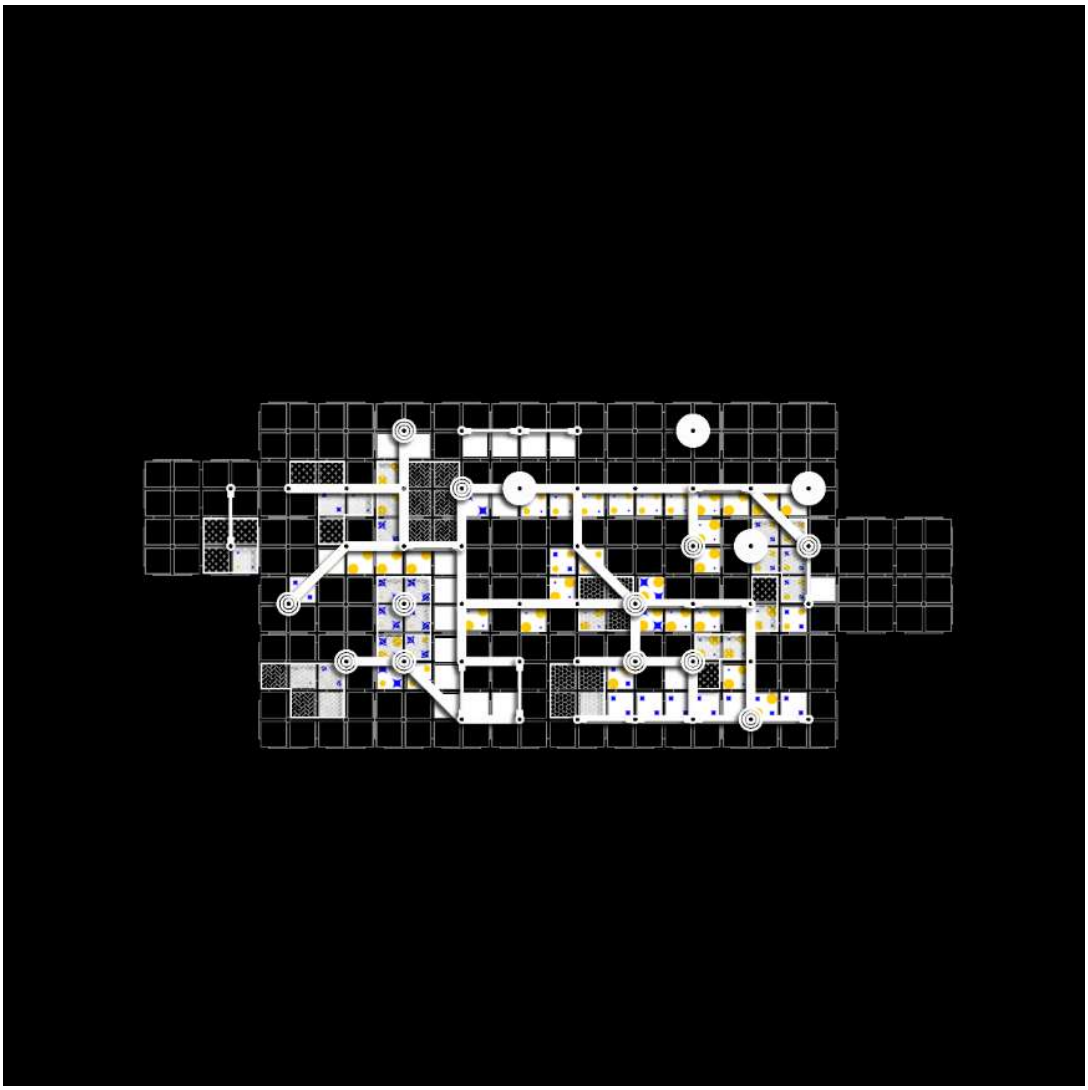


Figure 6.12 End-Result of Arenberg Game 3

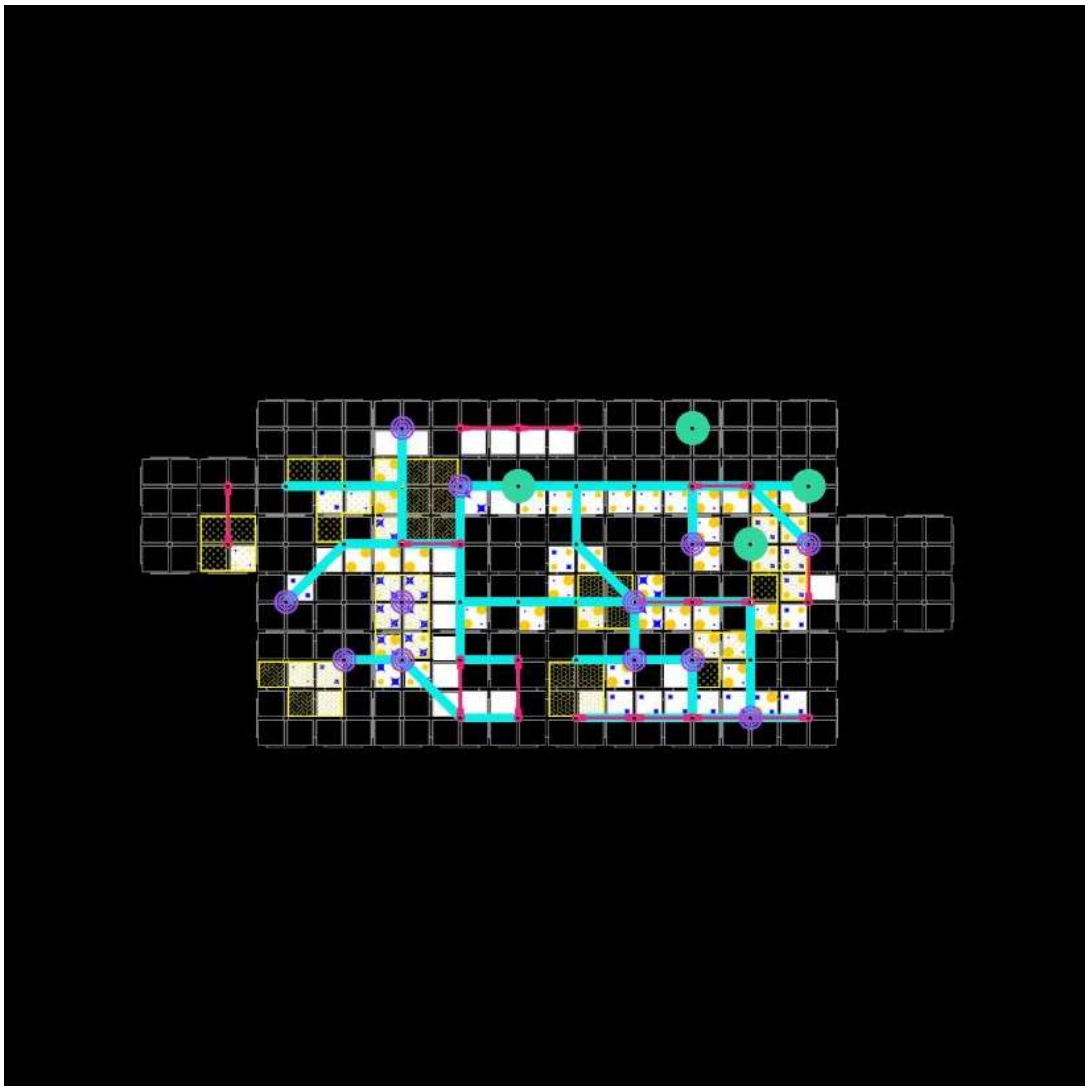


Figure 6.13 Colour-Coded End-Result of Arenberg Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

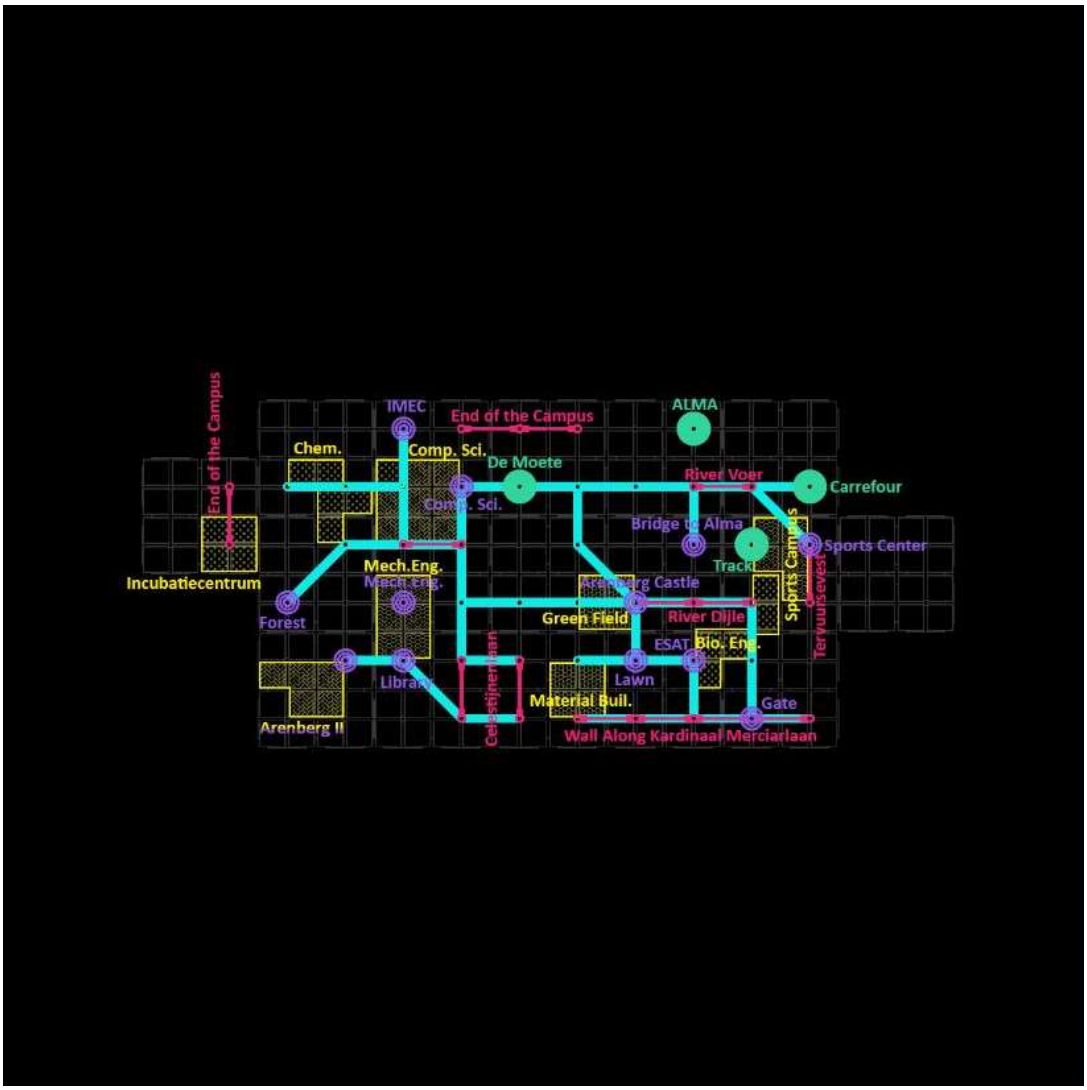


Figure 6.14 Location Specified Image Elements of Arenberg Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

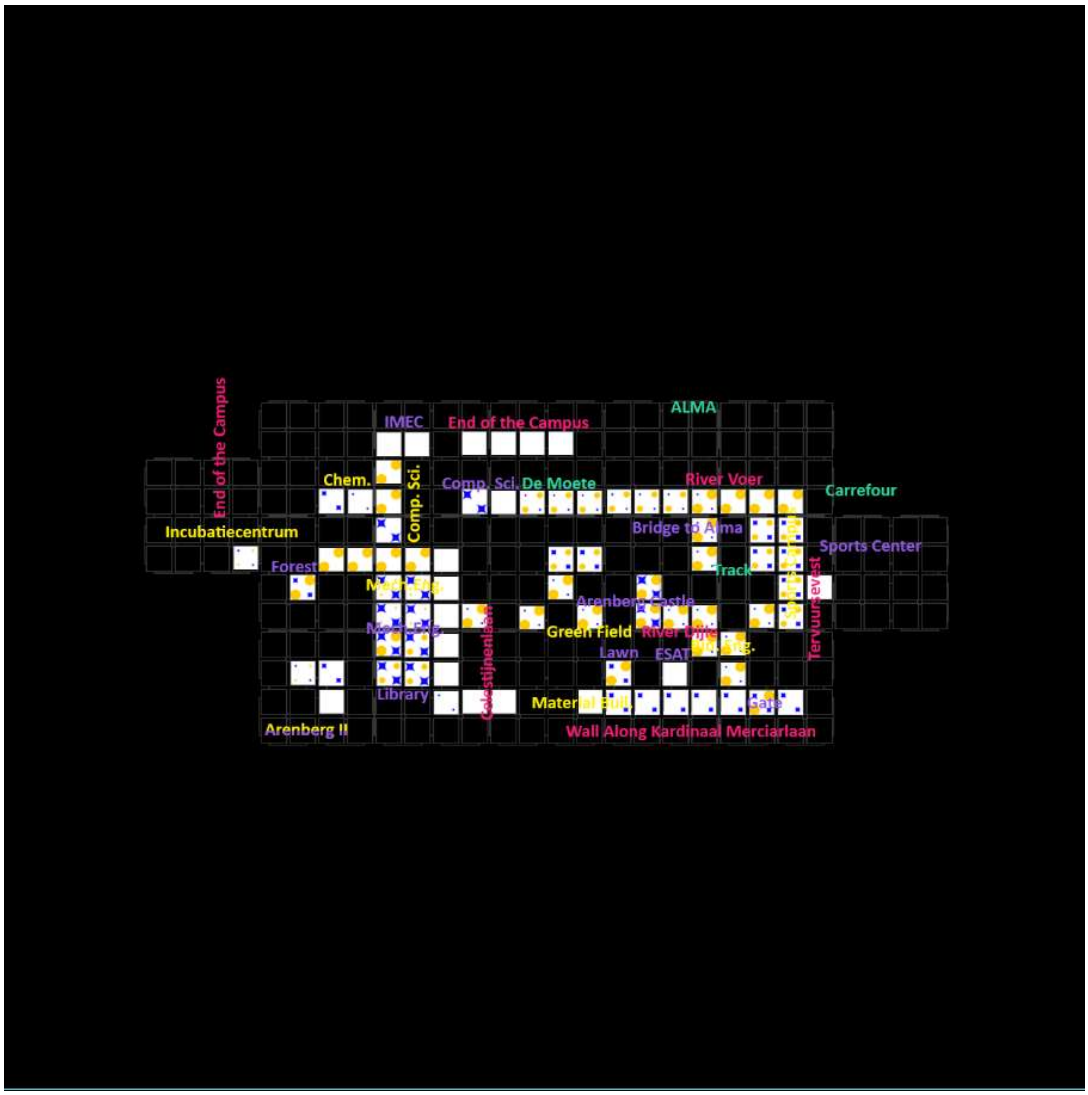


Figure 6.15 Location Specified Feeling Cards of Arenberg Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

6.3. METU Campus

6.3.1. General Features

20 players played Co-gnito in the METU Campus in 5 different groups to produce 5 different maps. As it was explained in the previous section, the game was expected to be played within 2 hours and for 4 rounds. Among the 5 groups in the METU Campus, 3 of them were able to complete all the rounds while the other two groups presented 12 and 14 stories due to the time limitation.

The Academic Campus of METU covers an area of around 2.5 km^2 without the vast forest areas that surround the settlement. Compared to the Arenberg, the area of METU is bigger more than two times. So, this kind of a size difference between two case settlements is an important variable in order to understand game performance in different scales as well as locations. Although the actual scales of campuses were drastically different, numbers of attached base tiles happened to have a similar range. While it was ranging from 17 to 43 for the Arenberg Case, the range was 18-44 for the METU games, as shown in Table 6.7 below. That similarity despite the size difference also affected the levels of complexity and integrity as previously discussed for the case of Arenberg. While players of the Arenberg Campus were representing a smaller area of around 0.9 km^2, METU users had to produce a map of a more complex spatial layout, on the same size of a base and in the same length of time. Thus, the METU maps were containing fewer details (Figure 6.16).

Table 6.7 Num. of Stories and Tiles for Each Game (METU)

		Base Tiles		
	Stories	Total Number	Empty	Build
Game 1	14	18	1	17
Game 2	16	36	4	32
Game 3	16	27	2	25
Game 4	12	44	3	41
Game 5	16	44	4	43

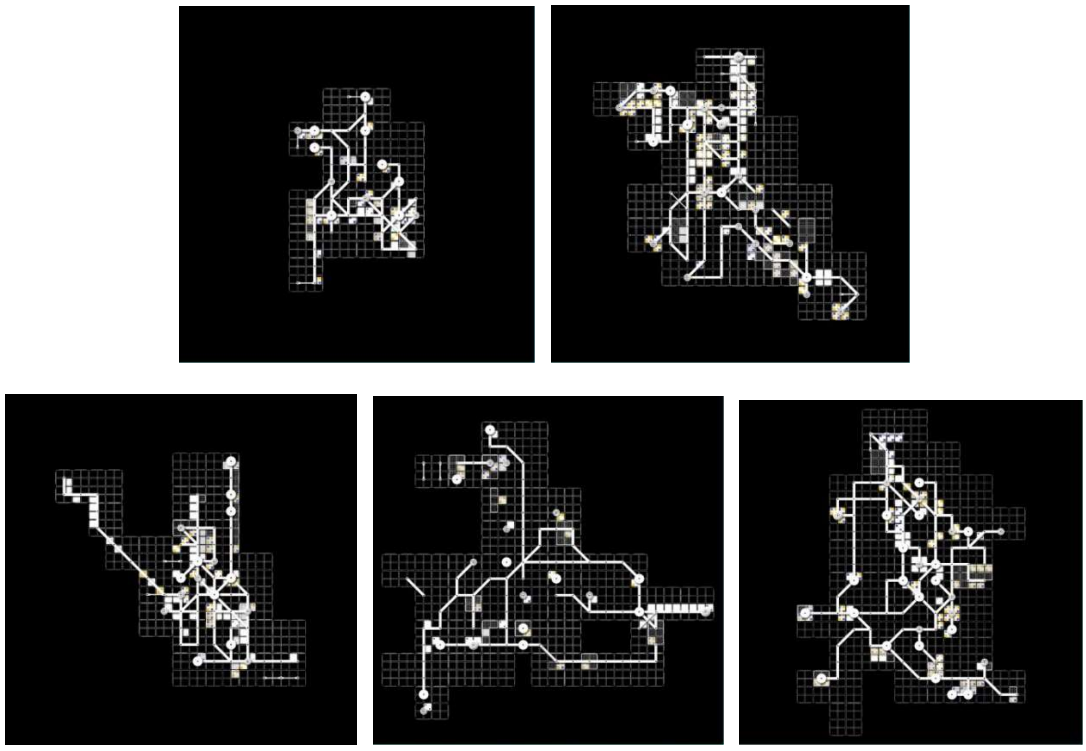


Figure 6.16 End-Result Maps of Five Game Sessions on METU Campus

As can be seen from the end-result maps which are presented above, the visual densities of the majority of the METU maps seem to be similar to the ones from the Arenberg Campus. However, while generalizing the findings, there should be an exception for the 4th METU game, which is the most problematic among all eight sessions. While the session was consisted of 12 stories; the end-result's capacity to represent the campus is even less than that. If we recall the issue that happened during the third Arenberg game, the action which caused scaling issues was the same, although the result was completely different. Just like the case of Arenberg, a central reference point was presented to the METU players at the beginning of the game as well. That reference point; Devrim Junction connects four main roads in the very centre of the campus. Thus, it was expected to be the starting point for the players. Moreover, regarding the two-level branching strategy, players were encouraged to stay close to each others' stories in order to earn points.

However, instead of starting from Devrim or any other close area, the first player of Game 4 (METU) told a story of an up-to-hill bicycle journey from the Sports Area to the A4 Gate; the endpoint of the campus in the East. The considerable distance which the player defined was possibly affected by his transportation mode and the steepness of the road. In addition to that action, the second player decided to stay closer to the center, and the other stories started to emerge completely independent from each other (Figure 6.17). While the first pl'yer's action of the third Arenberg game was resulted in having a small scale, it caused a "lost & stuck" situation for the fourth METU game players. As if two different players build two different stories on two far and unconnected corners of the base in the first rounds, there is a high probability of getting stuck in the middle because the distances were not properly thought in reference and relation to each other in the beginning. Thus, that process resulted in getting stuck between a few different scales. The situation can be understood the best through the words of a player while having a hard time deciding where to place the Çarşı;

> "*If I take this road as a reference, Çatı should be here, but if I take the Engineering Buildings as a reference, it should be there. Cause after the junction, there is the minibus stop, and then there is MM, and there is Çatı, and there is the road, and there is the Elf forest*[1]*. However, if Elf forest is that close, I do not know where should the Çatı should be!*" (Player 26, METU Game 4)

[1] Elf forest: A lighted path within a woodland which students call "Elf forest".

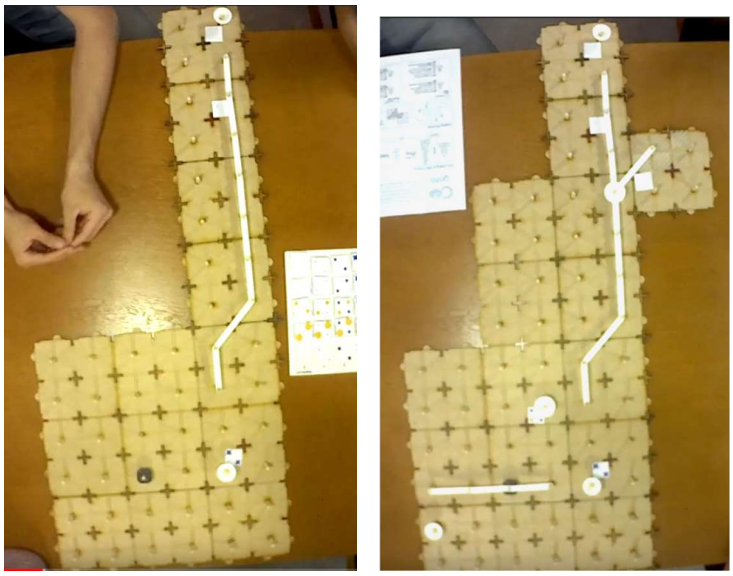


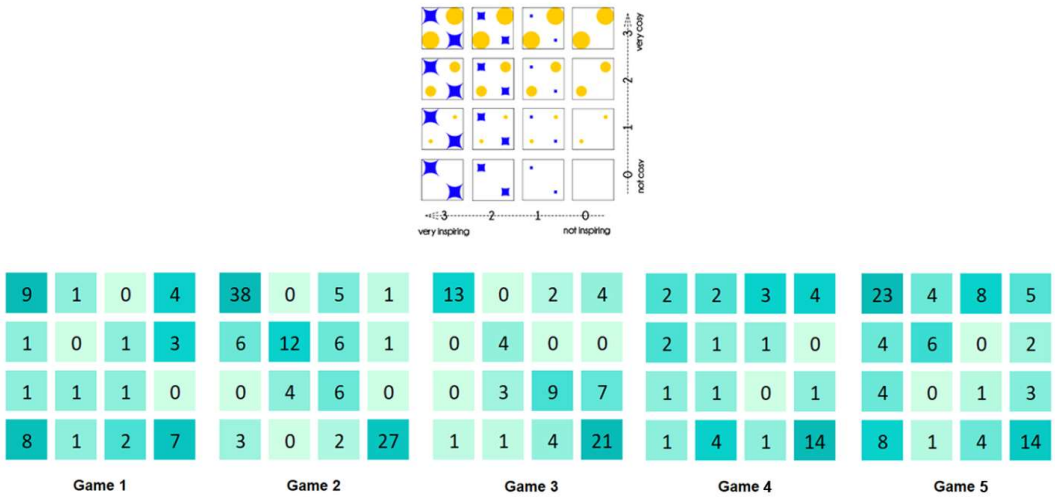
Figure 6.17 First and Second Stories of the Fourth METU Game

While it was presenting a weak visual representation of the campus in terms of figure-ground perception, it had the highest number of tokens (elements) per story ratio among METU games, with an average of 9.16 (Table 6.8). However, it still could not create a dense, complex pattern due to the scattered base structure as well as the players' unwillingness to put feeling cards with an average of 3.16 cards per story (Table 6.8). Surprisingly, the fourth 'ame's rate for feeling cards is not the lowest. The first game has an average of 2.85, whereas they had to put at least 3 cards in order to get points. The low average might be showing that the time the players spend to built each story might have confused them sometimes and led them to forget what they have placed or where they have placed. Thus, they might have started skipping steps unconsciously by placing 2 or 1 cards instead of 3.

Table 6.8 Num. of Feeling Cards in Total, Per Story & Per Element (METU)

		Feeling Cards		
	Stories	Total Number	Per Story	Per Element
Game 1	14	40	2.85	0.49
Game 2	16	111	6.93	0.90
Game 3	16	69	4.31	0.67
Game 4	12	38	3.16	0.34
Game 5	16	87	5.43	0.61

Table 6.9 Num. of Each Feeling Card Pattern Per Game (METU)



Different from the Arenberg games which the average element number per story was ranging from 6.50 to 6.68; the scale is much wider for the METU as shown in the Table 6.10 below. In addition to that, another outstanding difference is the number of edges. While 11 to 24 edges were defined within the Arenberg per each game, the numbers are ranging from 3 to 8 for the case of METU. However, what kind of things or spots were labeled as edged will be further discussed later in this section. Also,

regarding the bigger campus size, while the average number of paths that were placed during each game session was 44 for the Arenberg, it is almost 76 for the METU.

Table 6.10 Num. of Stories and Elements for Each Game (METU)

	Stories	Landmark	Node	Path	Edge	District	Total Elements	Avg. El. (per story)
Game 1	14	6	8	52	4	11	81	5,78
Game 2	16	16	7	83	8	9	123	7,68
Game 3	16	7	9	70	4	12	102	6,37
Game 4	12	10	12	73	4	11	110	9,16
Game 5	16	10	20	101	3	8	142	8,87

However, while analyzing each of the sessions individually, it is not easy to make conclusions only by looking at the quantitative data. With the awareness of the chaotic nature of game mechanics, which was explained in the third chapter; as a storytelling game, the interaction among players was also creating butterfly effect socially. For instance, when some players start explaining locations instead of telling stories, other players might get influenced by that player and express a similar behavior. While observing the storytelling sessions, it was seen that some groups were enjoying the feature of storytelling better and having more fun, thus placing more elements for longer stories. In addition to that, the motivation to win was another factor that created longer paths. When a player wants to reach multiple color-points, they seemed to tell longer stories, thus place more paths. So, understanding each of the games individually through analyzing the content and extend is crucial as well.

6.3.2. Content and Extent

Among 74 stories in total, the majority of the METU stories were structured on a journey within the campus with a rate of 83.7% (62 stories) while only 16.2% (12

stories) of them were focusing on a moment or an event in the METU; compared to the rate of 40% for Arenberg stories. Among the 62 journeys; 50 were on foot, which is equal to 67.5%. Additionally; 5 stories (6.7%) by a car, 1 (1.3%) by a bike, another 1 (1,3%) and the 5 (6,7%) as combinations of bus & walking and driving & walking respectively (Table 6.11).

Table 6.11 Incidents That the Stories are Based on (METU)

		Stories	%
	Moment/Event	12	16,2%
Movement	Walking	50	67,5%
	Cycling	1	1,3%
	Driving	5	6,7%
	Bus+Walking	1	1,3%
	Driving+Walking	5	6.7%
	Total:	74	100%

The starting reference point for the METU; the junction of Devrim Stadium, is located in the middle of many different functions and important spots such as; the stadium itself, the "C Sculpture" as students call it, KKM (Cultural and Conventional Center), MM (Central Engineering) building, minibus and bus stops, green area in front of the Çarşı. Because of that diversity in functions, the junction was perceived and even presented bigger than its actual scale during two of the games (Figure 6.18). The Devrim Stadium itself was one of the two most apparent spots, and it was mentioned as a landmark or a district during all the games. The other important spot was the library, which was explained through three different elements; landmarks, nodes, and districts likewise the Çatı Café. For instance; while the garden of the ÇICafe was mapped as a district to spend time out, the building itself with its roof was perceived

as a landmark. Moreover, the KKM was mentioned during only two games and MM building; the tallest building on the alley with nine floors was mentioned only once. On the other hand, Minibus stops which are located just next to it on a lower level was represented as a node during three different games.

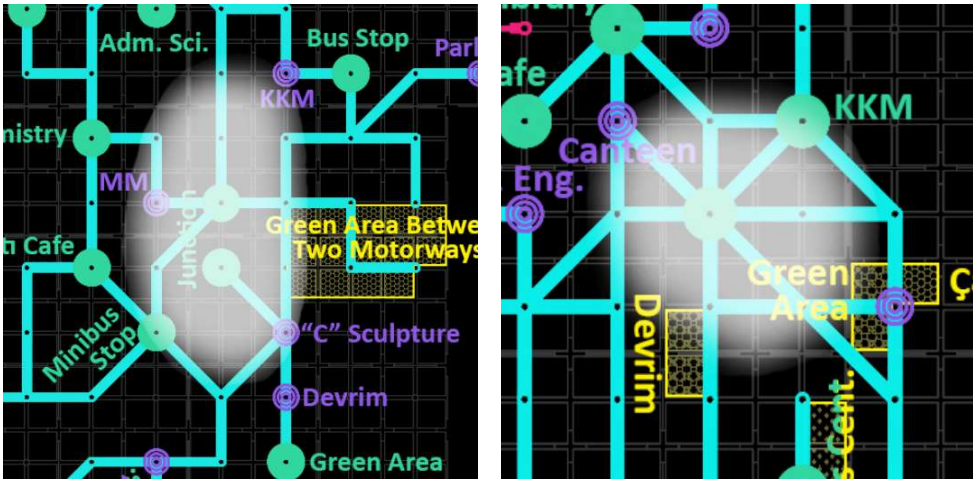
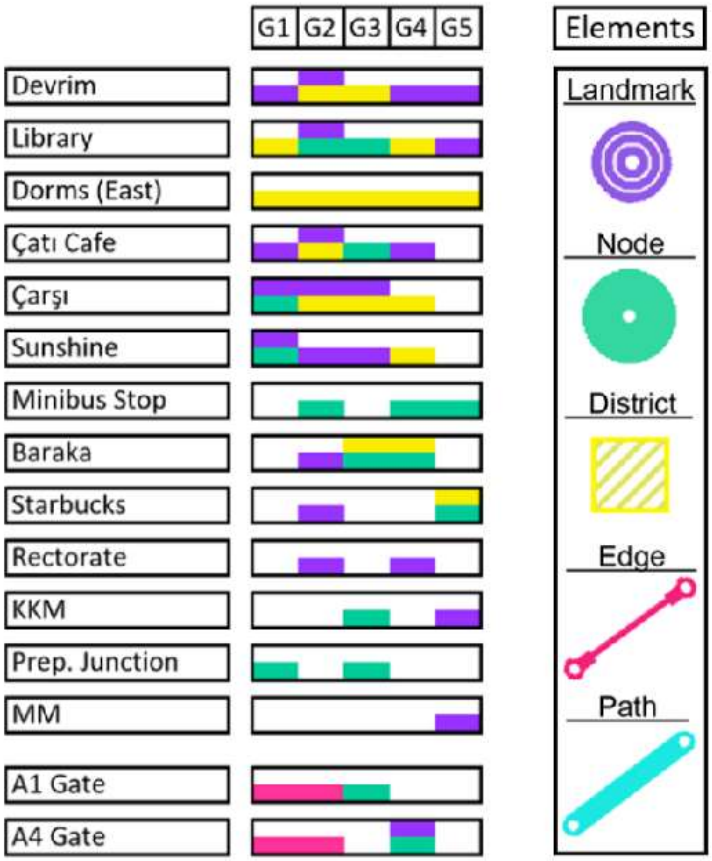


Figure 6.18 Devrim Junction Highlighted (Game 3 and 5)

Other spots which were distinctly mapped during at least three games were; dorms in the east, Çarşı (Shopping Centre), SIine Cafe and Baraka Sports Hall. The spots that were mentioned above are represented in Table 6.12 with the types of image elements that were placed for each of the spots during each game; Game 1 (G1), Game 2 (G2), Game 3 (G3), Game 4 (G4) and Game 5 (G5).

Table 6.12 Major Represented Spots (METU)



In addition to those spots mentioned above, both of the main gates which students and the staff use to enter the campus; A1 and A4 were mapped as edges by two different groups. Moreover, they were also mapped as nodes and additionally, A4 was mapped as a landmark as well. When we analyse the stories, the reasons behind those mental representations can be understood further. Since the METU is a gated campus which is guarded by the securities at the gates, it does not provide a permeable urban character which allows social or physical interaction with the surrounding settlements. As a result, the public sometimes faces difficulty while trying to enter the METU Campus. In parallel to this situation, both of the A1 stories which the edge elements were defined were about not being able to enter the campus. For instance, one player was explaining his first day at the school as;

"*When I came for the interview for the first time, I tried to enter from A1. Actually, all of the entrances of the METU are like an edge which you can not enter […] Security did not let me go in by car, so I parked here and walked till the faculty. […] So, the level of coziness and inspiringness increases towards the faculty from the gate on this road.*" (Player 6, Arenberg Game 2).

Additionally, while introducing the A1 Gate as a node, the act of hitchhiking was acknowledged during two games and those spots were mapped as nodes where people change their transportation mode from metro to bus for instance (Figure 6.19).

Figure 6.19 A1 Gate (Game 1 and 2)

The main road which connects the A1 gate to the Devrim Junction was presented on all of the five maps while only three of them were built until the A1 gate, and the other two was including only a section of it. During one of the games, it was acknowledged that the junction points on that road are not so imageable. However, a player was explaining an extraordinary day which the president of Turkish Republic was visiting the campus and hitchhiking was not allowed for that specific day. Thus, students had to walk all the way from A1 to the faculties as a similar situation to the Player 6's story mentioned above. While walking, the player perceived those junctions as important nodes which he has previously did not.

Besides the gates, a few other concepts were related to the element of edge as well. For instance, one player was mentioning about not being able to reach the end of the

alley from the backside of the Faculty of Architecture by passing through the buildings. While the majority of the faculty buildings has many doors on sides which could work as continuous in-doors paths; the fact that they are always locked bl'cks peoples' movement and requires them to use the Alley. Similarly, the building of Sociology was also defined as a border while describing the Faculty of Architecture (Figure 6.20). Moreover, during the second game, a player indicated that he can not go beyond the Sunshine and asked; "I can not go beyond it, so it is like Iedge. But... I have never tried to go beyond; there is no need. But if I want to, I can not." This opinion gave rise to a discussion among the players about if an edge exists if a person wants to go beyond or not. A similar situation was told for the case of Devrim as when its doors were locked a player could not pass through it and memorizes it as an edge. Moreover, an interestingly exceptional situation was indicated during one of the stories to define a few edges;

> "*Last week, after the protests, the police was attacking us and we started to run through the Faculty of Architecture but could not escape. It was the first time I have noticed that there were so many edges around this area, which I could not go through and run away.*" (Player 32, METU Game 5)

The story was pointing out to landscaping features which are not apparent as edges during daily life but came in sight on an exceptional incident where the main function was not walking around but "escaping" instead.

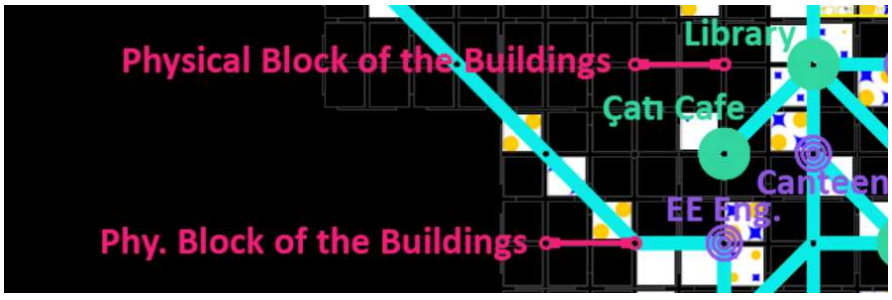


Figure 6.20 Physical Block of the Buildings (Game 3)

The sculptures or the artifacts of the campus were other important features during the stories. The "C Sculpture"[2], the "ATA Sculpture"[3], the concrete boat and the petroleum drill were the outstanding ones which were usually referred with positive feelings. Another interesting spot was a stump located in the green area behind the library which was included in a story of having quality time while sitting on the stump; away from the crowd of the library. In fact, in the following round, another player even attempted to mention a heightened utility hole next to that stump where people also use for sitting on (Figure 6.21). However, while three of the players seem to know that specific spot and agree that it is a nice imageable place, the fourth player who was an architect, was not agreeing with others. The architect player seemed to be quite surprised with the fact that the other three players were preferring to sit on such "undefined" place instead of all the designerly made public spaces and open areas. The discussion which the other players were indicating that "*architects do not understand peoples needs sometimes*" was showing how the game could be valuable to change designers' perception about a site by understanding what people expect from that space.

Figure 6.21 Students Sitting on the Heightened Utility Hole

[2] The "Youth Sculpture" by Burhan Alkar which students call "C Sculpture"
[3] A nameless sculpture by Rolf Westphal which students call "ATA Sculpture"

As in the Arenberg Campus, there were also a few times when the players related their personal attachments/emotional states to their stories. The most outstanding example for this situation was explained by a player as; "*[…] and I do not like the MM because my friend was committed suicide there.*" If we consider that the building was only mentioned in one story despite its strong visual effect as a 9-storey building; the reason behind such "avoiding" situation should be searched further to understand if avoid mentioning it due to their spatial perception or emotional memory (Figure 6.22).

Figure 6.22 MM Building From the Alley

(Source: web.24)

As a non-spatial feature; acknowledging that the dogs in the campus were mentioned during 8 different stories, might seem unrelated in terms of urban and spatial perception. However, it was observed that people tend to change their movement routes and prefer the main roads on the campus in regards to the fear of dogs at night time. Quite similarly, there were also a few number of stories stating that small sections of the forest with shortcuts (e.g. the "elf" path) are really cosy and inspirational spaces in the morning to pass through, but they are scary at night time because of the inadequate lighting. Thus, people prefer not to use them but the main roads. These two outstanding situations prove that due to variety of reasons users'

cognitive maps and perceptions might be different during the day and night times. As another interesting issue: a player was structuring his story on his route from the dorms to the preparatory school in the morning. After placing his tokens and telling the story, he continued as; "*And there is a return of that journey too.*" (Player 23, METU Game 3) to explain the way back during the evening time. However, his perception during night time had some apparent differences. One of those was the image of Devrim since people play music and spend time there in the evening time. According to the player's experience; the change of the way/capacity of usage and also the soundscape affect peoples' perception. Parallel to his experience, a player from the previous game also had inserted a story about how a group of people playing jazz in front of the Physics building was defining a space around them which she mapped as a district.

Besides the difference between the day-night usages, the seasonal conditions was also referred as a nonpermanent issue which differs peoples' routes; thus, perceptions due to pragmatical purposes. For instance, the slope from the faculties to the graduate dorms was mapped as an edge due to the ice on the ground during winter seasons which makes it dangerous to use. So, during cold days, people might prefer using a longer path to avoid the slope as the player who mentioned that spot did. Due to season-based reasons, it has also been observed that people seem to enjoy more while spending time in smaller green areas in between buildings to be protected from the wind and to stay warm, rather than big grass lawns. While the physics lawns is a well-known central open-air spot in the campus with a dominant visuality on the alley, it was mentioned only once as a district. On the other hand, small gardens in front of dorms, the garden between two Faculty of Architecture buildings, the woodland behind the library, open spaces around the Çarşı were adequately acknowledged. However, the Devrim Stadium was still a highly used place to spend time outdoors, but while the inspiringness was marked high, the coziness of the place was marked low around the stadium while specifying that the cold weather makes it an uncosy place.

As it was done for the Arenberg games, each of the physically produced maps is represented in four visual forms below. First; to represent the complex network as a

whole, second to colour-code and separate each element type to understand the relation of them with each other. Third, through specifying locations to understand how do players perceive the campus environment and how do they represent them. Lastly, to understand the most and least “liked” places through the feeling cards of inspiringness and cosiness…

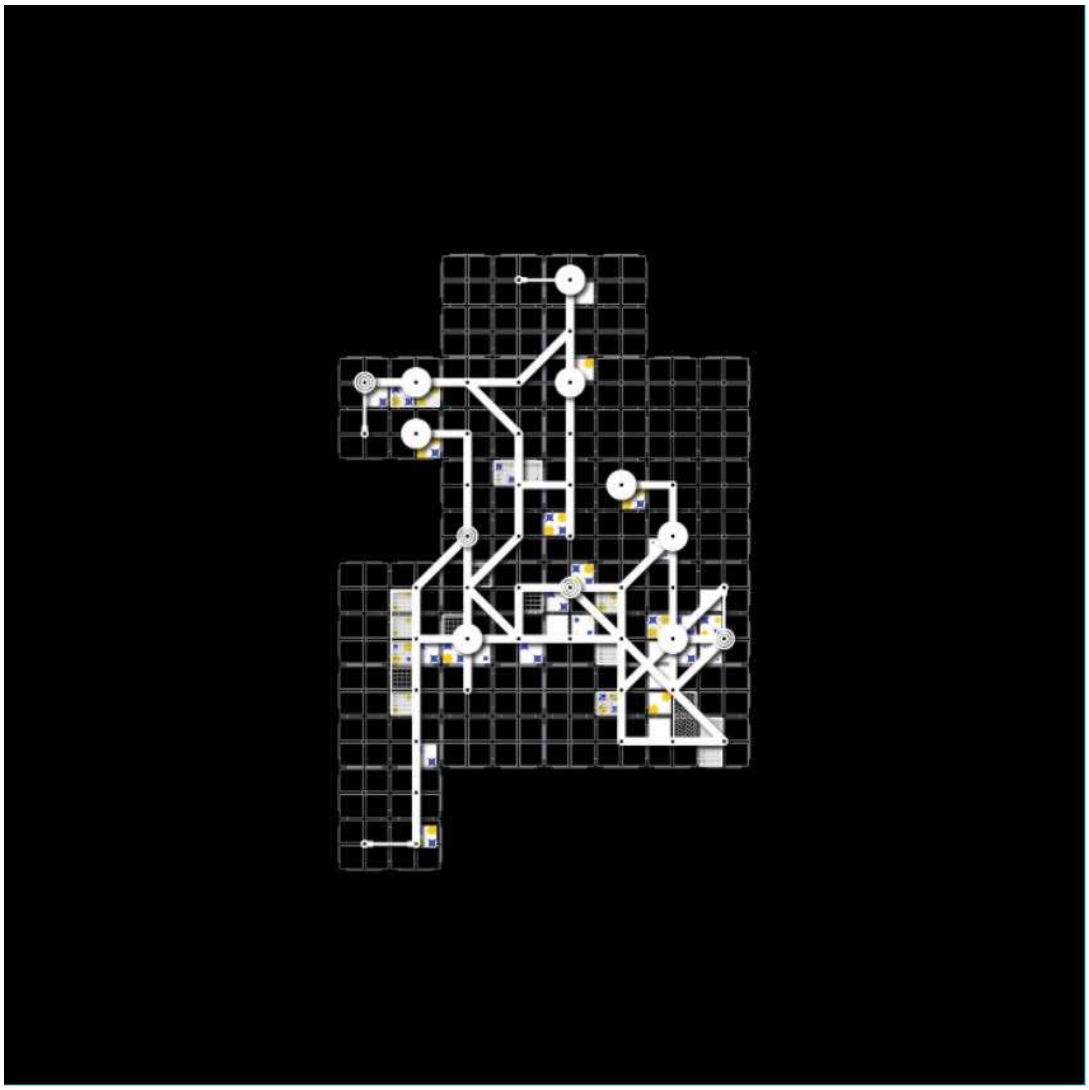


Figure 6.23 End-Result of METU Game 1

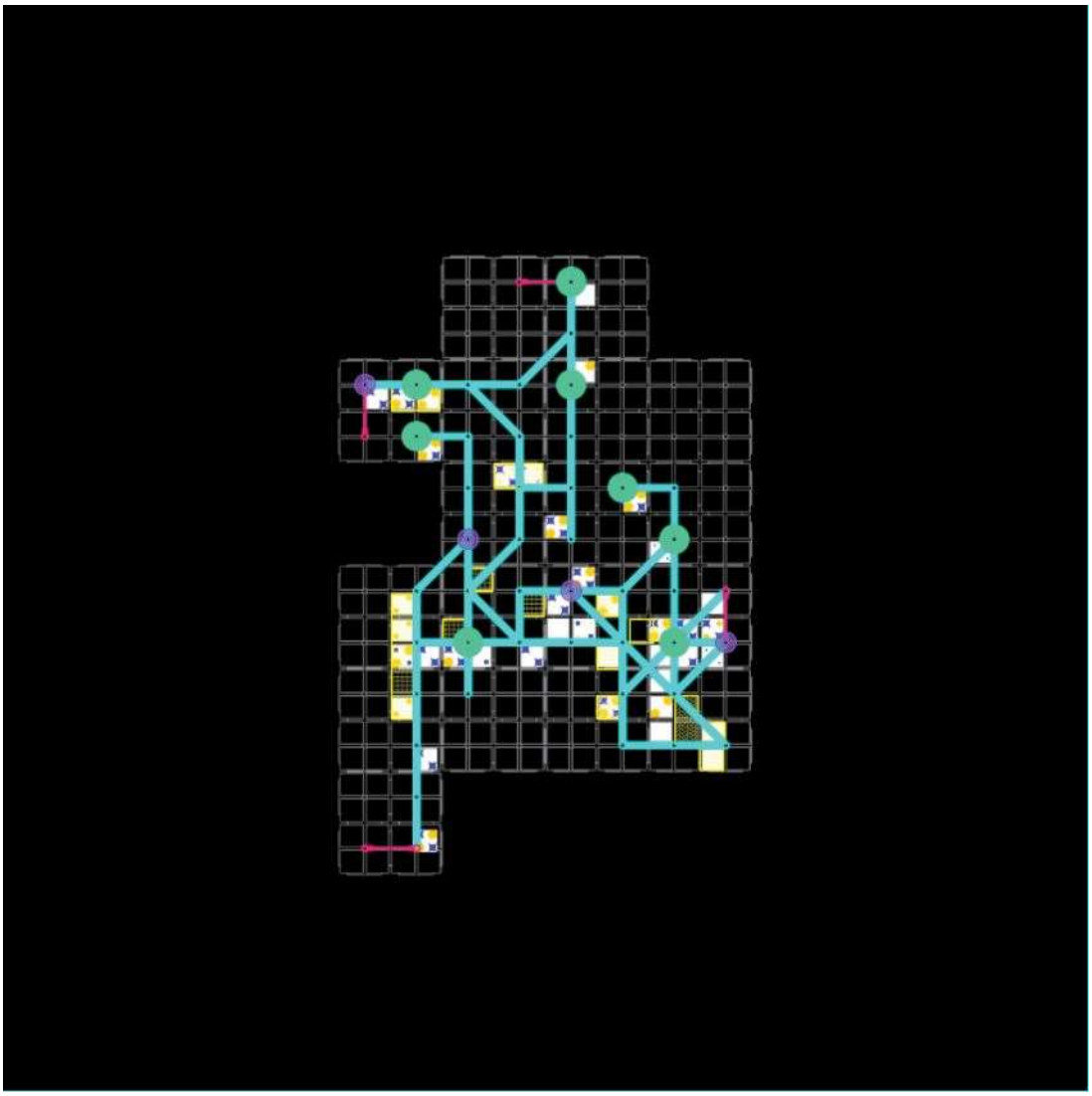


Figure 6.24 Colour-Coded End-Result of METU Game 1

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

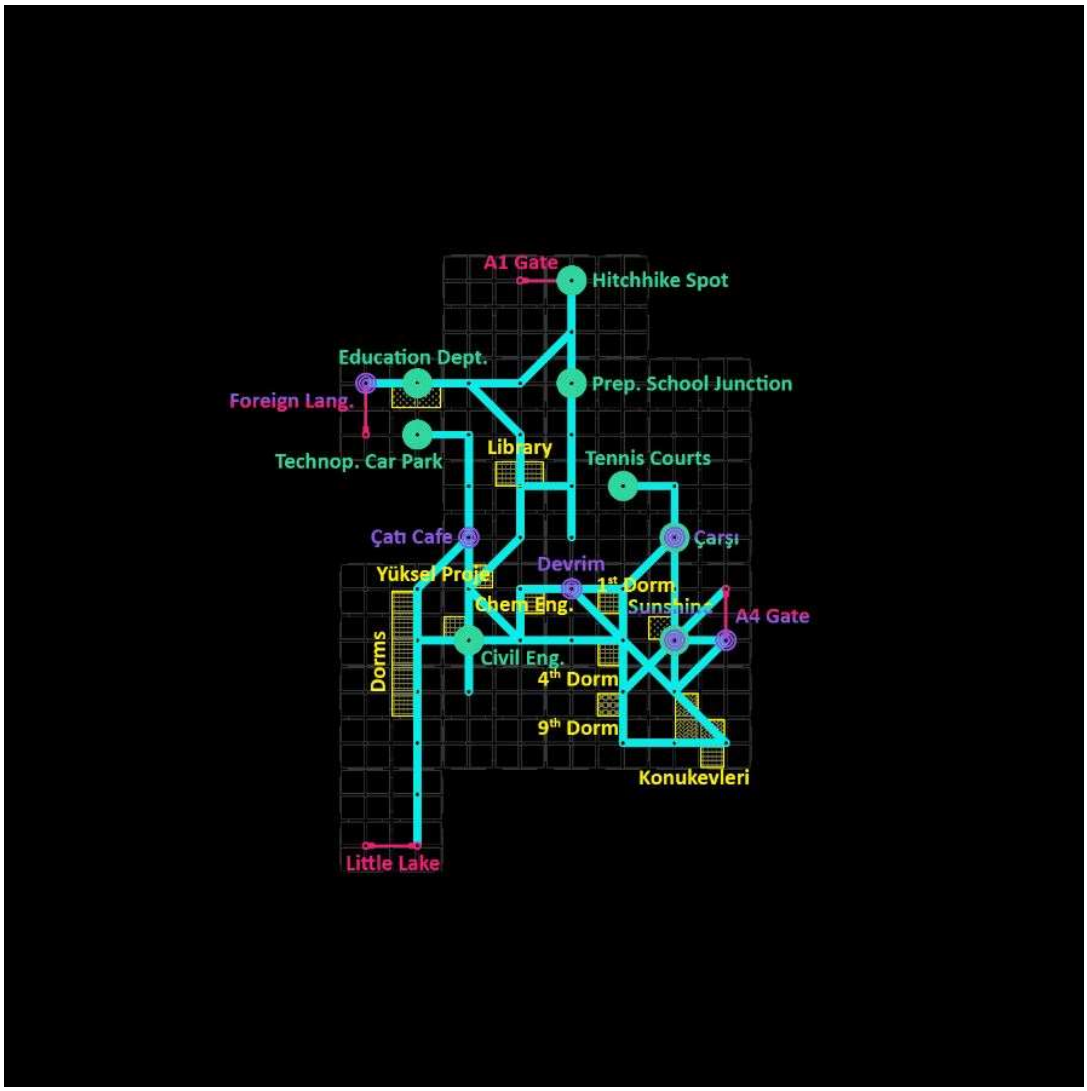


Figure 6.25 Location Specified Image Elements of METU Game 1

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

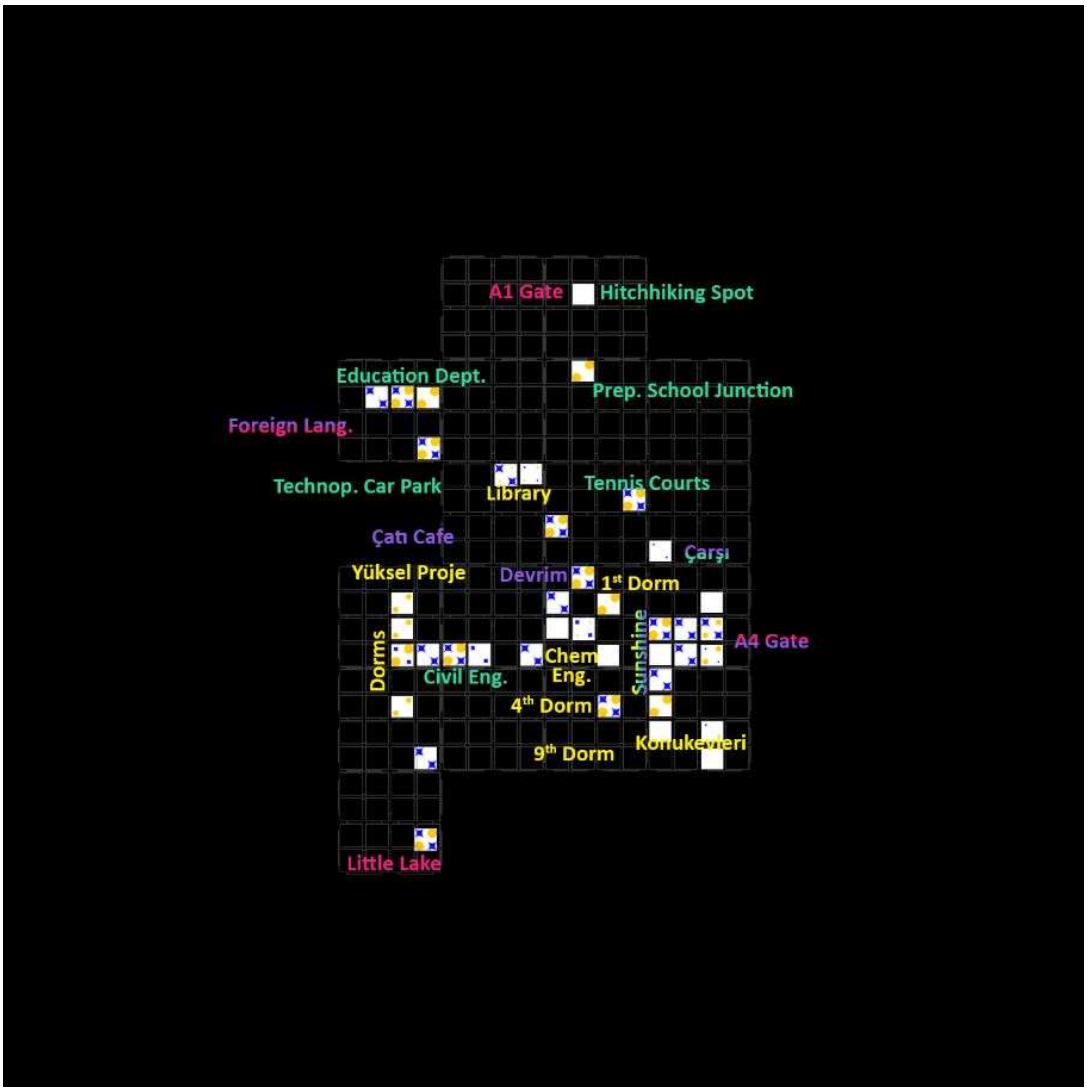


Figure 6.26 Location Specified Feeling Cards of METU Game 1

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

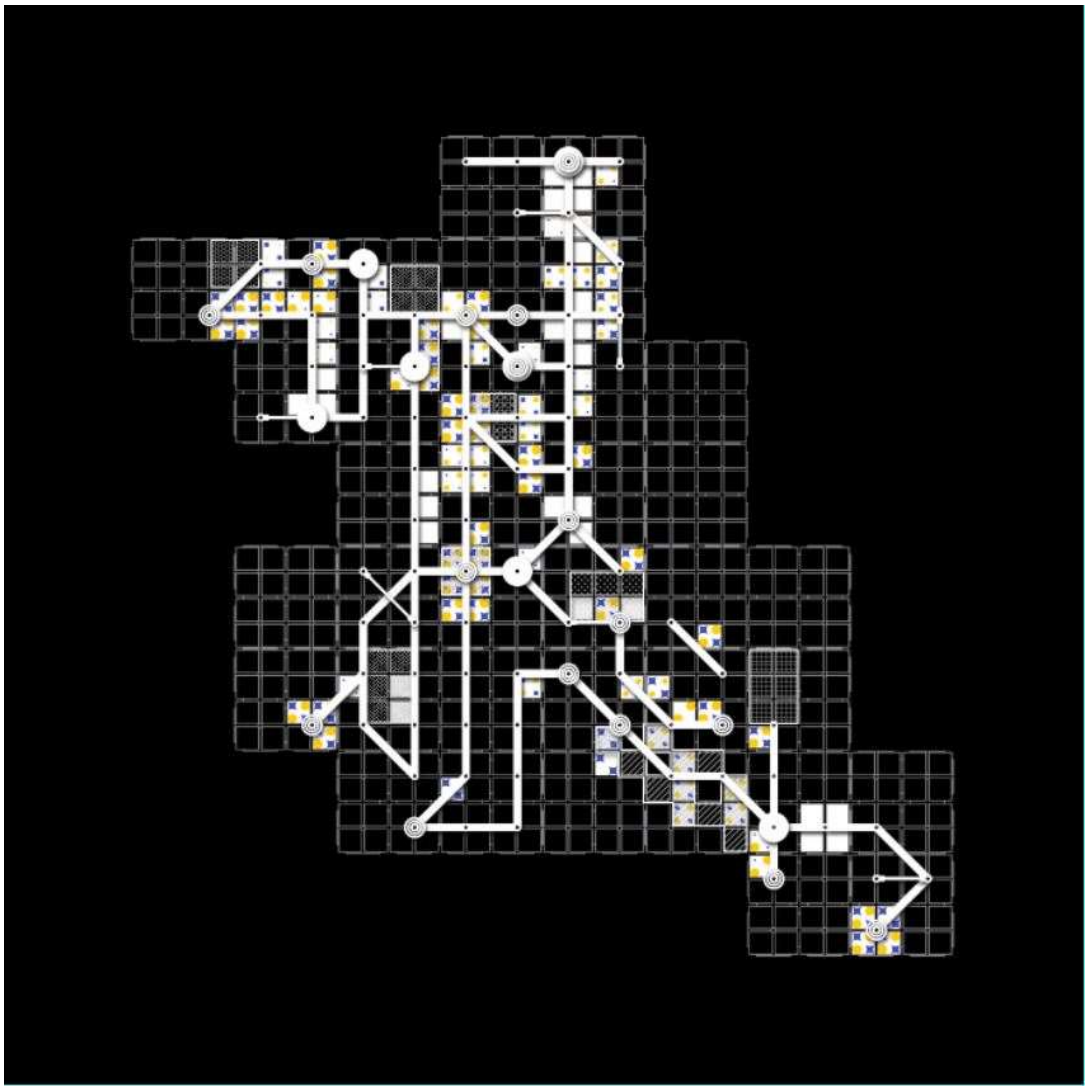


Figure 6.27 End-Result of METU Game 2

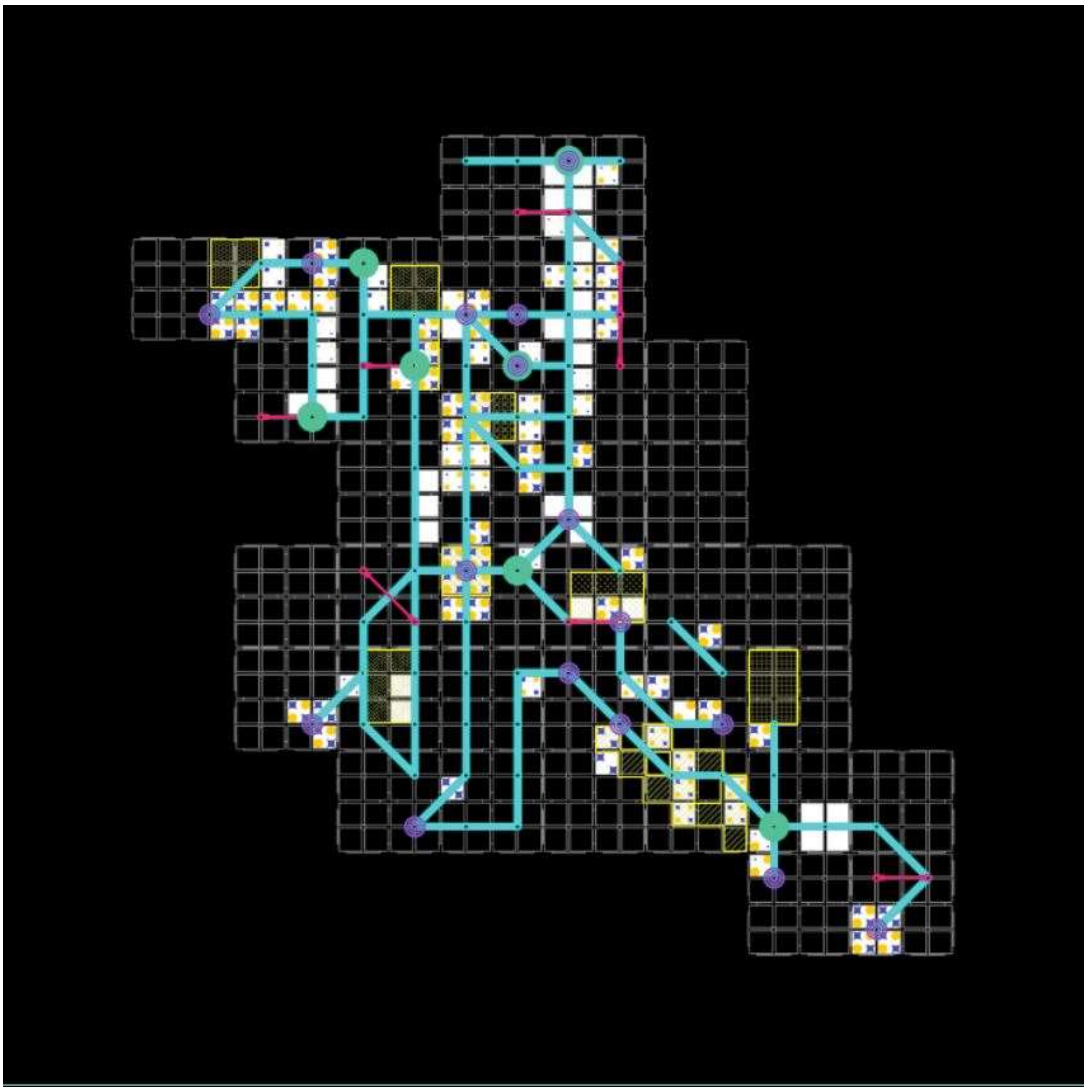


Figure 6.28 Colour-Coded End-Result of METU Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

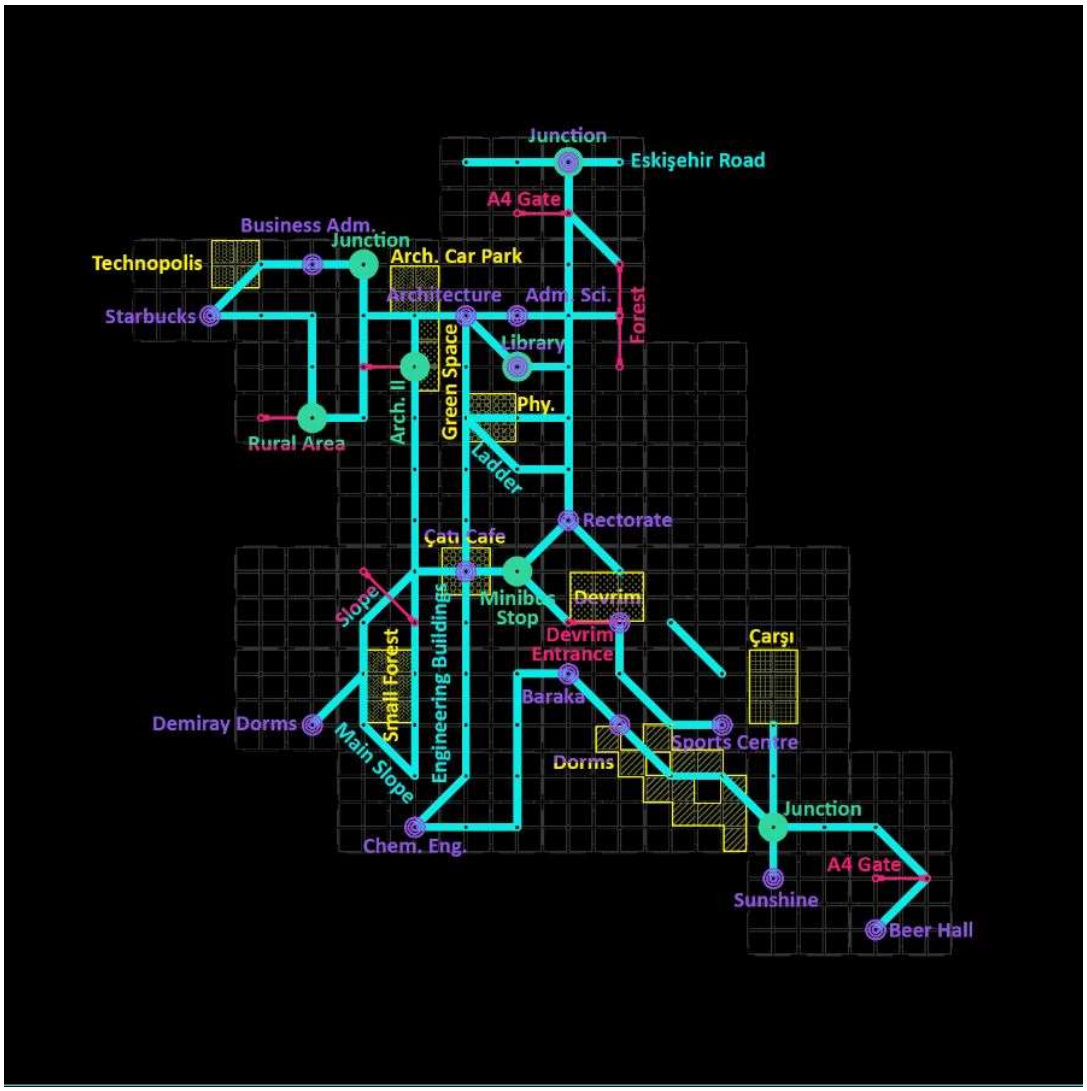


Figure 6.29 Location Specified Image Elements of METU Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

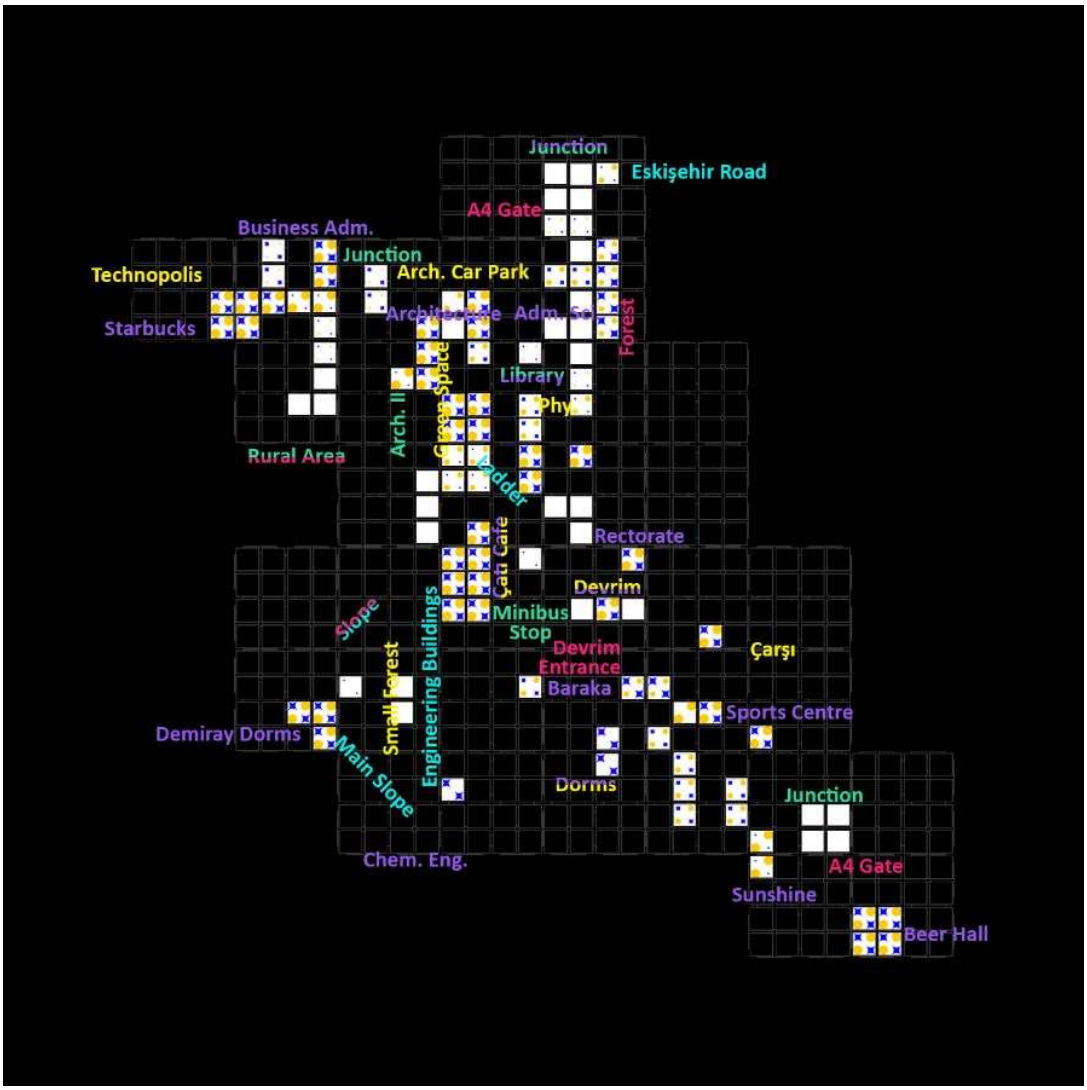


Figure 6.30 Location Specified Feeling Cards of METU Game 2

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

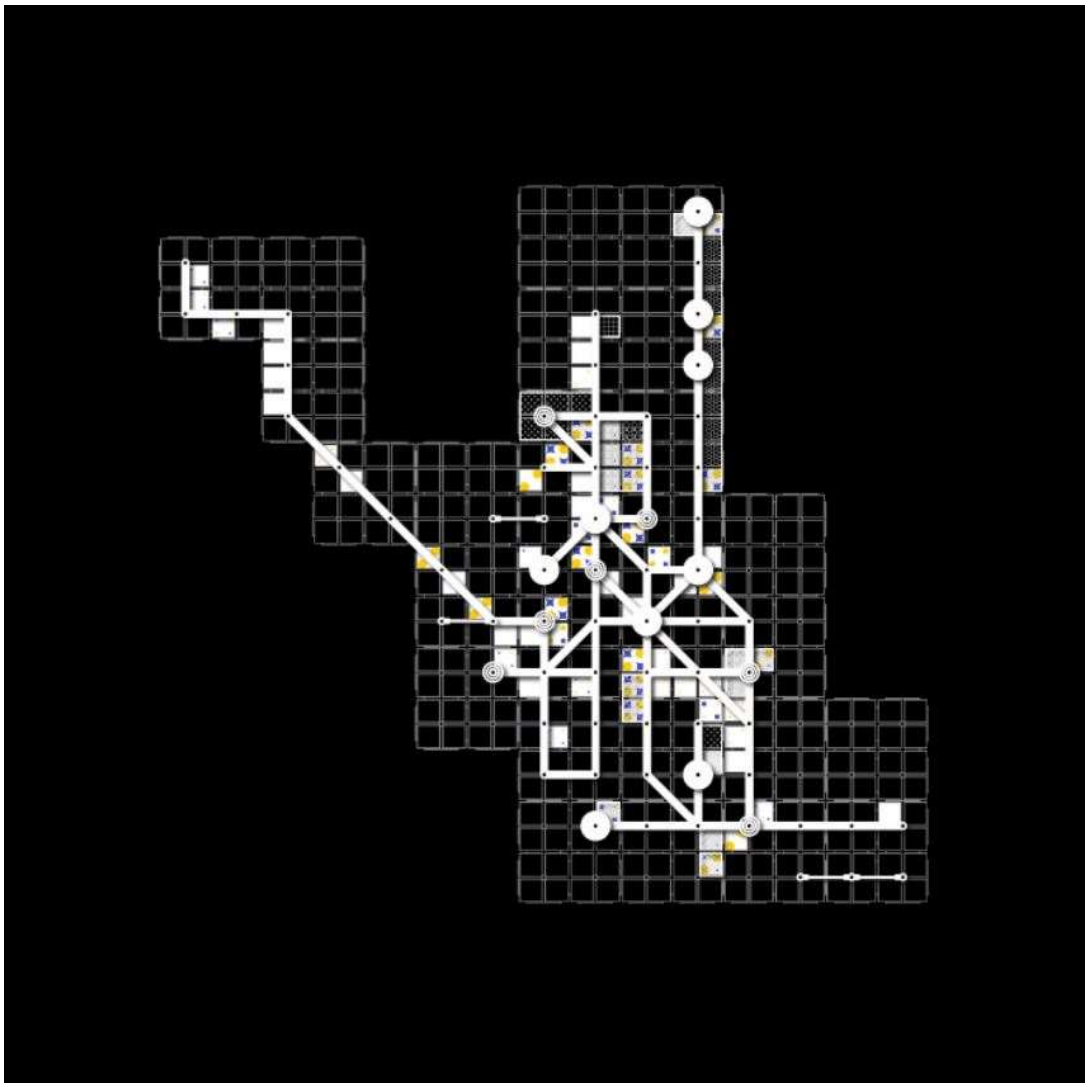


Figure 6.31 End-Result of METU Game 3

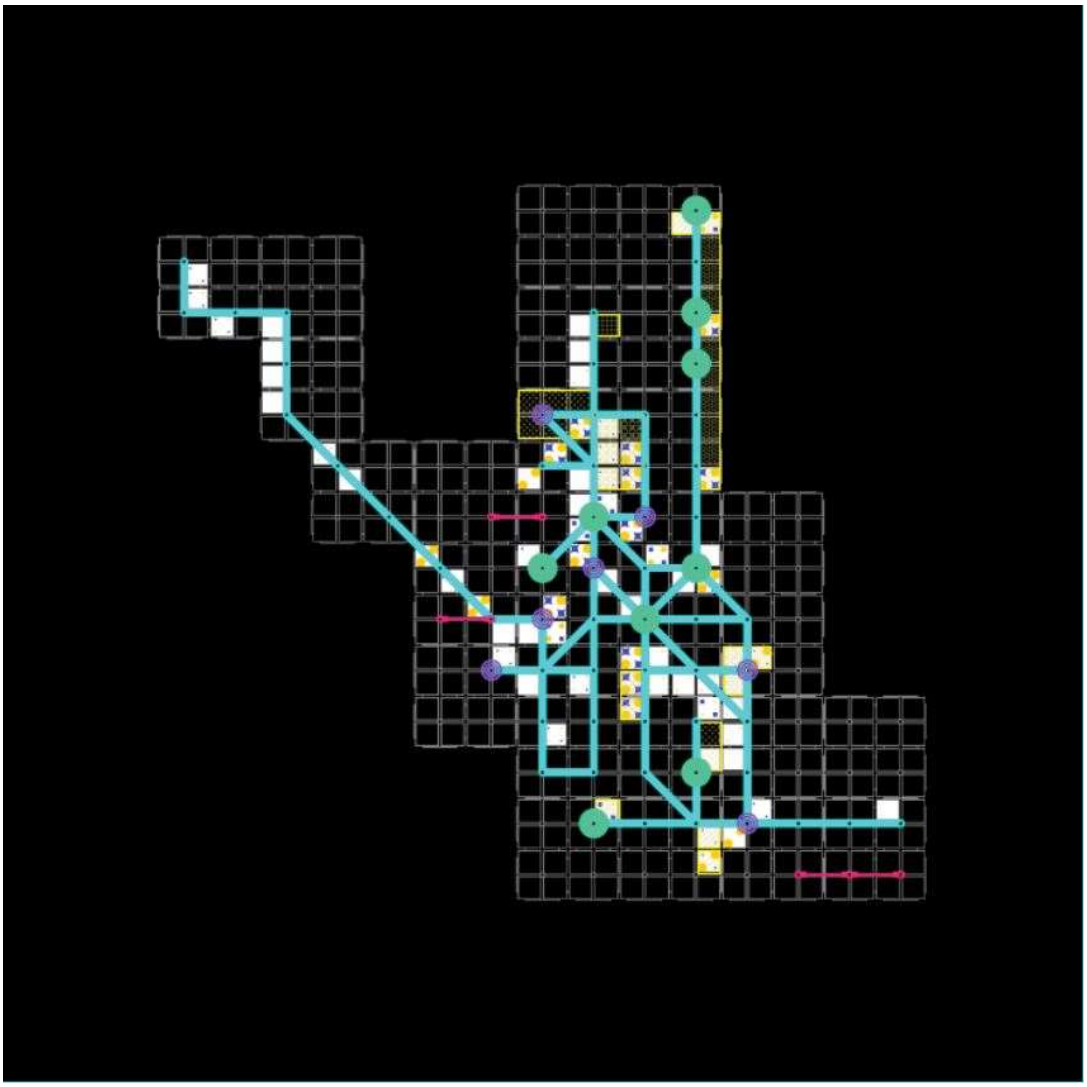


Figure 6.32 Colour-Coded End-Result of METU Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

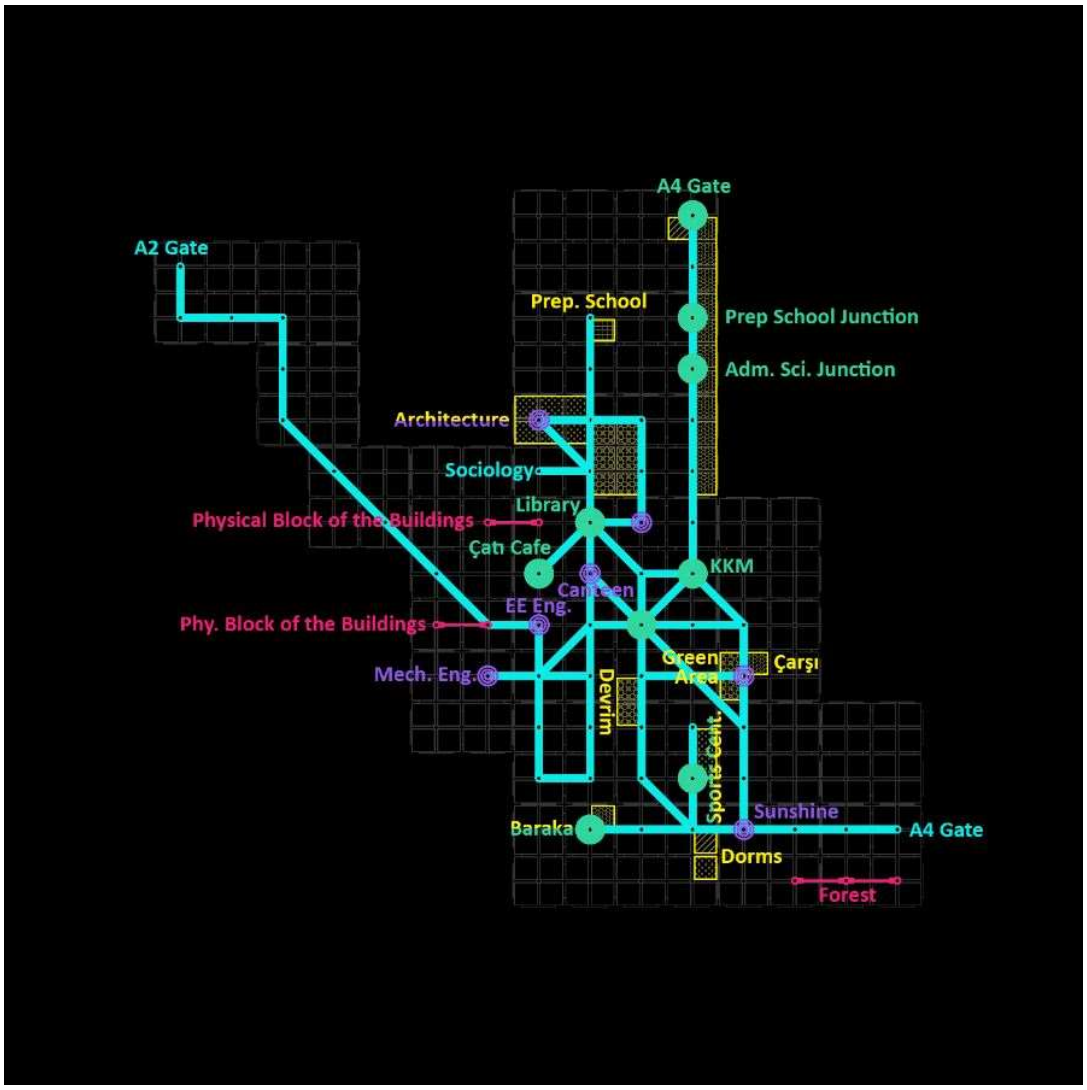


Figure 6.33 Location Specified Image Elements of METU Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

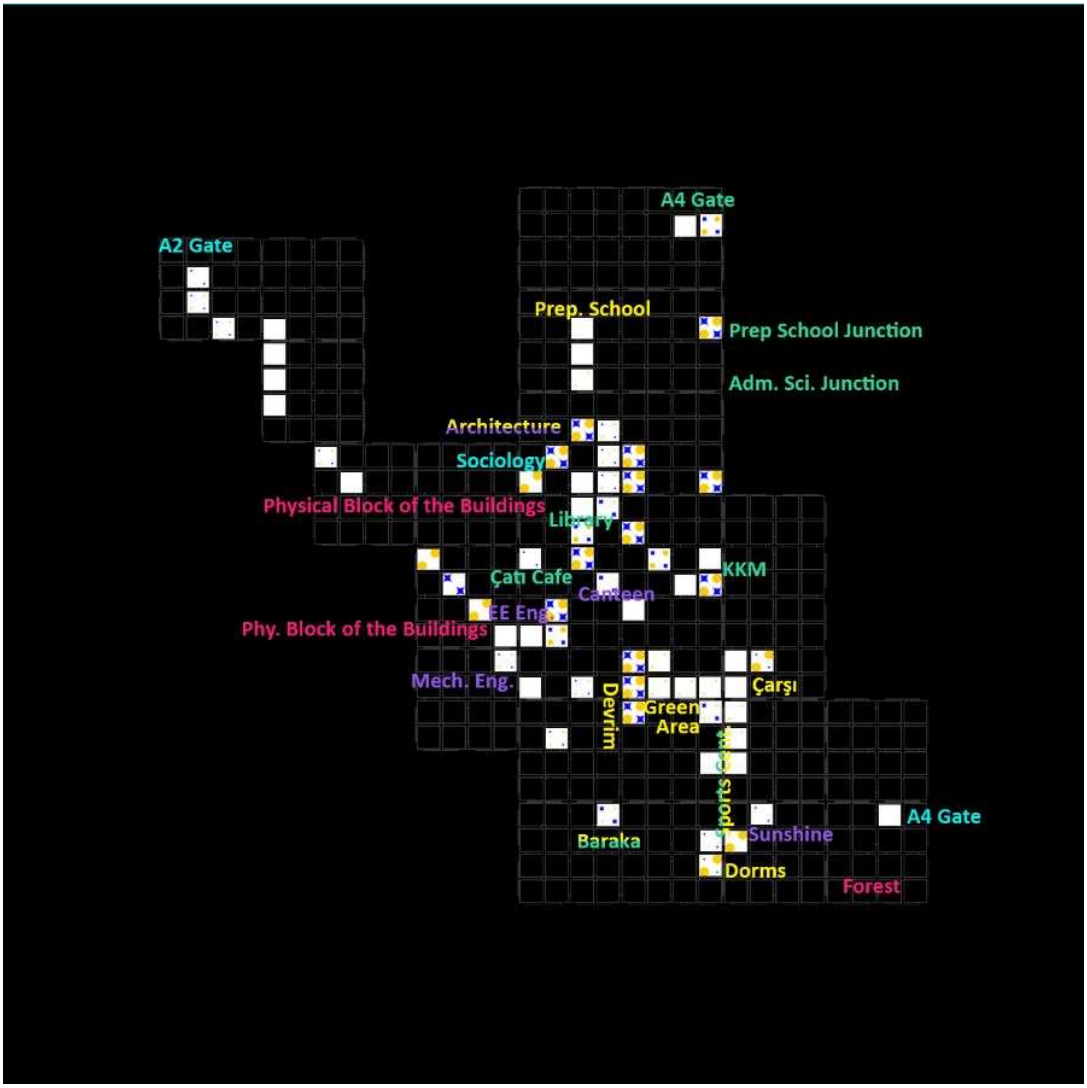


Figure 6.34 Location Specified Feeling Cards of METU Game 3

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

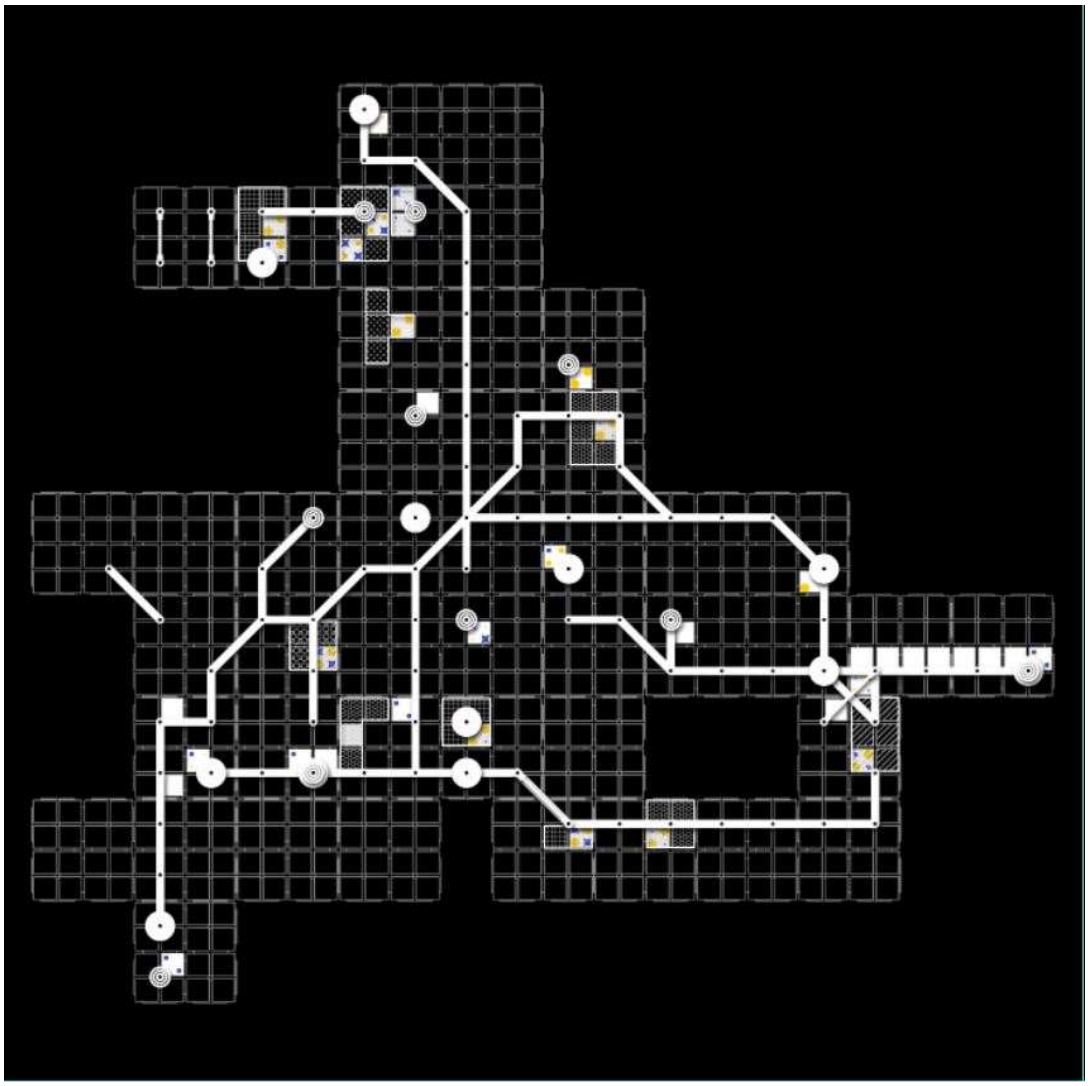


Figure 6.35 End-Result of Arenberg METU Game 4

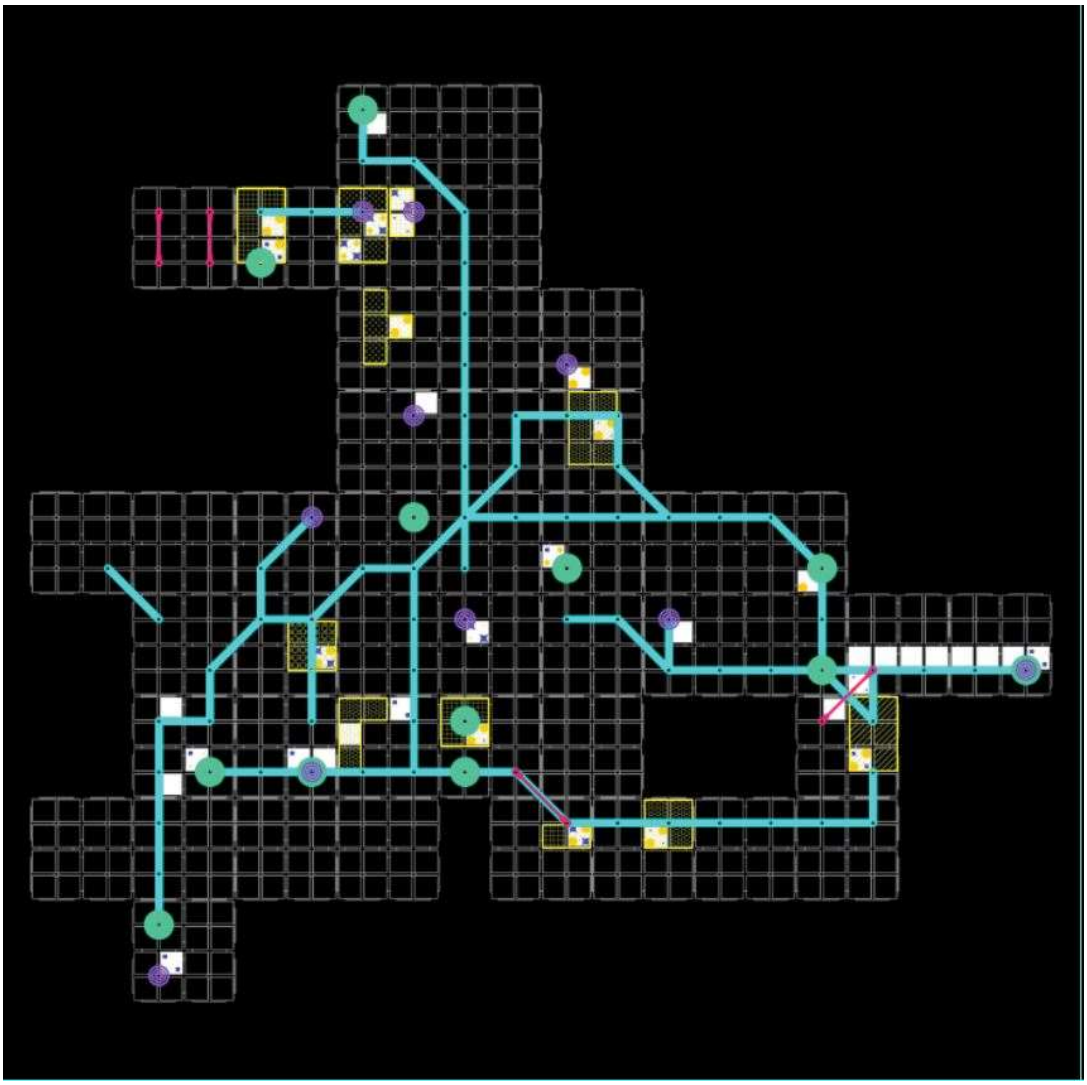


Figure 6.36 Colour-Coded End-Result of METU Game 4

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

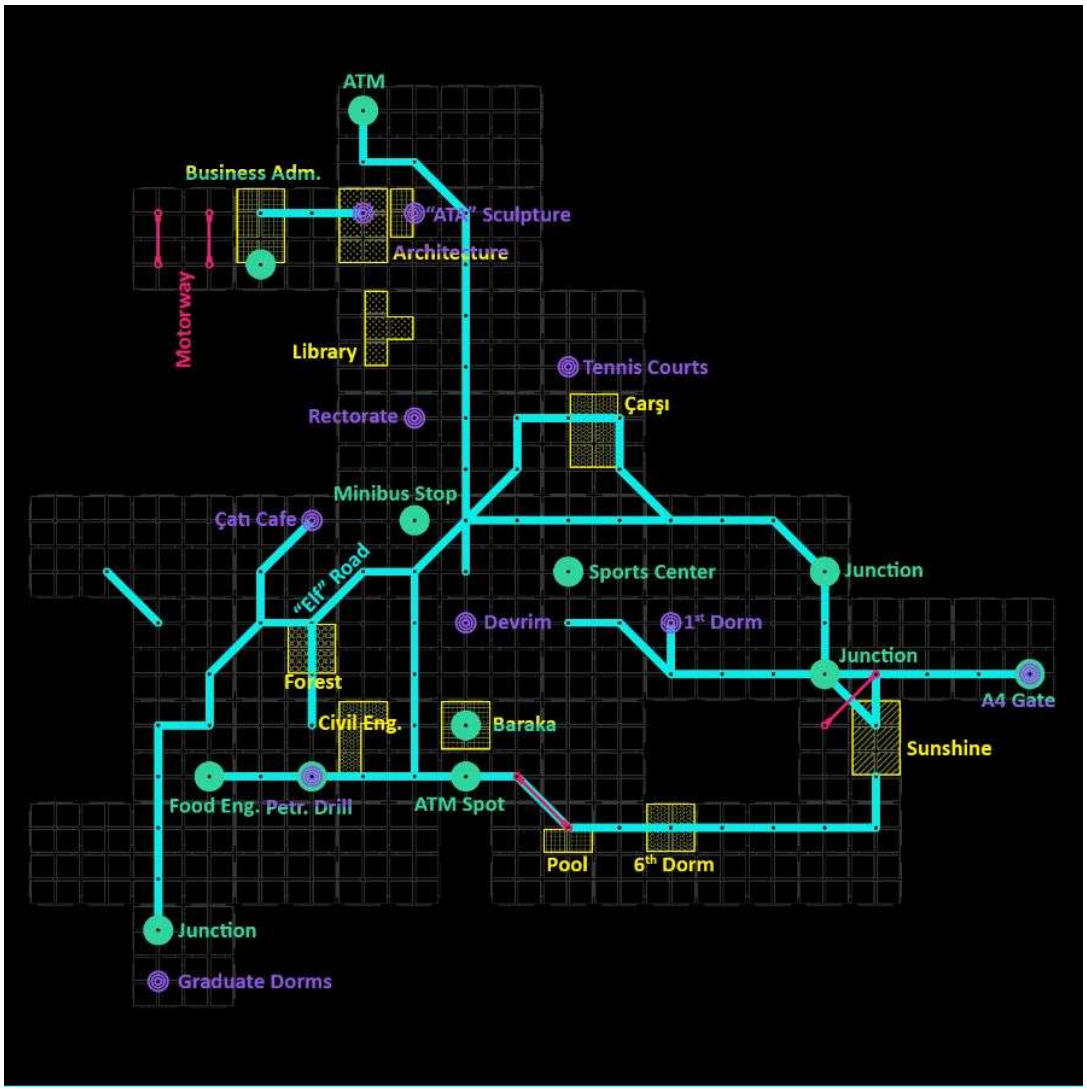


Figure 6.37 Location Specified Image Elements of METU Game 4

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

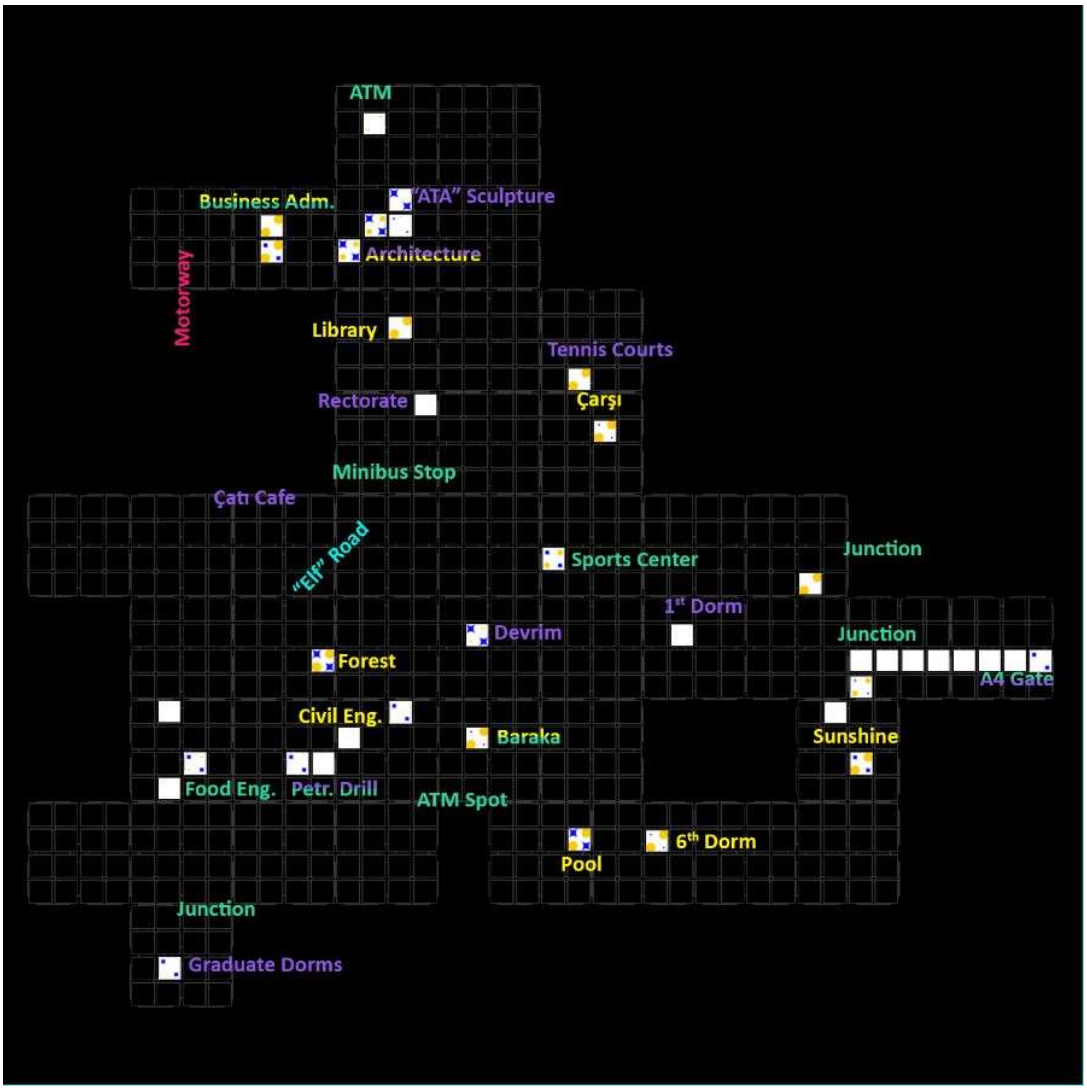


Figure 6.38 Location Specified Feeling Cards of METU Game 4

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

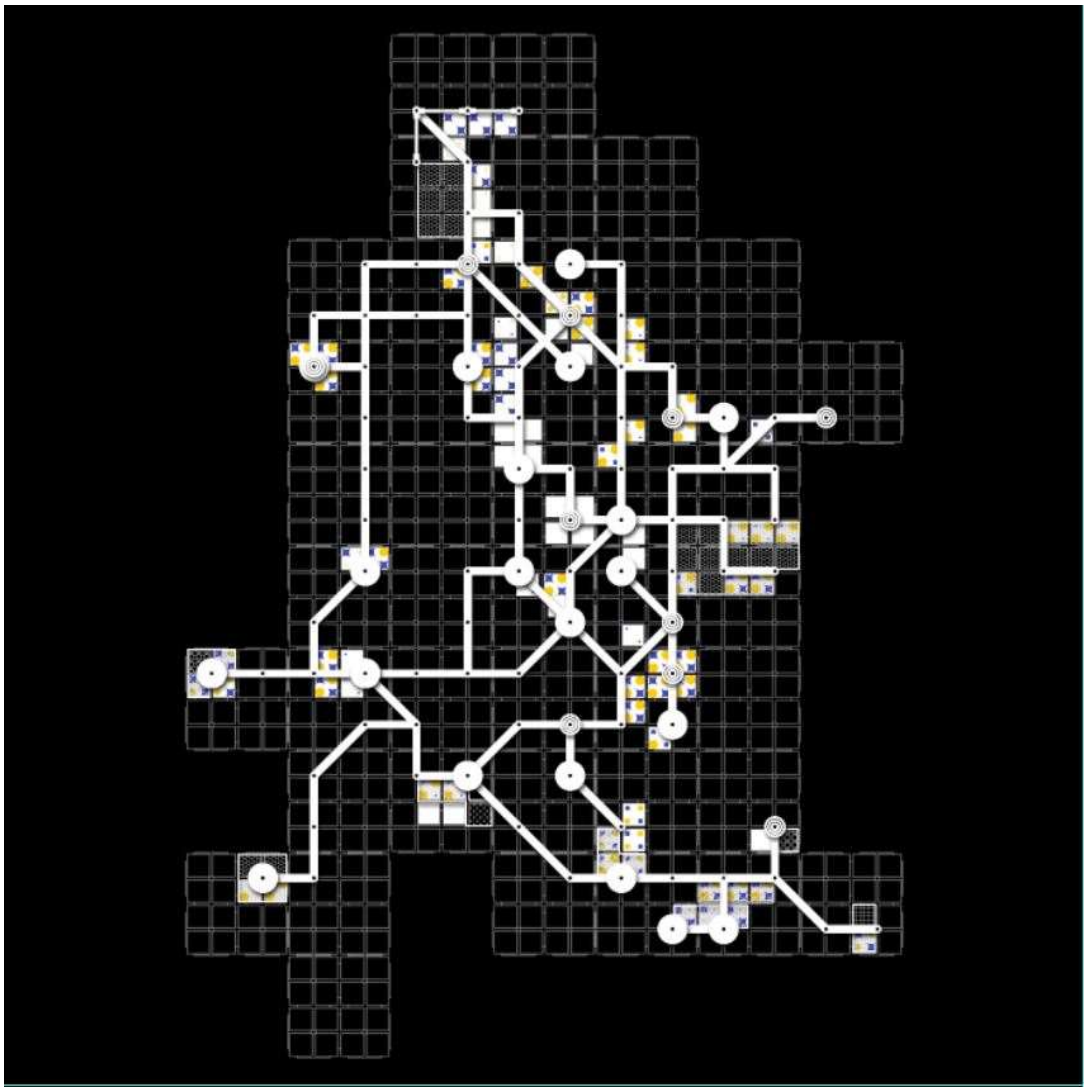


Figure 6.39 End-Result of METU Game 5

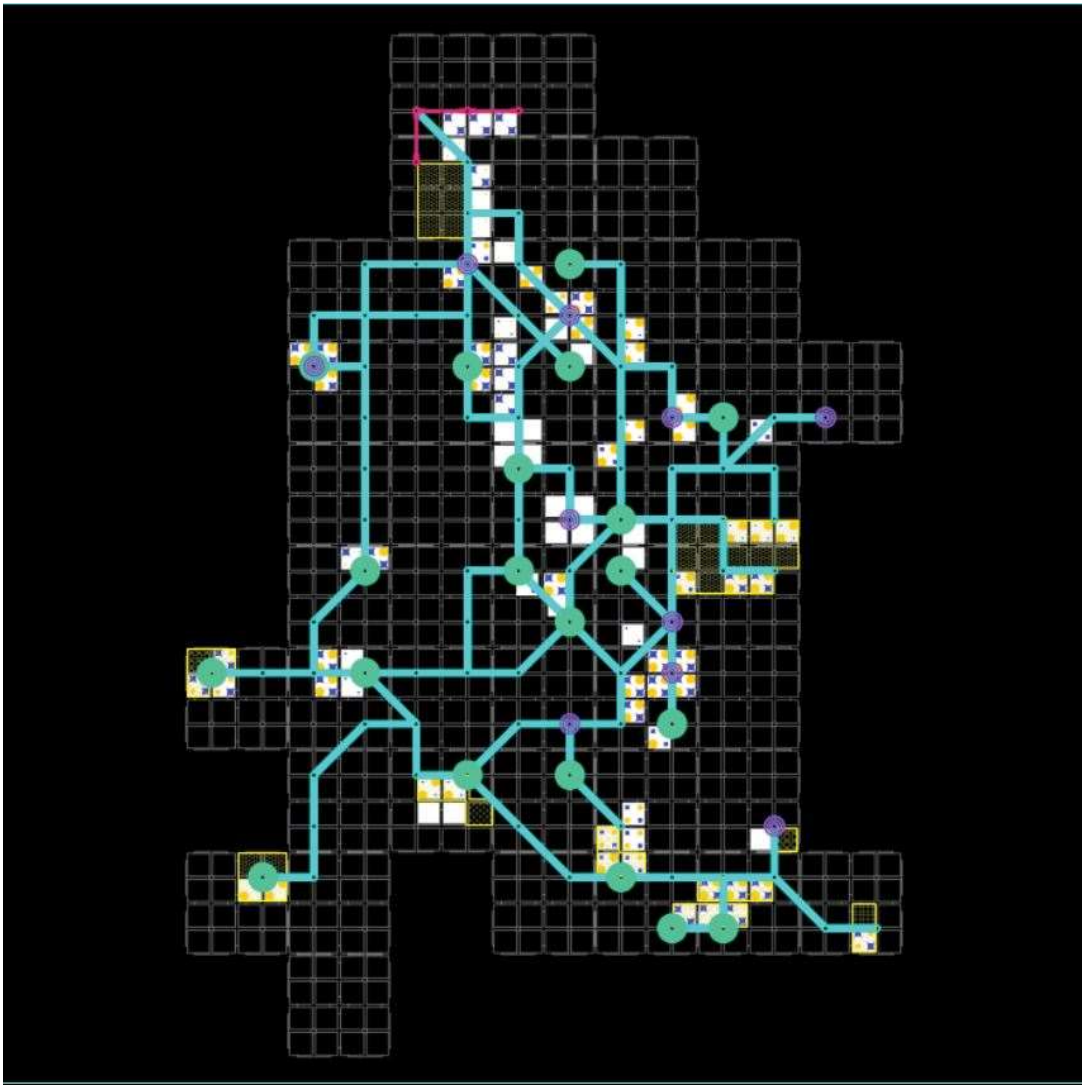


Figure 6.40 Colour-Coded End-Result of METU Game 5

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

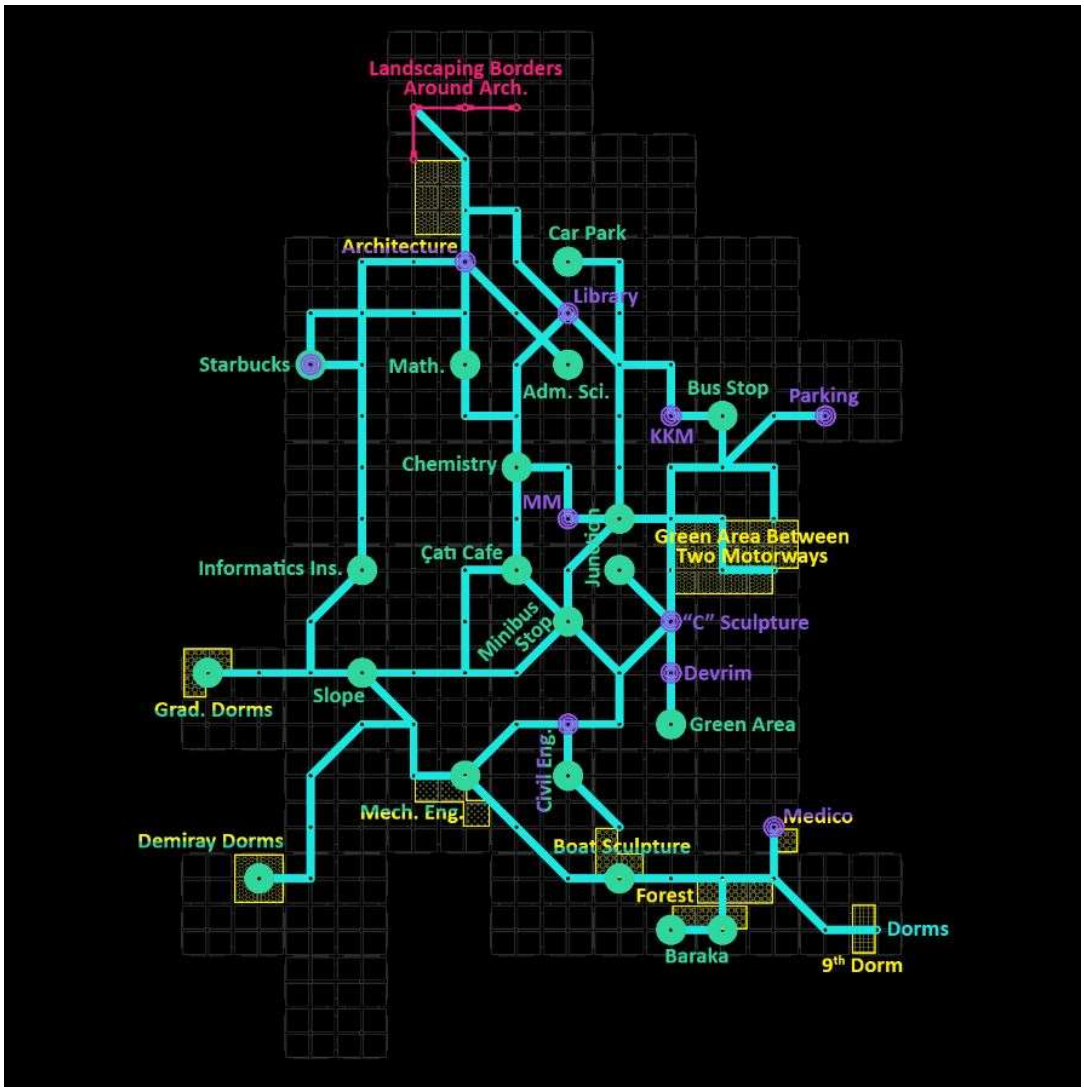


Figure 6.41 Location Specified Image Elements of METU Game 5

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

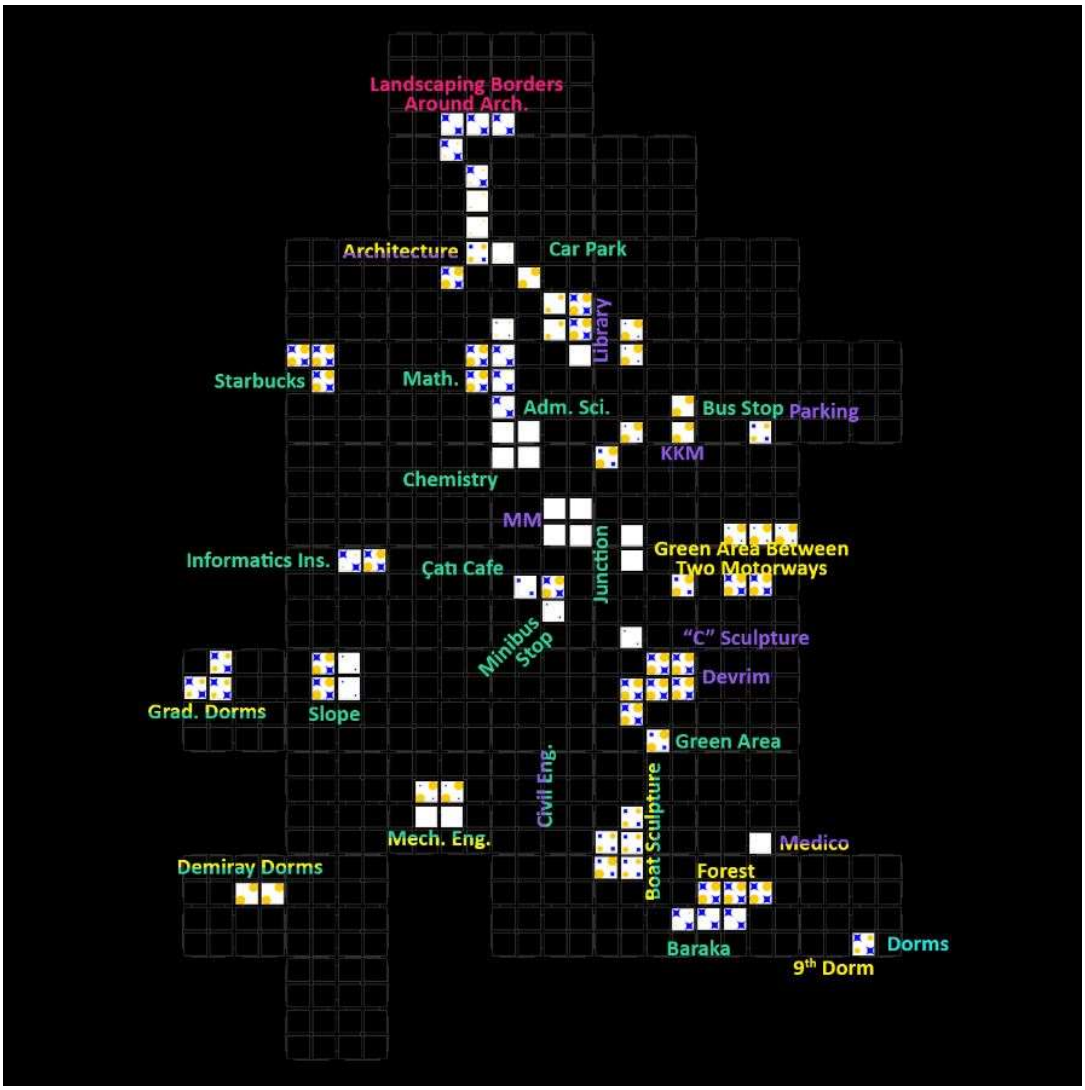


Figure 6.42 Location Specified Feeling Cards of METU Game 5

Greens for Nodes, Purples for Landmarks, Blues for Paths, Pinks for Edges and Yellows for Districts

CHAPTER 7

FINDINGS ON RESEARCH PROCEDURE

7.1. Introduction

Evaluation of the research procedures of likert scale questionnaire, written survey, researcher's personal observations during the gameplay and verbal interviews about the Co-gnito as a research tool as well as the findings on the expert interpretations will be presented in this chapter.

7.2. Likert-Scale Questionaire Results

After each game session, players were asked to fill an individual survey including questions about the gameplay. Firstly, a 7-point-response likert-scale questionnaire was presented which includes 8 different scales about the game including; annoying-enjoyable, not understandable-understandable, boring-creative, difficult-easy, confusing-clear, unattractive-attractive, unfriendly-friendly and, conservative-innovative. The scales were presented in a mixed order to avoid personal bias; not having all the positives on one side and negatives on the other side. Answers were re-organized and pointing was made from 1 to 7. While 1 represents negativeness, 7 represents positiveness. Table 6.1 shows average scores for each campus as well as the overall total averages of 32 answers. As it can be seen from the table, if we consider the overall average; none of the aspects have a value lesser than 5 out of 7. However, with an average score of exact 5, the confusing-clear scale seems to be the least successful one among all others. If the answers are being evaluated for each of the campuses individually, it can be said that no extraordinary difference exists with the

highest difference of 0.5 points for boring-creative scale which was higher for the Arenberg players (Table 7.1).

Table 7.1 Average Scores of Likert Scale Answers (Arenberg, METU and Total)

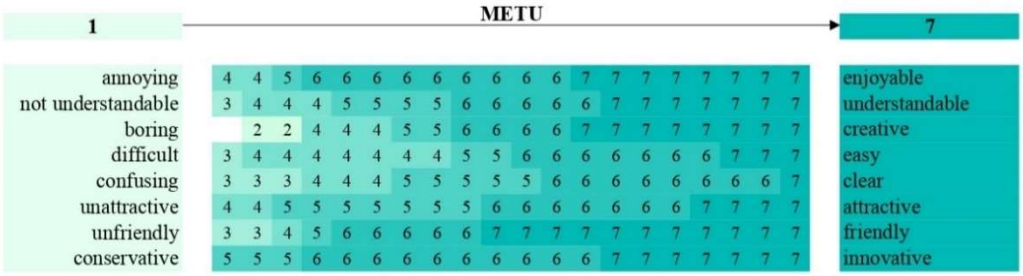
1	→ 7	ARENBERG	METU	TOTAL
annoying	enjoyable	5,7	6,2	5,9
not understandable	understandable	5,6	5,7	5,6
boring	creative	6,1	5,6	5,8
difficult	easy	5,0	5,2	5,1
confusing	clear	4,9	5,1	5
unattractive	attractive	5,4	5,7	5,5
unfriendly	friendly	6,2	6,1	6,1
conservative	innovative	5,9	6,2	6,1

Moreover, in Tables 7.2 and 7.3 , responses are re-organised to create a score texture with a color-scale. Each of the squares independently represent a response that was given by one player. And they were put in order from the most negative to the most positive randomly to understand the point distribution.

Table 7.2 Distribution of Likert Scale Answers, Campus Arenberg

1	ARENBERG →	7
annoying	5 5 5 5 5 6 6 6 6 6 6 7	enjoyable
not understandable	4 4 5 5 5 5 6 6 6 7 7 7	understandable
boring	5 5 6 6 6 6 6 6 6 7 7 7	creative
difficult	4 4 4 4 4 5 5 5 6 6 6 7	easy
confusing	3 3 4 4 5 5 5 5 6 6 6 7	clear
unattractive	4 5 5 5 5 5 5 6 6 6 6 7	attractive
unfriendly	5 5 6 6 6 6 6 6 7 7 7 7	friendly
conservative	4 5 6 6 6 6 6 6 6 6 7 7	innovative

Table 7.3 Distribution of Likert Scale Answers, Campus METU



7.3. Survey Results & Gamification Observations

Besides the likert scale ones, three open-ended questions were asked to the players through the same after-game survey. "*What aspects did you like the most?(Name three)*", "*What aspects did you dislike the most?(Name three)*" and "O*ther comments/suggestions?*". To analyze responses with a qualitatively, content analysis is used and most oftenly mentioned responses are categorized under sub-topics. In addition, given additional comments and suggestions to the third question are distributed under positive or negative answers as well. Under this section, survey answers will be discussed with researcher's first-person observations of about the gaming sessions.

7.3.1. Liked Aspects

The liked aspects about the board game are examined under four categories in regards to the T+MDA framework which includes:

1) Technology
2) Mechanics
3) Dynamics
4) Aesthetics

Table 7.4 represents these 'liked' aspects in terms of frequencies as well as percentage ratios. The table presents the results under three categories; the Arenberg, the METU and the Total. For instance, 6 players from Arenberg Campus mentioned “Physicality” as it can be seen in the first line. That is equal to 50% of 12 total players from Arenberg. While 6 players from METU is equal to 30% of overall METU sample which is consisted of 20 players. 12 people in total mentioned about physicality which is 37.5% of total 32 players including both of the campuses. The color scheme is presented according to the percentages, not the numbers.

Table 7.4. Content Analysis Results, Liked Aspects

LIKED ASPECTS	ARENBERG		METU		TOTAL	
	Num.	% (12 Players)	Num.	% (20 Players)	Num.	% (32 Players)
Technology Based:						
Physicality	6	50,0	6	30,0	12	37,5
Mechanics Based:						
Storytelling	7	58,3	10	50,0	17	53,1
Gameplay	2	16,6	7	35,0	9	28,1
Cognitively Making	1	8,3	5	25,0	6	18,7
Pointing	4	33,3	1	5,0	5	15,6
Emotion Cards	2	16,6	2	10,0	4	12,5
Dynamics Based:						
Cooperation & Interaction	5	41,6	5	25,0	10	31,2
Aesthetics Based:						
Understanding Each Other	7	58,3	3	15,0	10	31,2
Understanding the Campus	3	25,0	5	25,0	8	25,0
End Result Map	6	50,0	1	5,0	7	21,8

Talking of positive aspects, a few broad themes emerged. Storytelling is the most significant of all; mentioned by 17 players among 32 in total. Players were mostly emphasizing the joy raised by the share of stories. While some of them were explicitly mentioning recalling stories, some others underlined the fun of hearing other people’s stories about a place that they commonly experience too. In the beginning, players seem to be nervous about the format of the stories or what kind of a story was expected thus trying to follow the story structure which was provided in the introduction sheet

and asking questions like “Does that reckon as a story?”. However, after the first set of stories they mostly got used to it started to be more included during the game’lay.

> “*The game's mentality about planning a place which we know well while telling stories is really impressive and fun.*” (Player 15, METU Game 1)

> “*It was fun to win by directing/recalling the stories towards specific areas.*” (Player 17, METU Game 2)

Susi et al. (2015) cites Corti (2006) and Squire & Jenkins, (2003) as: “*What we do know is that games, simulated environments, and systems, etc., allow learners to experience situations that are impossible in the real world for reasons of safety, cost, time, etc.”.* In this thesis’s case, the storytelling was the main aspect which carried that role and allowed participants to see and understand situations which other people experience within the same environment that they also study/live in. As it was mentioned in the second chapter of this thesis; through “…a knowledge transmission process from one’s mind to other’s mind.”. It also helped the storyteller to think about spaces more correctly or in more detail compared to being alone and trying to draw a map.

As a second outstanding topic, the social interaction among players seems to be one of the most enjoyed aspects; considering that 16 people; equal to half of the total sample size, remarked about it. While 10 people directly pointed out understanding each others’ perspective, perceptions, experiences as a source of fun, 5 people underlined “interaction” while another 5 referred to the sense of making/building together or in other words the “collaboration”. However, the social interaction could not be separated from the outstanding “storytelling” side of the fun since many of the players were relating these two themes to each other. It might be proving that the storytelling became successful with the dynamic of interaction and collaboration among players. Thus, that resulted in the joy raised from the enhancement of awareness and understandin’ of each other's perspectives;

"*Very interactive, interesting to hear other stories. Interesting to see what other people find important, where they place certain things.*" (Player 1, Arenberg Game 1)

"*Sharing our memories together, discussing the campus environment with friends, learning their experiences, feelings in the game environment where you experienced before.*" (Player 22, METU Game 3)

Some players even mentioned that the interaction was inspirational at specific points which can be even listed as another dynamic;

"*The fact that hearing others stories and their vision helped me with finding interesting stories and points of view.*" (Player 2, Arenberg Game 1)

"*Linking our stories w'th group mates' stories is also quite fun.*" (Player 29, METU Game 5)

This behavior has also been observed many times during the gaming. When a player tells a story, another player was quoting things like: "*Aha, I can tell something about that place too!", "Since you told that story, it reminded me of...*".

The interaction patterns that were observed during gaming can be introduced in four categories. The first of these is the behavior of "approval". Common knowledge and experience about a specific spot encourage people to interact. People who reflect "approvement" behavior seem to nod while listening to the other's story or say things like; "Oh, yes that always happens". The second is the "plumbing". It was observed that when an unknown/unnoticed spot or an unexpected story is being mentioned by another player, plumbers tend to ask for more details while trying to imagine or remember that space. Sometimes this process takes a few minutes and other players also try to contribute to the image or the story to help him/her understand which is called as "contribution" as the third behavior. The contribution was not only in terms of enhancing other players' image but it was also sometimes an opposition as well. Finally, the fourth behavior was the "passivity" defined as listening to the stories and

following the game but staying silent. Therefore, all those interactions, discussions and comments or even the passiveness sometimes may affect the player's image and lead him/her to remember the space or moment more vividly and change his/her elements.

In addition to the storytelling and the social interaction that it enhances, 9 players mentioned the gameplay as an aspect that they have liked. They were reffering to a few themes like the competition, elements to relate stories, overall game scenario, team play and freedom which allows creativity;

> "*The way how the game was formalised and structured…*" (Player 26, METU Game 4)

> "*Relating our stories with gaming tools is quite fun.*" (Player 21, METU Game 3)

While telling stories, participants were observed to be using both of the spatial reference strategies; allocentric and egocentric successfully. During most of the stories, participants were observed to use an allocentric frame to relate distances to each other when they have doubts about the scaling. On the other hand, problems in terms of orientation and route-finding was observed to be solved through the egocentric frame. For the stories which were structured on a journey were observed to start with an egocentric frame in order to explain the space according to player's movement. But when the player can not be sure about the location of a place, s/he generally tend to switch to the allocentric frame and compare distances of specific spots according to each other.

Since it was not the primary aim to map the actual places and replicate a satellite map but how people perceive it, it was seen that sometimes some distances were exaggerated or minimized as also mentioned in the previous chapter. Sometimes participants were mentioning reasons which make them feel a specific road so long or a big space so small. As an example, a monumental tree between two buildings was mentioned multiple times during a game held in Arenberg Campus while its actual size

was less than one-sixth of the grand grass area just behind it. However, it was reflected almost within the same distances with the grass field. This way of cognitive representation was also mentioned positively through the surveys by 6 people.

Other minor topics that are based on the system of the game were; the pointing system being mentioned by 5; underlining the effect of minus points and ability to choose which points to turn, and lastly, the feeling cards essential by 4 players. Besides the gameplay and rules, the overall physicality aka the "technology" of the game was also a highly liked aspect according to the survey results. Twelve people referred to the features like modularity, simpleness, building, gridal design and tangible interaction as enjoyable aspects;

> "*Fun to play with tangible tools as a board game.*" (Player 31, METU Game 5)

> "*Also, the ability to make map larger is good because the feeling of boundaries is not present in this game.*" (Player 19, METU Game 2)

Since Co-gnito is a cognitive mapping method in addition to being a board game; it was also essential to evaluate the end-result which was positively referred by 7 players reflecting their satisfaction with the collectively built maps.

> "*We came up with an accurate image of the campus map in my opinion.*" (Player 1, Arenberg Game 1)

> "*The final map embodied our mental map, nice to see that.*" (Player 23, METU Game 3)

Lastly, all those categories that were listed above were planned and designed aspects as parts of gaming process and they were evaluated fr'm the designer's point of view but in addition to them, players pointed out to a side effect which was not the primary focus during the research design; raising awareness about the context. While understanding the context'from the users' point of view was one of the main aims of

this research, enabling them to do the same was not. Eight players, exact quarter of all the players, mentioned that they have liked the fact that playing Co-gnito enhanced their awareness and understanding of the campus;

> "*It made me think from a different point of view for everyday spaces & experiences.*" (Player 25, METU Game 4)

> "*Good for understanding the layout of the campus from d'fferent people's experiences.*" (Player 30, METU Game 5)

Not only through the surveys but also during the game, players were expressing their curiosity and excitement about a place that they did not know or notice before;

> "*I am so curious about it now, for me the library was the end of everything.*" (Player 11, Arenberg Game 3)

In Table 7.4, explained aspects are listed in 4 groups based on the "T+MDA" frame introduced in the literature chapter. The "Physicality" is being accepted as a "Technology" based aspect while "Storytelling", "Gameplay", "Cognitively Making", "Pointing" and "Feeling Cards" are "Mechanic" based ones. "Cooperation & Interaction" as "Dynamic"; and lastly "Understanding Each Other", "Understanding the Campus" and "End Result Map" are grouped together as "Aesthetic" features which brought joy to the players. Nevertheless, it should be born in mind that all these are not entirely separable from each other. For instance, while players mention the pointing system and how they liked the minus point factor, although it is a mechanics sourced feature, the reason why they enjoyed it or even noticed the effects of it were discovered during the dynamic of competition. Maybe when a team with higher scores opened consecutively minus points and other team got a chance to be ahead.

Considering the overall answers and the three appreciated aesthetic features, it would not be wrong to say that during Co-gnito, most players tend to act as "Socializers" of

Bartle's player taxonomy according to survey results. Nonetheless, other three player types have also been observed by the researcher time to time during the gameplay. For instance, an "explorer" player was suggesting of being able to take other teams points as well to block their stories.

However, the answers for each of the campusses are being evaluated separately as shown in the Table 7.4, there is a definite difference comes to the light about "Cooperation & Interaction", "Understanding Each Other" and "End Result Map" aspects. For all three of them, while they were referred by more than 40 percent of the samples from Arenberg Campus, the rate is much lower for the case of METU. Such a difference might be based upon many different reasons while the cultural differences seem to be a significant possible factor. It would not be right to deduce sharp sociological ideas from these results raised by such a small sample anyways.

7.3.2. Disliked Aspects

Disliked aspects have also been categorized and grouped according to the "T+MDA" framework and presented in Table 7.5.

Table 7.5 Content Analysis Results, Disliked Aspects

DISLIKED ASPECTS	ARENBERG		METU		TOTAL	
	Num.	% (12 Players)	Num.	% (20 Players)	Num.	% (32 Players)
Technology Based:						
Hardness of Building	6	50,0	3	15,0	9	28,1
Space Limitation	0	0,0	2	10,0	2	6,2
Mechanics Based:						
Complication of Rules	3	25,0	5	25,5	8	25,0
Emotion Cards	5	41,6	3	15,0	8	25,0
Understanding 5 Elements	0	0,0	4	20,0	4	12,5
Point Distribution	1	8,3	3	15,0	4	12,5
5 Tokens for Each Turn Rule	1	8,3	2	10,0	3	9,3
Dynamics Based:						
Need of Consensus	0	0,0	6	30,0	6	18,7
Timing	2	16,6	4	20,0	6	18,7
Finding Stories	4	33,3	0	0,0	4	12,5

Talking of disliked aspects, although 12 people mentioned the physicality of the game as a positive aspect as explained above, 9 other people found the physical or ergonomic hardness of building or attaching as one of the primary issues. However, a big portion; 6 of those are from the sessions held in Arenberg. This difference between two campuses could have been emerged because of the differences between two research settings' conditions. During the sessions at Arenberg, it was observed that although the size of the provided table allowed participants to expand freely, sometimes it was challenging to reach middle parts of the board for the players. That, actually resulted in the hardness of placing elements. On the other hand, the table provided at the METU was comparatively smaller while was still approved to be in the optimum size range by the researcher. However, that issue resulted in having two players who indicate that the table should have been bigger, and that was a limitation against the expansion. Although the table size was neither a wanted nor a planned variable, it showed how it would affect players in two different directions. Besides the table factor, players have also mentioned about the hardness they have experienced during the attachment of baseboards and minorly about the placement of tokens. Although it was found not easy to attach boards, none of the games resulted with an expansion of lesser than 8 tiles in addition to the starting base of 9.

> "*It is sometimes hard to add extra board structures.*" (Player 7, Arenberg Game 2)

> "*The table was not large enough, that restricted us.*" (Player 28, METU Game 4)

Figure 7.1 Tile Extension Schemes for Arenberg Games

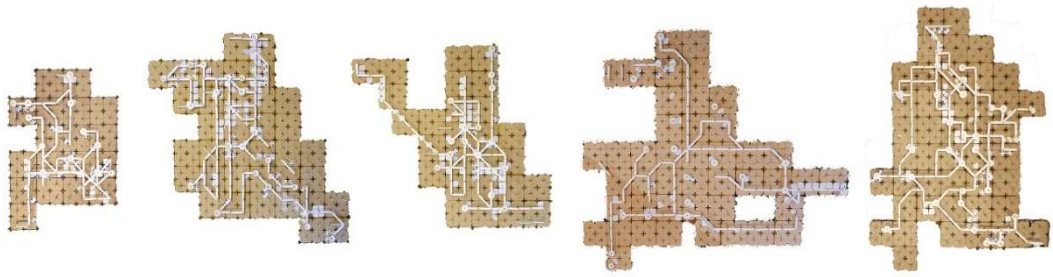


Figure 7.2 Tile Extension Schemes for METU Games

Sometimes the wooden sticks functioned as limits of that space when a stick does not have enough available space to place more tokens on it. Or as in another case, sometimes knowing the hardness of placing something underneath another something played the same role. For instance, when a path needs to be placed on a stick where a landmark already exists, the landmark needs to be removed first and then set again after placing the path. Thus, when a stick holds too many tokens, after a while, people were observed to avoid mentioning that space anymore not to get into trouble with previously put tokens. In that sense, games technology functioned as a limit and led to the rise of a player-based dynamic which resulted positively to encourage players to mention about different places. Sometimes people however pushed that limit and placed the e.g. one hole of a path element next to a stick instead of the top of it. (Figure 7.3 (Right)). As stated in the responses:

> "*It took some time to put all the elements and stickers together.*" (Player 3, Arenberg Game 1)

Figure 7.3 Over-Built Sticks

However, the physical challenge during the building up process of the map seems to be enhancing the interaction among players. For almost every turn, players behaved helpfully (Figure 7.4). Especially when a player starts telling a story about a point which others do not think is within the current base of tiles, other participants start handing free tiles and asking; “So it should be here no?”, “How many do you need?” , “I think you will need one more tile, it is farther. Here, I can put.” and more… That interaction and collaboration also helped them for the sake of ice-breaking especially among the groups who were not previously knowing each other.

Figure 7.4 Players Helping Each Other

The complication of rules was defined as one of the two second disliked aspects. Eight players indicated that rulesets were not easy to understand in the beginning and confused them during first rounds. That opinion was raised during gaming as well. When players were asked if they have any questions after explaining all the rules from the introduction sheet in the beginning of the game, for many times players expressed that they were overwhelmed with the rules but after playing for a while, it would get probably easier;

> "*There is a lot of information to process at the beginning. It becomes clearer while playing.*" (Player 8, Arenberg Game 2)

Another issue was feeling cards; being mentioned by 8 people. Players expressed that the two feelings; coziness and inspirationalness were not adequate to represent their stories/ideas about that space. Interestingly, a similar idea was raised for the Lynchian elements as well. 4 players were not happy with the differentiation of elements. And one player was even suggesting that more urban image elements needed to be defined;

> "*Sometimes areas were described as ugly/annoying etc, but this doesn't appear in the map.*" (Player 12, Arenberg Game 3)
> "*The landmark, node and district definitions can sometimes be confusing.*" (Player 15, METU Game 1)
> "*More categories would be needed other than 5 elements*" (Player 23, METU Game 3)

During the "defining the elements" phase of each turn, players also seemed to interrogate each other's decisions on element selection. Many discissions were focusing on whether a spot was a landmark a node or a district. For instance, when one player places a landmark, the discussion goes like:

> "*I think it is a node, no?*"
> "*No, it is a landmark for me because when I…*"
> "Ah, okay then, yeah it can be a landmark too."

Those kinds of discussions sometimes also resulted in having the first player getting convinced and change e.g. a landmark into a node. Of course, there were a few characters who seem to dominate the game but all the discussions were peacefully handled.

Other two comparatively minor issues were the random point distribution and 5-tokens-for-each-turn-rule which was mentioned by four and three players respectively. It was stated that the randomised point distribution was a disadvantaging factor for some teams and using at least 5 tokens for each story was sometimes distracting since players had to count each time, they tell a story;

> "*The rule of using 5 elements in each turn…*" (Player 18, METU Game 2)

> "*The distribution of the points wasn't uniform, it gave my team a disadvantage.*" (Player 27, METU Game 4)

Besides the designer sourced ones, three gameplay sourced aspects have also been referred to as problematic features. One of them was the need for consensus to decide the scaling, orientations, distances, etc. It was not even mentioned during the Arenberg sessions but was pointed out by six of the METU players. However, there is one more interesting fact about this data. Three of the six players who were being unsatisfied with the consensus need during the game were from the same game; the fourth METU game which was observed to be the only one that shown many errors in terms of game flow among 8 games in total. During the fourth METU game, players spent way too much time on trying to decide about the scale and locations which caused boredom and despair. There were some points which players even requested help from the researcher to determine. Such error of flow could be associated with the personality of the players whereas the existence of two shy people has found to be related to the issue; basing on researcher's personal observations. Nevertheless, if the liked aspects are being re-mentioned; understanding each other was mentioned only by 15% of METU players comparing to 58.3% of Arenberg players. The reason behind that could be the difficulty that METU players experienced during consensus creation while Arenberg

players seem to have no problem with that, thus, they got to enjoy understanding each other more. This considerable difference might be related to the cultural factors or the legibility of the urban environment, or even both of them;

> "*Finding middle way between different perspectives...*" (Player 20, METU Game 2)

> "*Playing on the same board with different people's perception of scale and orientation was different and that was a bit frustrating.*" (Player 25, METU Game 4)

> "*Multiple reference points could have been helpful for faster gameplay.*" (Player 26, METU Game 4)

> "*Few more reference points...*" (Player 28, METU Game 4)

The second gameplay sourced aspect was listed as the timing whereas 6 participants reflected that each turn took longer than they have expected. Lastly, finding stories has found to be one of the main challenges by 4 people; all from Arenberg campus. For one more time, it would not be reliable to define certain reasons for such difference due to the small sample size. However, considering that METU players haven't experienced any hardness while memorising/remembering stories, it can be possibly caused by the level of attachment to the campus and campus life.

> "*The average time each player took per turn. Maybe limiting each player to make their turn a bit shorter?*" (Player 10, Arenberg Game 3)

> "*I had difficulties coming up with specific stories.*" (Player 8, Arenberg Game 2)

An additional negative comment that was raised during the oral questions was the first team to start has a disadvantage since they don't have any open points and have no chance to get any points in the first story.

Lastly, nor a liked neither a disliked aspect but a very critical issue was raised during a game in METU. At a certain point, one player asked if she should play to get points or to provide true information to the researcher. This expected question was pointing out to the main challenge during the design process. Game rules' success to avoid made-up stories and correlate the players' joy with researchers benefit. Most obvious example was defining two types of rounds with different rules to encourage players to spread their stories in the campus. Although they were not informed about this aim, knowing that they have only 8 stories to collect opened points non-cognitively directed them to link stories to each other first and spread around afterward. However, it was still found natural to receive this question from a player.

7.4. Verbal Interviews

After the gaming sessions, a few group interview questions were directed to players. Firstly, it was asked if it was a fair game or not. While the majority of the participants stated that it was fair, some players indicated that the chance factor was so dominant and that was making the game unfair. Some players even proposed about changing the rules for the future (e.g. leaving a few already points at the beginning of the game). The second question was about Co-gnito's collective aspect. Similar to written survey results, many of the players seemed to agree upon different merits of playing the game collectively (e.g. seeing similar experiences, remembering stories, exploring the campus…). However, parallel to the survey results; players of METU Game 4 were unsatisfied with the level of collectivity while all four of them were acknowledging that sense of being a team was lacking and there was no cooperation.

Players were asked a few more questions on underrepresented, overrepresented and unexpected parts of the map. Answers to those questions were giving many clues about players' initial motivations while identifying a space. For instance, a player stated that although they lived in the dorm for five years, they did not even mention it because they probably feel about it as a hotel. Another group was indicating that scale was

getting bigger or smaller according to stories. For instance, when so many stories are being told about one place, the scale of it gets bigger which results in having an improper representation of space as they referred. Another reason was mentioned as the competition which encouraged players to go different spots; thus some of the really well-known spots remained deserted.

Discussions about the surprising moments were proving Co-gnito's ability to reveal real-life experiences which would not be reflected through asking direct questions. For instance, a group was really surprised with their mate's stories with animals in the campus while another one was surprised by hearing that her friend likes to chill under a specific tree that she knows. And as one more example, another group was judging their mate's honesty because of the long path he defined in order to earn points. Other players were stating that they were not aware of the continuity of such a long path.

At the end, the given answers to verbal interviews were parallel to the results of written surveys and questionnaires however when they had a chance to talk about the end-results, more specific details were shared which were not observed during the gaming.

7.5. Expert Interpretations

After each gaming session, invited urban experts tried to understand the produced end-result maps as abstract, physical artifacts. That procedure was made to understand Co-gnito's potential and ability as a physical representation tool.

At the beginning of the sessions, it was observed that most experts experienced hardness while orienting themselves and specifying reference points because of the abstract representation of distances and lack of the complete building or road network layouts. For some cases, there was a tendency of subjectively identifying a landmark or node token as an important building (e.g. the library for METU or the castle for Arenberg) and trying to explore other spots in relation to it within an allocentric frame. Once the orientation of the maps was explained, and a central reference point was

introduced, experts were able to relate distances and spatial features in reference to the image tokens and the feeling cards. For most of those times, the feeling cards and tokens were evaluated separately. However, it was also observed that, sometimes one of those dimensions were causing some doubts about the assumption that was made basing on the other dimension. This behaviour was discovered during discussions among two experts or even one him/herself.

> "*Maybe it is the library! No*?" (Expert 1)
> "*But the library is more cosy to sit outside.*" (Expert 2)

In some cases, the discussion among them was changing one's opinion:

> "*Bridge, castle and then you go to ALMA.*" (Expert 2)
> "*Yeah. But I do not think it is cozy; the ALMA.*" (Expert 1)
> "*But a lot of people think it is cozy, there you have all those benches that you can sit.*" (Expert 2)
> "*True…*" (Expert 1)

However, for the situations in which one of the dimensions among image tokens, feeling cards or spatial relationships were ignored, researcher directed questions about the ignored dimensions to enhance the awareness about multi-dimensional data.

While evaluating the unexpected representations, experts were reflecting several different approaches. One was trying to relate the players' demographical features (e.g. faculty/profession) to their perception and making sense of it. For instance, when an expert was asked about unexpected spots in the map, he stated:

> "*Yeah, I did not expect that the people using the campus would use this area like the forest. […] I think you could guess that they are engineering students because they see big buildings where they have a lot of lessons as like a landmark.*" (Expert 5)

As a second approach, they were discussing the possible spatial reasons behind an issue to avoid their own bias. For the example of Çarşı (Shopping Center) of METU Campus, at the beginning of the session, experts could not understand the layout of the campus map because of lack of the Çarşı and negative feeling cards around where it supposed to be. Thus they reacted in surprise; thinking it was a significant spot. However, after the discussions among them about the building's physical state and inefficient usage, they agreed upon the need for enhancement.

And thirdly; judging the players and including his/her own idea was another behavior. One expert was remarking that students are probably too lazy to perceive a specific path that long. As another example; in response to some edge tokens that were put to reflect the lack of shortcuts between faculty buildings, an expert was indicating that there was no need to intervene and people need to learn shortcuts in time even if they are not legible.

However, the interpretation of the experts was found really valuable considering Co-gnito's ability to turn unexpectedness or unforeseen into questioning and understanding. Even though they did not have knowledge about the stories that built the end-result maps, the physicality of the Co-gnito was still offering a speculative ground to understand users' experiences.

CHAPTER 8

CONCLUSION

8.1. Introduction

Co-gnito game was designed as a tool to understand people's environmental perception, experience, and behavior through the five well-known elements of Lynch; i.e. path, node, landmark, district and edge. The main aim of the research is to evaluate Co-gnito's performance by using two case studies in order to see its strengths and weaknesses, as well as its potentials for further development. Hence, this chapter introduces and discusses these features in order to reveal the contribution of the research to the literature.

8.2. Evaluation of Co-gnito

The study was conducted with sample groups of 12 and 20 people for two different cases; KU Leuven-Arenberg in Leuven and the METU Campus in Ankara. The samples were balanced as to gender and level of familiarity (years in the campus). The samples were all volunteers, as they applied to play the game with their own will. However, before testing the game, it had not been possible for the researcher to conduct a detailed pre-survey in order to consider other factors to provide a more representative sample. The ways of transportation or the homogeneous distribution of students' faculty buildings among different parts of campuses might be a few of factors which can influence the perception of people. Therefore, making a strong generalization and providing totally reliable analysis of urban perception would not be realistic with such small sample sizes. However, the primary goal of this research is

not to provide a detailed data set to urban designers. Rather, its main aim is to design and to test an experimental tool and evaluate its' performance in regards to the ability to collect people's experiences in a game environment. Thus, understanding this experimental tool's potentials to provide a detailed data set to urban designers is the primary motivation of this research. There are two success criteria, which come forward. In this research; the success of Co-gnito as a fun environment which players do not lose their motivation for a long period of 2 hours and enjoy the interaction; and secondly, the success of Cog-nito as a research tool which researchers are able to collect meaningful data to be analyze.

8.2.1. As a Fun Environment

The answers that were given to the after-game surveys and questionnaires proved that Co-gnito as a fun environment has a high ability to motivate people to talk and discuss their experiences and perception for long periods of time without loosing the interests and motivations. The storytelling, the physicality of the game, interaction and understanding each other can be listed as a few of the most liked aspects of this game. However, there were also moments which the players faced hardnesses in the gameplay which entails of losing interest or the joy if the conflicts among the players' ideas cannot be solved fastly.

For instance, although Co-gnito was designed as a collectively image making tool, some limitations of the game were discovered during the phases when players had to relate their cognitive scales to each others' scales. While it was solved quite easily in some cases, it became a significant challenge for some other cases which the first player defines a far point at the beginning of the game. This was found to be the main reason behind the confusion about the 4th game on METU campus. It stands as the only problematic session, as explained in Chapter 6 (Section 6.3.). This problem can be easily solved by adding one more single rule to the ruleset. That rule can be whether leaving a few points open at the beginning of the game to encourage players

to start from the very center point or not allowing the use of additional base tiles during the first round.

A second issue which the players had a hard time was the physical hardness in building especially while replacing a token to place something underneath or reaching a point between a number of built tokens. However, this feature pf the game was a conscious decision at some points to avoid players to focus on the same single spot and put so many elements there. Besides, it is also true that the scale of the sticks was sometimes challenging in terms of ergonomy. Hence, Co-gnito can be re-produced more durable and slightly bigger for the further researches.

8.2.2. As a Research Tool

This research has revealed that a great amount of valuable data can be collected by Co-gnito. However, it might not still be possible to provide reliable generalizations with this amount of small sample size. Therefore, the game provides us with an oppurtunity to attain a significant detal and amount of data about the perception of the people about a place. However, it is critically important to attain a large amount of data to make reliable generalization on environmental perception.

Akkar (2005, p.2) states that "*The space in which we live, work and experience is not composed only of three dimensions, but is rather a four-dimensional entity, an outcome of time, which might be studied under its development and use processes.*". One of the most important original findings that emerged during this study was the differences of experiences and perception at different times of the day especially for the case of METU than Arenberg campus. Since the proportion of the sample population who are living in the campus is higher in METU than the case of Arenberg, more people are experiencing the METU campus at the night time. With that reason, the perceptional differences, due to time differences were stronger for METU. Not only the daily

differences but also the seasonal differences were found to affect people's behavior in, and perception of the urban environment. Therefore, the urban environment can not be evaluated by ignoring the time factor not only in terms of long-term permanent changes but also the short-term provisional changes (Akkar, 2005).

Besides the time-based variables, this research has also discovered that the aspect of storytelling is beneficial in terms of understanding other sensory perceptions besides the visual perception. As mentioned in Chapter 2, Lynch's approach which focuses only on the visual perception was followed by other researchers like Southworth (1969) who coined the term soundscape and searched on soundscapes impact while perceiving an environment. However, Co-gnito aims to collect the rich daily experience instead of specific sense-based data like the visionary or the auditory. Recalling the stories that were structured on "hearing something and changing the route" or "passing through the same place in the morning and in the evening but paying attention to specific spot only in the evening time because of the music", or even the stories about "feeling cold and changing the location" show Co-gnito's the tool's high potential in revealing the feelings, thoughts and responses of individuals to the built and unbuilt environment. The tool successfully functions in terms of collecting such data about individuals' perceptions in detail. However, it's ability to communicate such multi-layered data can be discussed further.

Bringing back the discussions about the participant's selectivity during different techniques that Lynch used, the mechanic of storytelling presents another level of selectiveness. Dalton and Bafna (2003) indicated that the reason behind having a high number of elements on the verbal maps was not "*primarily because that they were visually distinctive as such, but only within the context of a particular route or situation*" (p.59.5). They also showed that; "*The sketch map, Lynch finds, is more selective than the one verbal one; however, some elements that occur on the sketch map are not found on the verbal one. This can only happen if those elements are not intrinsically visually distinctive, but are crucial within an overall wayfinding structure.*"(p.59.5). With regards to their analysis, both of the situations that were

mentioned above might be applied to Co-gnito as a “mapping through stoytelling” game. That is to say; many of the “built” elements on the end-maps did not represent a hierarchy of imageability but a continous series of vistas and people’s relation to them.

Applying Co-gnito in two different contexts which have different scales, characteristics and different groups of users in terms of cultural differences was a conscious decision to support research’s rationality. As a result, some interesting dynamics have occurred. One of those was the discussions on the features of integrity and complexity of maps on two areas with two different scales

It is understood that the increase in the number of tiles positively affect the number of tokens that is put per each story. The longer distances get, the more elements players tend to place to reach specific spots. That is allowed through the rule which reckons the multiple numbers of continuous linear tokens as only one. However, the increase in the number of tokens per story has a decreasing rate (Figure 8.1). For instance; while a game with only 9 base tiles is expected to have an average of 5 tokens per story, the rate is to be 5.2 for the one with 12 tiles and 5.5 for the one with 15 tiles (Table 8.1). Thus, in order to attain maps with an adequate level of complexity, it is necessary to be purposive to provide a guideline for future researches on the complexity and detail rates of different sizes of settlements with different environmental densities. As an instance, if more details are being sought, the number of tiles and the number of turn should be increased. With that easy operations, the game could be played in any other environment without being dependent on any context.

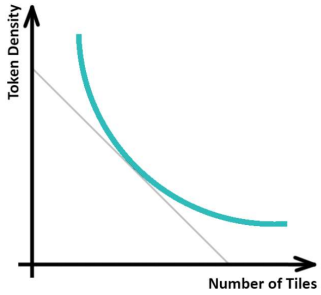


Figure 8.1 Relation of Tile Numbers and Token Densities

Table *8*.1 Example Table for Tile Numbers and Token Densities Relation

Num. of Tiles	Av. Tokens per story	Token Density	Decreasement Rate
9	5	0,555	1,22
12	5,2	0,433	0,67
15	5,5	0,366	0,39
18	5,9	0,327	0,03
21	6,1	0,29	

Another issue was the interaction patterns of players which is assumed to be highly influenced by the cultural factors. Interaction might seem to be an aesthetic feature bringing the fun and not being directly related to the games' research-based aims. Nevertheless, Co-gnito, as a cognitive mapping tool, helps to develop a consensual ground to interact and to engage, thereby producing a cognitive result in the end. In other words, it helps to the social interaction between players happen.This is a very important feature. Interestingly, the participants from two university campuses reflected slightly different opinions about the issue of consensus building (Table 7.4 and Table 7.5).

The players of Arenberg campus seem to enjoy the consensus-making process.Those of METU campus did not really show the intention of consensus-building or enjoying to build consensus on some opinions about their environmental perception. However,

the responses of the players of the METU campus to likert-scale questions show that they have still found the game enjoyable and fun.. This is an important issue to elaborate for future studies to understand Co-gnito's adaptability in different contexts and cultures.

Lastly, due to the large volume of qualitative data that has been collected, the lengthy analysis procedure is one of the main challenges of the method even for a small sample group.

8.3. Further Studies

For the further studies, the minor improvements that are mentioned above should be considered in order to obtain valuable and meaningful data in the future. However, some major changes could be also applied to bring the tool of Co-gnito further with respect to the overall research design.

Although this study was not designed and conducted to provide primarily benefit to researchers rather than players, the benefit of players can be also sought for further applications. With the Co-gnito's collective characteristic, there was a consensus among the players about the game's ability to enhance environmental awareness while many of the players were also agreeing on the ability to enhance the social awareness. As explained in detail in Chapter 7, most of the fun that was raised was not sourced by the competition but the interaction and sense of sharing. So, the game promises a considerable potential to be applied with local communities to achieve a series of benefits as; enhancing environmental awareness, thus the social cohesion and strengthening the communal unity among a broader range of social groups. Starting from the 1960s the importance of collective action has been recognized more and more and the community-driven development projects have become a focus of interest, especially among urban researchers. Especially with the new developments like the

"Maker Movement" that the Industry 4.0 brought, local communities even started to design and produce for their common spaces together. During such processes explained above, numerous researchers worldwide have been working to develop tools to enable collaborative decision making among different stakeholders. As Ekim Tan (2014) asserts;

> "*The curious question for city-making becomes whether gaming can serve as a method for collaborative decision making, co-creation of urban environments from seeding ideas to implementing plans. Beyond feeding decision making, can gaming become operational in producing collaborative urban schemes to be implemented? This question implies that gaming as a method would become a permanent part of city making cycles for collaborative actions from decision-making, to participatory budgeting, to crowd-building and maintaining cities.*" (p. 131)

Today, there is a large volume of recent board gaming studies which deal with decision-making, implementation of urban projects, or even maintaining problems and solutions of the city (Tan, 2014). However enhancing the sympathy and the interaction within the society through gaming would also make a significant contribution to decision-making processes. If we assume that two different social groups who do not have much in common were brought together with the aim of collective decision-making for new development in the district. The most important question in such case should be how could that collectiveness can remain through the time if the society does not share intimacy and strong social cohesion. A sustainably peaceful social interaction could be only possible through having citizens being aware of each others' needs and behaviors. So, the Co-gnito can be developed further as a communicative tool which fulfills two main needs of local communities; understanding their environment and understanding each other.

The second potential usage area is discovered as an educational tool for architecture/urbanism students. The game's tangible and abstract feature is promising to be used for the analysis studies of the design studio courses. The analysis studies of

given sites to apply a design; generaly includes a coverage trip to the area on foot, discovering and documenting the space through photos, videos, sketches, maps etc. The process would be followed with the analysis of the infrastructure, built structure, topography, natural assets and many other issues which will be presented in formats of posters, physical models, videos, installations… At that point, with its high performance to enhance environmental awareness; Co-gnito is expected to provide an abstract model base to be collectively built by the students of the design studios after a field-coverage trip. However, such kind of usage might require different sets of rules since the players' relativity about the environment will be low and participants would not say more than the routes they have taken and the things they have noticed. Not only that, but also in regard to the observations based on expert interpretation sessions, the tool's capacity to transmiss spatial knowledge which were basing on real experiences might be limited when being faced with person who was not witnessing the gaming process. Thus, it could be made possible to tag tokens through writing on them for instance. However, if the process would be successful, the physically produced end-result maps can stand as perceptional site models to be used throughout the academic semester**.**

To conclude, Co-gnito as a collective and cognitive mapping tool has some very important strengths such as its ability to collect first-person experiences and the possible environment/time/person/…-based reasons behind them; without pushing participants to reveal. Seeing other people's reactions to such experiences in order to understand until which extent are they common or at which points are they getting personalized. Thus, seeing possible intervention possibilities to enhance the quality of the urban space by responding the common/agreed issues. The second major benefit would be introduced as; providing a democratical, peaceful environment to the city users and asking them to compete through social interaction. And lastly, enhancing the sense of community by enabling people to understand each others' needs and aspirations and to adapt themselves to others' movements and perceptions for a fun aim... Besides the strengths, it also has some weaknesses in the game mechanics which should be solved to avoid all possible risks of having an unsuccessful or incomplete

result. Moreover, due to the great volume of anticipated data, the representation method needs to be developed further to be able to represent it's multi-layered nature. However, when evaluated in a holistic manner, it promises many potentials to be developed for future researches in urban contexts.

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