Emine Yıldırım

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TRANSITION OF BANK SPACE IN DIGITAL AGE

A THESIS
SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE
AND THE GRADUATE SCHOOL OF ENGINEERING AND SCIENCE
OF ABDULLAH GUL UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
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By
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SCIENTIFIC ETHICS COMPLIANCE

I hereby declare that all information in this document has been obtained in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

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M.Sc. thesis titled Transition of Bank Space in Digital Age has been prepared in accordance with the Thesis Writing Guidelines of the Abdullah Gül University, Graduate School of Engineering & Science.

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ACCEPTANCE AND APPROVAL

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ABSTRACT

TRANSITION OF BANK SPACE IN DIGITAL AGE

Emine Yıldırım
MSc. in Architecture
Advisor: Prof. Dr. Burak ASİLİSKENDER

January 2022

In this study, Lefebvre's definitions of space have been discussed and interrelated to digital space interpretations through theorists from different disciplines such as Mitchell and Manovich, and the concept of transition from digitalized space to digital space through bank architecture. With the inclusion of digital technologies in the space, hybrid spaces have emerged as a transitional form between physical and virtual space. These transformations in the space have reduced the need for the physical environment to interact with the user. Decentralized distribution channels and web 3.0 have important implications for the idea of virtualization of space. Considering both the distributed network protocol and the transaction structures of cryptocurrencies that do not need physical reality, it is observed that many leading banks and financial institutions have adapted their headquarters and branches to this transformation. It was found meaningful to examine the transformation in bank branches within the scope of the thesis as the area where the transformative effect created by the relationship between finance and technology can be observed the fastest in the user and the place. The digital interfaces of the space, which has been needed by banking transactions since the first periods of its history and shaped accordingly that banking transactions today, have been discussed and it has been tried to predict the way the space will be handled and design decisions in the future.

Keywords: digitalization, spatial transformation, hybrid space, bank branch

ÖZET

DİJİTAL ÇAĞ'DA BANKA MEKANININ DÖNÜŞÜMÜ

Emine Yıldırım
Mimarlık Anabilim Dalı Yüksek Lisans
Tez Yöneticisi: Prof. Dr. Burak ASİLİSKENDER
Ocak-2022

Bu çalışmada Lefebvre'in mekâna dair yaptığı tanımlamalar tartışılmış ve dijitalleşme ile birlikte farklı disiplinlerden Mitchell, Manovich gibi kuramcıların dijital mekân yorumları ile dijitalleşen mekândan dijital mekâna geçiş kavramı banka mimarisi üzerinden ilişkilendirilmeye çalışılmıştır. Dijital teknolojilerin mekâna dahil olmasıyla fiziksel mekân ve sanal mekân arasında geçiş formu olan melez mekanlar ortaya çıkmıştır. Mekandaki bu dönüşümler kullanıcı ile etkileşime geçmek için fiziksel gerçekliğe duyulan ihtiyacı azaltmıştır. Mekânın sanallaşması fikrinde merkezi olmayan dağıtım kanallarının ve web 3.0'ın önemli etkileri vardır. Hem dağıtılmış kanallar hem de kripto paraların fiziksel gerçekliğe ihtiyaç duymayan işlem yapılarına bakıldığında, birçok önde gelen banka ve finans kurumlarının merkezlerini ve şubelerini bu dönüşme adapte ettikleri gözlemlenmektedir. Finans ve teknoloji ilişkisinin oluşturduğu dönüştürücü etkinin kullanıcıdaki ve mekandaki karşılığının en hızlı gözlemlenebileceği alan olarak tez kapsamında banka şubelerindeki dönüşümün incelenmesini anlamlı bulunmuştur. Mekânın nasıl bir bilgi ile üretildiğine yönelik araştırma için temel kaynakların yanısıra birçok makale ve tez tarandı. Banka mimarisindeki dönüşüme yönelik analiz içinse banka planları incelenmiştir. Tarihinin ilk dönemlerinden itibaren bankacılık işlemlerinin ihtiyaç duyduğu ve buna göre şekillenen mekânın, günümüzde bankacılık işlemlerini gerçekleştirdiği dijital ara yüzler tartışılmış ve gelecekte mekânın ele alınış biçimine ve tasarım kararlarına dair öngörüde bulunmaya çalışılmıştır.

Anahtar kelimeler: dijitalleşme, mekânsal dönüşüm, hibrit mekân, banka şubesi

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Firstly, I would like to express my sincere appreciations to my dear thesis advisor; Prof. Dr. Burak ASİLİSKENDER whom encouraged me during the thesis, guided me through his reviews and motivated me in all possible ways every time. Pursuing my thesis under his supervision has been an experience which broadens the mind and presents an infinite source of learning.

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Hilmi, Nihal and Samed, who support me all the time with their friendship even with the long distance between us; And Eren, who always stands by my side whenever I needed and changed my perspective on life, I am glad to have you all.

At last, I would like to convey my sincere thankfulness to my dear family, especially to my mother, for their endless support, understanding and belief in me always given to me not only for this thesis but for my whole life.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AR	Augmented Reality
AI	Artificial Intelligence
VR	Virtual Reality
HBC	Human Body Communication
HCI	Human-Computer Interaction

To everyone in the past, present and future who encouraged me to go beyond myself…

Chapter 1

Introduction

> "… The understanding of place cannot be undertaken without major theoretical endeavour... almost all the major social and cultural theories bear upon the explanation of place in one way or another."
>
> John Urry, Consuming Places[1]

The **aim** of the thesis is to conceptually examine the digitalization of space with the effect of advancing technologies. By examining the digitalization process of the space; the circumstance of the space in the Digital Age will be understood: Its transformative effect on society will be discussed and a conceptual design framework will be foreseen for the spaces to be designed in the future. Beyond investigating the digital impact of information and communication technologies in the definition and transformation of space; With the awareness of other parameters that create and transform the space, studies and research have been made in the social, cultural and economic context. Architecture, on the other hand, faces a transformation with the change in these parameters, even if the technological innovation is not directly related to the space. Identifying these transitions is very important for the designer to dominate the field. In the context of the direct relationship of the transformative impact of technology with money, banks were chosen as the scope of the study due to their effect on banking and indirectly on bank architecture. The reason why the bank branch architecture has opted is that it is the most effective medium through which banks can interact directly with their customers and is more spatially flexible. It is aimed to be the most important output of this thesis to be able to predict the future of the architectural discipline by examining the effects of the transitions created by information and communication technologies in the social and physical environment on architecture.

[1] Urry, J., 1995. *Consuming Places*, Routledge, London.

The phenomenon of space includes a series of interconnected situations beyond physicality. Urry (1995) grounds in this series of complex situations on three arguments that he deems necessary in understanding space. The first of these is that it requires theoretical effort with several new research and technical tools; second, associating the nature of the place with time and space; The third is the analysis of the consumption of the space. Whatever people find meaningful about a place and make sense of the place is consumed over time (Urry, 1995). This consumption corresponds to a dialectic based on space, time and sociality in Soja (1996).

The thesis limits its purpose to the arguments that Urry (1995) bases for the understanding of space. The first of these is the necessity of theoretical effort to understand the place. The second argument is that the nature of the place is not adequately dealt with because it is not known how to relate time-space-nature. In this thesis, instead of "nature" in the second argument, time-space-technology is associated. With these relations, the nature of "place" in the digital age is opened to understanding and discussions. The concepts of being, selflessness, space, place, dimension, surface, which the thinkers discussed theoretically, have found an experimental ground with digital technologies. The third argument is the "consumption" of space. The concept of consumption will be read concerning the virtualization of physical space in the following sections.

To elaborate the content, *The Production of Space* of Lefebvre (1991) and *Consuming Places* of Urry (1995) were criticized as the main sources within the scope of their interpretations about the place. *The Language of New Media* of Manovich (2002) and *City of Bits, Me++: the cyborg self and the networked city* of Mitchell (2003) were used as main resources for their interpretations of Digital Space/ Virtual space concepts and understanding digital space. In addition to those main sources, many articles and theses were reviewed. Not only written sources, advertisements, films, banks' own websites and exhibitions were also used in the literature review.

In this context, rapidly developing technologies have provided the opportunity to create different spatial alternatives in the twenty-three years since then. The space is no longer only supported by digital technologies, in addition, it can be designed and experienced with augmented reality and virtual reality technologies. In this thesis, more

recent samples in banking and banks that have become places of experience as a result of their transition under the impact of digital technologies are examined and local banks were analyzed in this sense, and space transformations were revealed.

Examining and content analysis was used in the first part of the thesis, and morphological analysis was used as the research **method** of the thesis. In addition to that, academic studies, industrial knowledge was used chronologically and historically and movies and advertisements' contents were examined in the review. The components of the spatial context in the review could be seen visually in Figure 1.1.

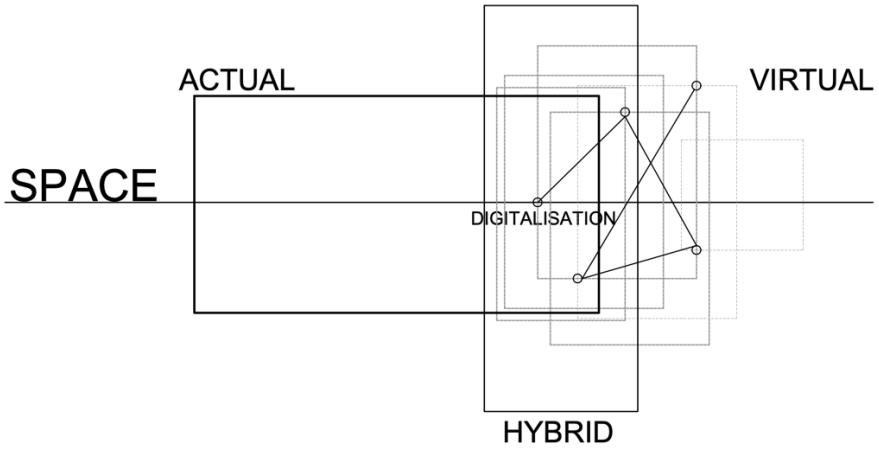


Figure 1.1 The components of the spatial context

Following a literature review on the subject, starting from the discussions about the origins of the space and digitalization of space. Within the scope of the thesis;

- How has been the new digital culture and lifestyle re-forming in the face of the relationship between daily life and technology in the Digital Age, and what are the predictions for the future?
- What are the changes in the banking system in the digitalization process and the effects of these changes in the space?

questions are sought.

The second part of the thesis answers the first question; the third part focuses on the banking literature and answers the reflection of the changes in the sector due to the digitalization on the space.

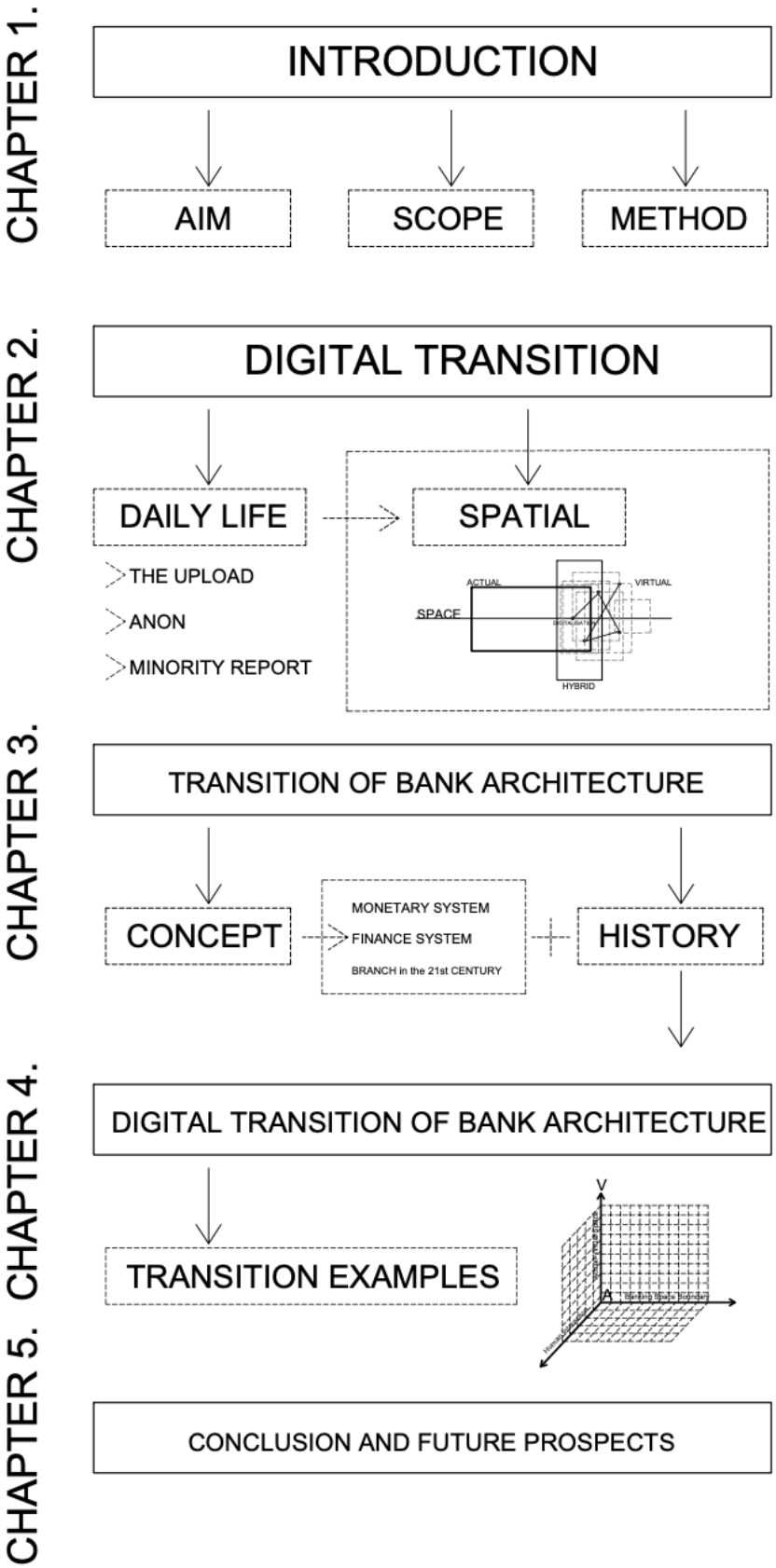


Figure 1.2 The flow structure of the thesis

Branches were chosen as the study area because the changes in technology and finance system affect each other and the potential of banks to strategically plan and identify future trends with innovative tools. The main aim of this study is to examine the transition of space from digitalization of space to digital space with advancing technologies. For this, in the first part of the thesis, the first spatial examples of the development of computer technology will be briefly mentioned, and then the subject of designing digital space, where architecture has come to the point of being an interface, will be examined through the concepts of augmented reality (AR), virtual reality (VR) and hybrid space. Despite the discussions of real space and virtual space having found a practical and experimental response with today's technology, the conceptual framework of the chapter will be completed with the discussion of the readings of the theorists in which this discussion is made on the cognitive perspective (Figure 1.2).

Chapter 2

Digital Transition

“Once noticed, it continued to occupy one's mind. It even persisted, as it were, in going about its own business... The striking thing was that it was neither simple nor complex, initially or intentionally complex, or con- structed according to a complicated plan. Instead, it had been desimplified in the course of its carpentering... As it stood, it was a table of additions, much like certain schizophrenics' drawings, described as 'overstuffed,' and if finished it was only in so far as there was no way of adding anything more to it, the table having become more and more an accumulation, less and less a table ... “

Henri Michaux- Les Grandes (Deleuze & Guattari- Capitalism and Schizophrenia)

The aim of this chapter of the thesis is to understand digital transition and to be able to relate with spatial transition. In order to understand digital transformation, what is digitalization, what is meant by digital technologies and digital age, has been made a literature review to understand them. First of all, its effect on daily life was researched. During this review, in addition to academic studies, examining the movies related to the subject in the context is one of the methods used in this section. Transformations that occurred before the digital age (agriculture, industrial revolution) were examined but not explained in the thesis, they were only used as a factor in comparing the effects of the digital transition. In the "from digitalization of space to digital space" section, the transformation of the space, which started to digitalize with the integration of digital technologies into the space, into a completely digital space corresponds to different space definitions. This kind of transition describes the gradual transition from physical space to virtual space. The transition of space to virtuality will be associated with Urry' s consumption of place and will be read as a different consumption approach. The effect of

digital technologies in architecture on space and designers who write about digital space and produce projects based on this will also be exemplified in this chapter.

2.1 Digital Transition of Everyday Life

"In thinking about the future of AI, Karl Marx is still a better guide than Steven Spielberg"

- Yuval Noah Harari – 21 Lessons for the 21st Century[2]

Digital technologies in the early 1980s changes society, economy, culture and almost every aspect of daily life. Broad definition of the *digital* was given in the study of Wang as follows; 'translate all inputs and outputs into binary structures of 0s and 1s, which can be stored, transferred, or manipulated at the level of numbers, or 'digits'(Lunenfeld, 1999; Wang, 2019). According to Cambridge Dictionary, "digital age" means "the present time, in which many things are done by computer and large amounts of information are available because of computer technology". As understood by the definition, most of things related with the computer technology and have entered our lives as an output of this age. Digital changing is important and opens the door to a brand-new era of human development. Big data, artificial intelligence (AI), the Internet of Things (IoT), cybersecurity and other digital applications will profoundly change systems of societal standards and values in similar ways to the previous development the invention of the printing press (550 years ago), and the technological and social confusion since the beginning of the Industrial Revolution (Jones, 2018).

Phases of digital technology emergence between the 1960s and 1970s. With the usage of internet, digitalization spread to everyday life in the 1980s-1990s. The web 2.0 and rising the data-centered technology start with the 2000s. The 2010 and beyond societal awareness of digitalization grows (Jones, 2018). Although there are many studies executed within the scope of digital technologies, it has been observed that there is a lack of clear and well-understood theoretical background (Goerzig & Bauernhansl, 2018; Van Veldhoven & Vanthienen, 2019). In the study conducted by Vial (2019) to prevent terminological confusion in the Digital Technologies in the literature, 282 articles were

[2] Harari, Yuval N., 2019, *21 Lessons for the 21st Century*

searched and a conceptual definition was developed by the author, based on the extant definition. The definition of Digital Technologies is "*a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies*" (Vial, 2019).

According to Toffler (1996), society continued its development in three eras. While the pioneer of these ages is the Agricultural Age, another is the Industrial Age and the third is classified as the Technology Age we are currently in. This developing new "wave" brings with its new regulations, from the way we do business to the way we interact with people, and offers us a new consciousness. Agricultural and Industrial revolutions until the Digital Age occasioned great social changes in their own time. For instance, with the Industrial Revolution, the use of public housing became prevalent, and the places where working and living were located in different parts of the city. This demonstrates a significant change in urban design after the industrial revolution (Toffler, 1996). With the technology revolution and globalization, production has no longer been done only on the workbenches and the working culture managed by computers has developed. Now, the dependence to the place has decreased and the scale of the city and space has moved to different dimensions. On the other hand, the developments brought about by the industrial era in material and building technology are seen as a critical step on the way to the transparency and dematerialization of the space. Subsequently, with the digital age, the dimensions of dematerialization and its effect on perception have increased. Referring to Toffler, who mentioned that the new age is more democratic, it can be said that space has also become more democratized in this age.

As Lefebvre states in his book *The Production of Space*, the product-producer space forms the substratum for social and economic relations. The new mode of production adopts the existing space and rearranges it according to its own means and purposes (Lefebvre, 1991). In accordance with Lefebvre (2004), the increasing intensity with intermediary environments such as the internet in daily life changes the daily rhythms and transforms the economic-based usage policies of time. Lefebvre (2004) gives as an example the principle role played by the railways in the organization of space of industrial capitalism. The railways did not disappear with technology, but continued to be used while developing new transportation and communication routes.

As well as the potential positive effects of the third wave, Toffler refers the social state of mind and loss of selfness experienced in the transition from the second wave (Industrial Revolution) to the third wave (Digital transformation) later in the book. He explains this situation with the geographical and psychological spread of capital (imperialism), which Deleuze and Guattari (1983) define as schizophrenia, and the liquidation of existing meanings and beliefs.

In the years when digital technologies began to develop, some theorists made accurate social predictions about the future from today. One of them is McLuhan's (1994) perspective that defines as "The Global Village", the temporal and spatial distinctions lose their importance in the connected world, which is getting smaller with globalization and increasing the communication between individuals with digital tools. According to McLuhan, suitable spaces have begun to be designed in this era for interaction with the transforming human body with the change in technology. Similarly, with this new system, Meyrowitz (Meyrowitz, 1985) states that the redefined relationship between physical space concept and the experience were disconnected in this period.

In web 1.0, where computer graphics are not developed, the user in the role of passive reader turns into a dynamic content producer whose focus is interaction with web 2.0. In web 2.0, which is defined as Web of Communication (Müller, 2010), Toffler calls both the producer and the consumer as Prosumer (Producer and consumer). The third generation of the World Wide Web (web 3.0) also known as Semantic Web. Data integration is the foundation of web 3.0. "Display only" data is transformed into meaningful information that software agents can identify, evaluate, and provide using metadata (Patel, 2013). In web 4.0, which is associated with Industry 4.0, machine learning and Internet of Things (IoT) concepts are related. For example, it is one of the first examples of web 4.0 that amazon.com recognizes the user and makes personalized recommendations in more than one visit. The transfer of this online functionality to the physical world is expected to be one of the most critical developments of web 4.0 (Patel, 2013). In addition to computers, it is possible to communicate and perform transactions through the *Ubiquitous Computing Network*, which enables simultaneous interaction with mobile tablets, phones and other electronic devices in daily life, anytime and anywhere (Figure 2.1). In the context of Müller's (2010) connection between the generations and technologies of the web and the body, the medium turns into an extension of the body

with web 3.0. Web 4.0, which is categorized as *Always On*, ensures that data can be continuously received and processed with face recognition and retina recognition technologies (Figure 2.2).

Figure 2.1 Ubiquitous Computing Network (Müller, 2010; Kut, 2013)

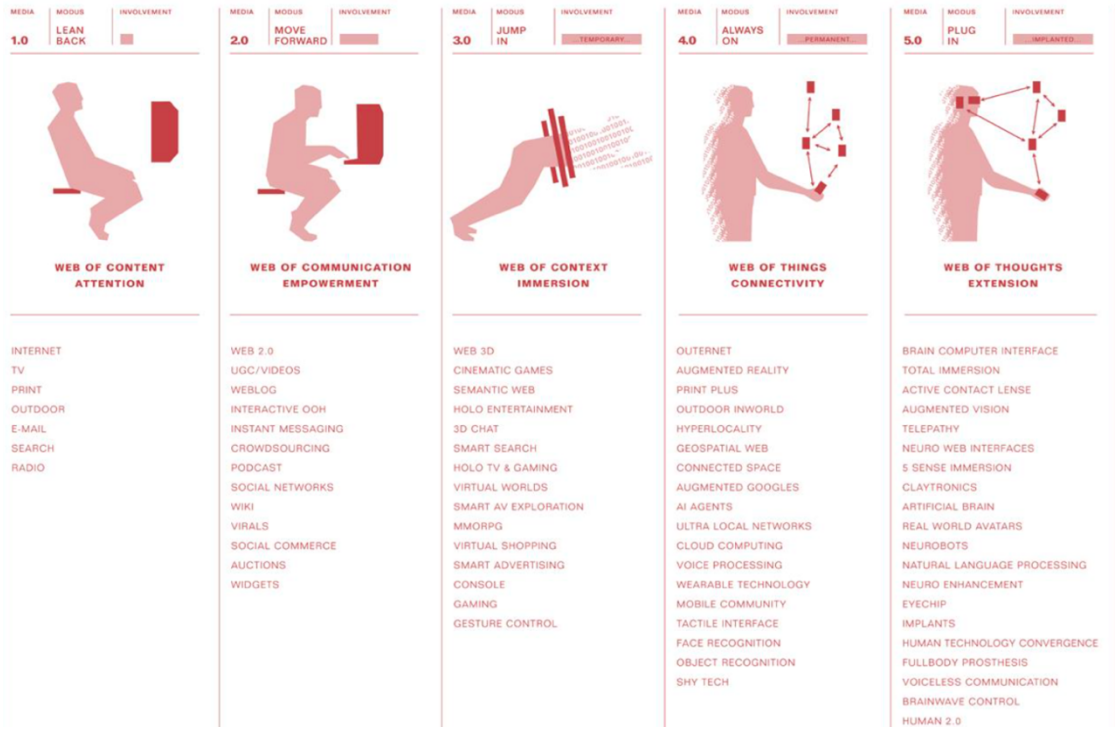


Figure 2.1 The relationship between new technologies and the body extension Müller, 2010; Kut, 2013)

Currently, the web is emotionally neutral and web 5.0, in other words *Symbionet* web, allows users to interact with the avatar created by neuro technologies that detect their emotions and respond with real-time facial expression. With the inclusion of the Internet in social life, society has turned into a "network society" as defined by Castells (2013), and information has taken on a digital form. Digital information has created a new definition of culture, and this digital culture is a concept formed as an extension of culture in response to the needs of the new age caused by modernism and capitalism (Gere, 2002). It is emphasized by many social theorists that today's social life and culture, which is also shaped by digital communication forms, will experience a more effective transformation than the social and cultural transformation that occurred with the industrial revolution in this new age. For instance, Toffler (1996) states that people who have been connected to the land for 10,000 years, broke away from the land with industrialization, changed their cultural structures and basically adapted to the new factory working order; moreover, he indicates that the family structure, education style and social structure have been transformed in this direction in order to ensure harmony.

With Covid-19, the change in practices in many areas from daily life to business life has accelerated, and many companies continued their work through online connection platforms such as Zoom. The transition from the real economy to the digital economy accelerated during this period when big fashion brands like Balenciaga chose to launch their latest collections on such a virtual platform (Figure 2.3). To date, the game and film industry has inspired architects, city planners and provided experimental space designs with graphical interfaces, game engines and 3D modeling software. With the concept of metaverse, the definition of which was first made in Neal Stephenson's Snow Crash novel in 1992, with the content of multiple users (single user interaction has shifted into multiple user interaction) and environments created in 3D over the internet in real time, architects encounter to new creative designs opportunities. Current studies to improve the spatial experience of visitors and to experience the space in the metaverse have accelerated recently with new imaging and digital interaction methods.

Figure 2.2 Balenciaga launches a video game for its fall 2021 collection (Sun, 2022)

As algorithms become involved in daily life, autonomous vehicles and artificial intelligence have caused the question of "what is being human" to be addressed in a different context, for which different field of science and philosophy have sought answers for hundreds of years. Harari (2015) discusses this extensively in his book *Homo Deus*. According to Harari, history has witnessed many technological, economic, political and social transformations over thousands of years. However, “the only thing that did not change in this whole process was humanity itself”. Mankind has been affected by transformations but has not experienced a clear break from Homo Sapiens in the historical process. Today, technology causes the restructuring of the mind, perception and senses. The *Technosphere* of the Digital Age has created a new kind of *Sociosphere*. In the context of the *Sociosphere*, it is necessary to foresee the people of the future while creating a discussion ground for the spaces of the future. In Harari's (2018) book, against the question of "what can minds like ours do with biotechnology"; It raises the question, “what can beings with other minds do with biotechnology?” If we bring these questions to the ground of architecture, what is space for beings with different minds, what can be done with space?

The importance of the ground created by capitalism in the rapid, comprehensive and effective spread of digitalization is undeniable. As Harari (2018) emphasizes, it is therefore important to interpret Marx in order to predict the future of technology and its impact on society. Artificial Intelligence (AI) is a capital tool in terms of technological developments and especially the point it has reached today. Machine intelligence is the product of not only a technological logic, but also a social logic, the logic of producing surplus-value. Capitalism is the combination of this technological and social logic. AI is the latest manifestation of the illusory combination of computation and commodification (Witheford et al., 2019). Objects and bodies in terms of making meaning their existence is inseparable from the material and virtual environments. The transition from design to meta-design is also the transition from a constant, static universe of Kantian subjects and objects to a dynamic, contingent, spatio-temporal community (Jaros, 2007).

Figure 2.3 Service examples provided by artificial intelligence (AI) (King, 2019)

Today, as seen in Figure 2.4, personal artificial intelligence provides services in a wide range from health, education, personal assistant, to the entertainment sector (King, 2019). The scope of digitalization in health care, as well as interest in possible applications, has risen significantly in recent years. People can use a variety of apps on their smartphones to track their health, contact a doctor online, record a range of health-related data, and seek information (Blix & Levay, 2018). According to Blix and Levay (2018), software robots, which are based on neural network working systems, are advancing in making cancer diagnoses better and faster than dermatologists. Progress has

also been made in diagnosing diseases using artificial intelligence and machine learning. In the health sector, personal data and patient records are constantly collected in big data, processed by artificial intelligence and sent information to health institutions and doctors in case of a possible problem; all of this happens due to home-integrated and wearable technologies are now used as important inputs in today's spatial and product design.

Especially with the rapid ageing of the population on a global scale, the wireless wearable health-status monitoring system, which can be developed owing to digital technologies, is becoming widespread in our daily lives. Systems that use the human body as a transmission medium in the hospital, home, vehicle and even without the need for any physical environment are called Human Body Communication (HBC) technology. It is emphasized by experts that there will be widespread technologies in the future for data communication in the health sector. In the images below, examples of the studies within the scope of HBC technologies are added. In the first image (Figure 2.5), the transmission of data analyzed in the human body to the computer of the health unit via wireless connection is shown in the study by Shi and Wang (2018). In the second figure (Figure 2.6), the textile product designed with sensing fiber is exemplified (McKnight et al., 2018). For highly personalized healthcare sensing applications, sensing textiles be possible comprise multiple component detecting fibers at different locations.

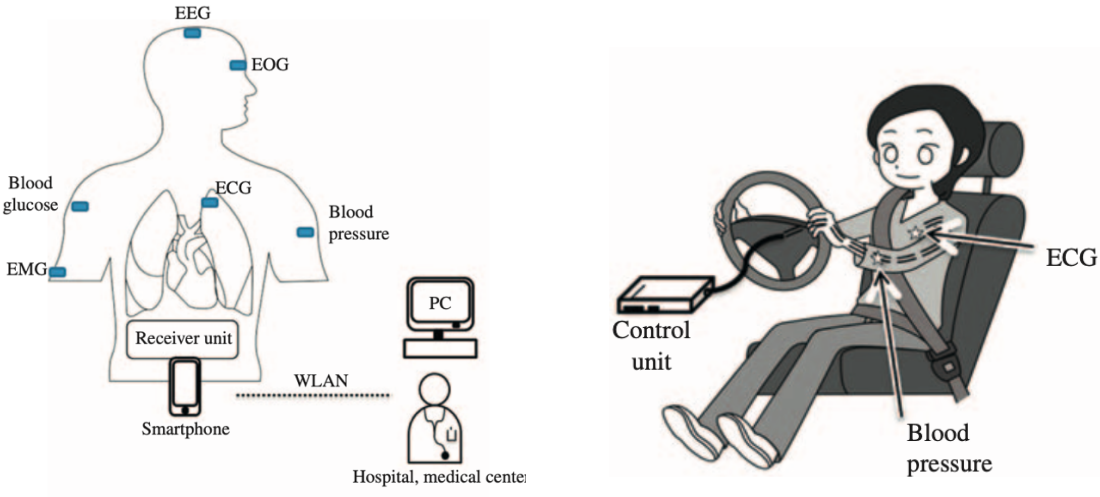


Figure 2.4 Health-care monitoring systems working principle (Shi & Wang, 2018)

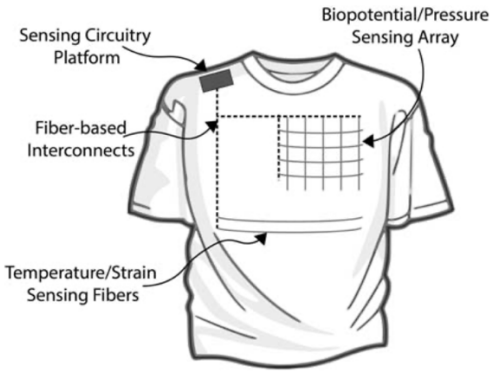


Figure 2.5 Sensing textile and fiber components (McKnight et al., 2018).

Additionally, to the readings, the effect of digitalization on daily life was also examined with examples from movies (*Blade Runner, Oblivion, Minority Report, Anon* ...) and TV series (*Black Mirror, The Upload*...) within the scope of the thesis. The first of these examples is *The Upload* (2020) series, which questioning the concept of "reality" and "consciousness" in terms of its subject. The Upload is a one-season and 10-episode series that aired on Amazon Prime Video in 2020, edited by Greg Daniels. The series focuses on a future where technology and virtual reality technology evolve. While the person is alive, all the data in the mind is transferred to companies with the theme of "digital afterlife" and this data is processed, and a virtual avatar is created. After death, the individual is uploaded to the environment designed virtually with these data and ongoing self-consciousness. With the idea of "Digital afterlife", human beings, who can make virtual reality technology a concrete extension of the next life, are trying to reload the loaded data into a living body in the later parts of the series. Virilio states this as entering a world that contains two realities instead of one: present and virtual.

Figure 2.6 The Upload series – Upload room choice, episode 1, Amazon Prime Video, 2020

The scene in the image (Figure 2.7) shows two options presented to a person who was brought to the hospital after the accident. “Upload Room” can be given as a good example of the transformative effect of life, which changes with technology. The concept and need of an Upload Room corresponds to a space required for loading into virtual reality and storing the body in the freezer. Virtual spaces were needed for virtual reality created parallel to reality in The Upload, but they were designed as replicas of existing real spaces. This design decision has been chosen considering the perception and psychology of the human being accustomed to the real space. Although the daily life in the series does not seem different from the present, the example of the telephone integrated into the body is frequently encountered (Figure 2.8).

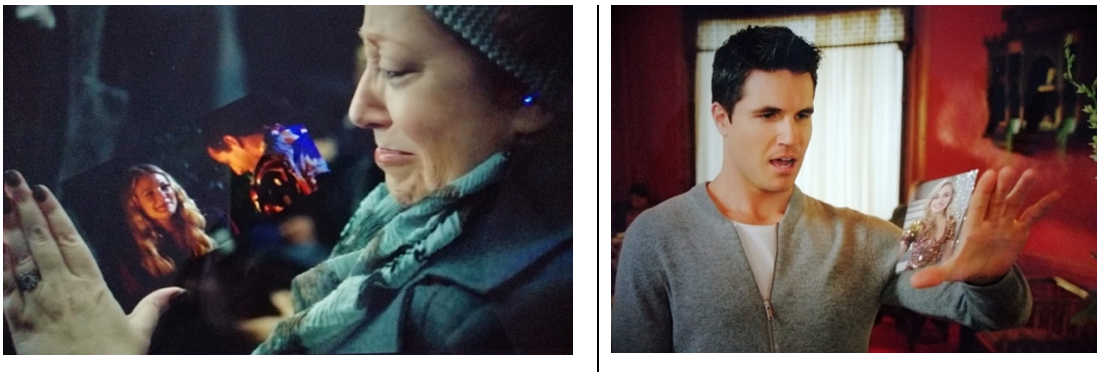


Figure 2.7 The Upload series – Daily technology usage

Another example is the 2018 movie *Anon* written and directed by Andrew Niccol. Owing to biosynthetic implant eyes, people live in hyper-augmented reality in this sci-fi movie. Continuous data flow and recording are made with eyes. There is no anonymity left in the world where the identity information of people passing by on the street can be accessed. In a world where even the payments are made through the eyes in daily life, personalized advertisements are animated on the surfaces without the need for a physical reality (Figure 2.9&Figure 2.10). With this aspect, the film suggests how private life, advertising, cities or places can be with augmented reality in the future.

Figure 2.8 Anon movie- Advertisements on surfaces through the eyes of Detective Sal (*Chivas Regal and UTZ In Anon (2018)*, 2018)

Figure 2.9 Anon movie - Advertisements on interior surfaces (*Chivas Regal and UTZ In Anon (2018)*, 2018)

The 2002 Steven Spielberg production *Minority Report*, which is based on the short story of the same name by Philip K. Dick, has also been the subject of several research. In this movie, the primary way of interaction with the main technology in the story is gesture and voice interface. Individuals are recognized and tracked biometrically in the environment via retinal scans, which are used to get access to buildings, transportation, services, and customized advertising (Figure 2.11). In addition that, as seen in figure, with the usage of holographic video projector (Figure 2.12), images and video characters replays as realistic image in the home setting (Forshaw, 2014). Despite all this technological integration, the spaces in the film are created with technological articulations on the existing construction.

Figure 2.10 Minority Report movie - Personalized advertisement

Figure 2.11 Minority Report movie - holographic video projector

While today's forms of socialization and spaces are preserved in the film, there is also a new system and space created with the help of technology. In the new spaces designed, although the only thing that is physically real is the seat and the user, a virtual feeling is created with the help of holograms that people feel as if they are real (Figure 2.13). In Figure 2.14, a protest demonstration in Spain using the hologram technique is exemplified. In 2015, a group of people protested the Spanish Parliament using a hologram. During the protest, slogans were broadcast as well as images of the group (Toprak, 2019).

Figure 2.12 Minority Report movie - Simulation room

Figure 2.13 Hologram for Freedom movement, Spain, 2015 (Tomlinson, 2015)

Despite the intervening twenty years, although the technologies exemplified in the Minority Report and their equivalents of space are examined in academic studies, the equivalent of space cannot be observed in daily practice. The technologies exemplified in the films examined and their effects on the space are summarized in Table 2.1.

Table 2.1 Summary table in terms of movies

Movies	**Technology**	**New Space**
The Upload (2020) Greg Daniels	VR AR Wearable and Implantable Technology	Upload Room
Anon (2018) Andrew Niccol	Biosynthetic implant eyes AR	
Minority Report (2002) Steven Spielberg	e-ink/ e-paper Wearable and Implantable Technology VR Holograms	Hologram Cabine

In general, wearable and implantable technologies provide user-space interaction in movies. Today, it is possible to interact with the place remotely with the applications we install on our phones. The table shows examples of technology used in films and their relationship with space. Among the examples, only *The Anon* did not need a physical new space design for the technology that was fictionalized in the film. The upload room in *The Upload* and the hologram cabine in *Minority Report* are spaces designed for the need for new physical space.

2.2 From Digitalization of Space to Digital Space

"We are entering a world where there won't be one but two realities, there will be two realities: the actual, and the virtual."

-Paul Virilio[3]

In this section, "space" and "digital transformation in the process" are tried to be understood. Starting with the sociology of space, examples of the use of technologies in space will be given, and examples of virtual space, augmented space, hybrid space transformation will be examined through the ground created by digital technologies in the perception and definition of space. As Löw & Alexandre (2016) points out in his book The Sociology of Space, even in the 1990s, despite the work of Lefebvre, space was thought to be not the subject of sociology's study. Today, however, it is inevitably accepted that space is a cultural and sociological issue. The definition of the concept of space has gone through a long philosophical process (Lefebvre, 1991). Even in the recent past, space was considered as a geometric empty medium and its source was seen as the science of mathematics. Modern mathematicians accepted a science and scientific that disengagement from philosophy as sufficient in the treatment of concepts. With this perspective, they made space and time their working areas, but according to Lefebvre, this *paradoxically* created an ambiguity with spaces.

According to Lefebvre, (social) space is (social) production. The production of social space, on the other hand, is occurred with all of the physical, mental (the space of epistemological philosophers' and mathematicians') and social production

[3] Paul Virilio, Louise Wilson 1994, *Cyberwar, God and Television: Interviev with Paul Virilio.*

understandings. Lefebvre (1991) defines perceived space (in the production of space) as physical production. Urry (1995), on the other hand, considers the perception of space as the consumption of space. In both cases, it corresponds to the perception of space by the senses of the individual in daily life, which must be understood. The conceived space, on the other hand, is produced in theory as the space of design. It can be defined as the living space as the outcome of social production (Lefebvre, 1991).

Lefebvre, who comes from the Marxian tradition, states that the endless multiplicity of definitions and disengagement (He explained the disengagement on page 38 as follows; epistemological-philosophical reflection has not provided the science of space, which many publications and studies have sought for a long time. Research either reach definitions or the fragmentation and rupture of space) make them unreliable. This means that intellectual labour within the model of production – just like material labour – is infinitely divided. If this analysis is correct, *the space* science sought is:

- Equivalent to the political (neo-capitalist) use of knowledge. It is known that this knowledge is more and more directly involved in the productive forces and indirectly in the social relations of production.

- It involves a technological utopia, the simulation or programming of the future (possibility) within the framework of the current mode of production. This happens starting from the knowledge integrated into the mode of production.

Boer presents a schematic mode of production prevalent in Marxist theory periodized by Lefebvre. In this scheme, absolute space dominates the hunting and gathering mode of production. With Early Capitalism, abstract space (political-economic space) with a political dimension was created by designers and planners with government incentives (Boer, 2015). Changing production and consumption patterns depending on the developing technology, digitalization and globalization in the information age have created today's "consumer society". Cities and spaces designed as a result of this were designed to serve consumption due to the market conditions of capitalism (Yırtıcı, 2003). Space production has changed in direction with both the demands of the changing conditions of daily life and their demands on the production of space, especially after the post-industrial capitalist mode of production. The separation from the social space, which

has already begun to be designed not for the individual but for the consumption culture, has also accelerated with individualization and socialization of the individual through digital platforms. Due to the space that is not designed in harmony with the social life of the individual and is under the influence of changing market conditions, the interaction of the citizen with the social space gradually decreases. According to Michel de Certau, the city should be studied closely and without leaving its context. Analyzes made from cursory will stay away from social realities (Certeau, 1988; Erol, 2015). Just as the *"Body Without Organs"* behaves like a machine, so in the changing city, *the body is no longer has a place*. In the virtual space, which will be examined in detail in the next part of the thesis, the space is disembodied in this context. In postmodern image cities (city of signs), where body-space cannot be interacted, space is now constructed on visual perception (Soja, 1996). In the discussions on the mental production of space, the relationship between the existing physical space and visual perception after its transformation into image space, the mental production without the need for physical reality, and the relationship of this production with perception should be discussed in a different context.

The nature was considered as a machine by Descartes in the 17th century, and was regarded as the art of using and creating new machines in science (Sterler, 2019). Descartes' Cartesian Thought has been influential on the interpretations made in the modern era for understanding the space. According to the Cartesian understanding, space is accepted as a static object that can be designed with its lines, surfaces and coordinates. According to Lefebvre, space has been conceptualized with the abstraction of being since Aristotle (along with the concept of time). It acquires its objective reality by providing the precision of the senses of other objective realities. In other words, they are things that have been brought into existence only by logical reflection. These vague definitions of Aristotle and his tradition of thinking about space gain absoluteness with the Cartesian system of thought. According to Lefebvre, Descartes is seen as a decisive stage in the formation of the concept of space. Together with the Cartesian mind (mind-body dualism) (that is, with Descartes), space enters the field of the absolute (Lefebvre, 1991). The nature was considered as a machine by Descartes in the 17th century, and was regarded as the art of using and creating new machines in science (Sterler, 2019).

Within this context Heidegger, who conceptualizes the human as being in the world in his philosophy, criticizes the Descartes' Cartesian way of thinking and underlines

the difference between the space and spatiality. Space has the measurable dimensions of the orientation and its essence is constituted by the extensions of which in that space. In this regard, the space is defined as spatiality' experienced circumstance (Can, 2019). Phenomenological approaches, in which space is not materialized or idealized in the process of understanding space, can be opposed to forms of thought in which space and subject are kept separate. The phenomenological study of the space is accepted as an approach that tries to understand the experience of the subject, not as an abstract thought on its own, separate from the experience or existence as the subject of the space, where the user interacts with the space. According to Heidegger's phenomenology, the world in which people live (without being reduced to an external object) is created from their own experiences at the moment they live. Humans are self-interpreting beings, and these interpretations emerge in the context of everyday experiences. The interpretation is based on the person's past experiences and historicity. Understanding is a reciprocal act; The present can only be understood with the past, and the past with the present. Heidegger (2018) calls this reciprocal relationship the "hermeneutic circle".

All written, audio or visual tools that have emerged in the historical process have expanded the boundaries of the physical space we interact with, providing opportunities for new alternatives for communication and information flow. From the end of the 20th century to the present, in the information age, space has become a mixture of spatial and temporal processes in direct connection with changes in science, technology and culture. In the digital age, which information has become the subject of philosophy, the methods of information transitions provide many possibilities for the conceptualization of space and thus open new perspectives for architecture. No matter how fast the developing technology and its integration into daily life are, such a rapid transition has not been observed in the built environment in the last century.

Architecture is now handled through the experience of the body, beyond the understanding of geometric space and the body in it. Tschumi (1996) states that with digital façades, the space can both be defined and interact with the body. It can be said that the features of the place do not consist of a physical environment, but the sense of continuity and belonging with the place, the perception of space is transformed by people and places and an electronic network (Zafer, 2019).

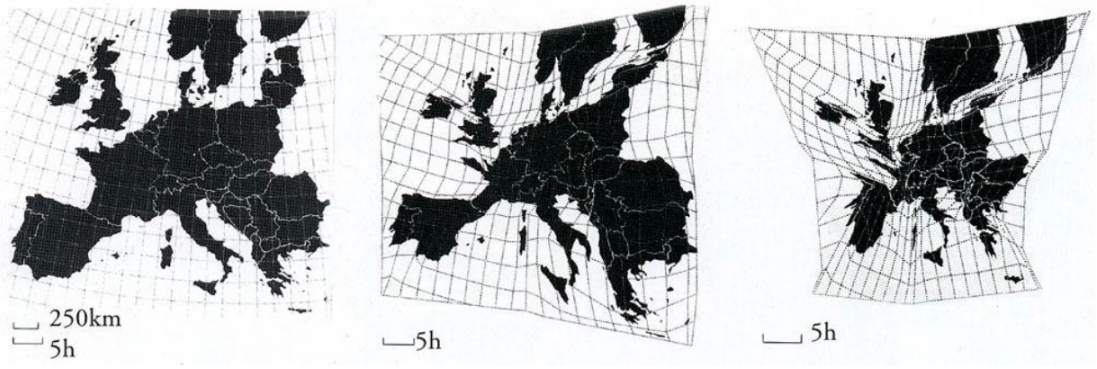


Figure 2.15 Real Distance Is Shortened by The Use of High-Speed Trains (Hill, 2014)

The developments primarily in mobility and in transportation, affect perceptions about the physical perception of the city. With Figure 2.15 produced by Joan Busquets in his book “Barcelona: The Urban Development of a Compact City” exemplifies this situation that redefines the distance on the European map, on the fact that real distances are shorter on account of the high-speed train (Hill, 2014). The traditional relationship between physical space and sociality, which was quite evident before electronic media, has changed with the Third Wave. Meyrowitz (1985) defines this as the transition to the era of "spaceless". In this age, the role of physical distance in new communication systems and human relations has been greatly reduced. The boundaries of social space have become uncertain with electronic communication tools such as telephone, computer and radio. This uncertainty will become even more uncertain with VR, AR and MR technologies in the future. Different physicality creates unlimited alternative virtuality within a common digital medium (Meyrowitz, 1985; Toprak, 2019).

Ilhan Tekeli mentioned in the foreword to Jan Gehl's (2020) book *Cities for Humans* that the modernist thought that brought the urban design into a dead end put the automobile at the center of urban design and the circulation of the pedestrian in the city was put in the background. In space design, too, due to capitalism's desire for more profit and the interest in the integration of technology with space, the individual's perception and experience of space carries the risk of bringing the space into a dead end.

Perspective understanding emerged with the Renaissance. The perspective founded by Filippo Brunelleschi was an advanced development for the technology of the period and enabled the building to be designed before it was built (Argan & Robb, 1946).

The invention of the train was the groundbreaking technological development of the era, and as a result, the mechanical clock emerged. According to Mumford (1934): *"The clock, moreover, is a piece of power-machinery whose 'product' is seconds and minutes"* (Postman, 2017). In *Technics and Civilization*, he refers how, starting from the fourteenth century, humans have undermined the authority of nature and created a mathematically measurable plane of seconds and minutes (Mumford, 1934).

In this age, it is argued that the goal of architects in the production of space is no longer just to place the digital installation of electronic devices, but rather to imagine and create the digital environments that are desired to be experienced (Mitchell, 1996). *What does it matter? Why should we care about this new kind of architectural and urban design issue?* Mitchell addresses his questions primarily from an economic and political perspective. He says that it is necessary to understand what is going on in order to ensure the continuity of the architects as the determining active subject on the character and content of the space, the city and even the society. If the transformation is understood, alternative futures can be envisioned and opportunities for designers to resist, organize, plan and design are created.

The thesis traces the transformation of space in the digital age, which has been in interaction and transition throughout history. In the thesis, Urry's reinterpretation of the consuming place within the scope of new generation potentials, transforming the space into a virtual space, allowing the user to experience and consume the concept of space without the need for a physical space, is associated with Urry's consumption. The space first appears in the mind of the designer, and although it is not a physical object at that point, the space shows a mental existence when it appears, designed and can be expressed in the mind (according to Lefebvre, mental space, the space of the philosophers and epistemologists). After being built, the space, which takes on physical reality from the mind of its designer, undergoes a secondary space definition and consumption as the space experienced by the person who experiences it, as well as its objective reality. In addition to the visual consumption of the place, what people find meaningful about the place is also part of the consumption in a different context.

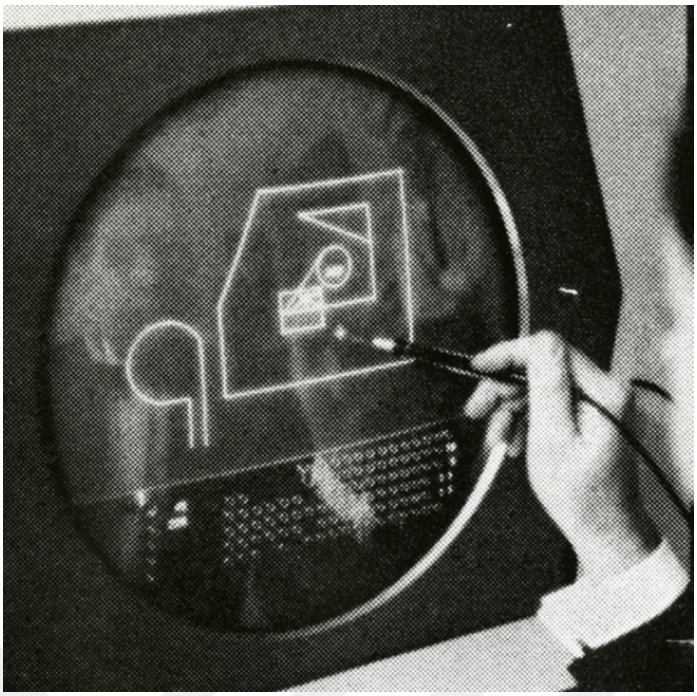


Figure 2.16 First computer graphical interface (Sutherland, 1962)

The use of digital tools in architectural design has led to the transfer of existing approaches and then to a means of thinking differently. Traditional methods have left their place to experimental and experiential architecture. Figure 2.16 shows The Sketchpad, the first computer graphical interface designed by MIT professor Ivan Sutherland in 1962 as part of his doctoral thesis. According to Sutherland, human-computer interaction, which is reduced to written communication, is accelerated through graphic drawings and a new field is opened. The effect of digital technologies on the experience of space has been realized with the physical integration of technology into the space. With this integration, the space, which started to become digital, has turned into a digital space with mobile technologies, touch systems, augmented reality, mixed reality systems, etc. that are included in our daily life. Humans have now become able to experience space even without physical space. In the past, the centralized body and the body's needs to the physical space have been broken with the exclusion of the body with information technologies, the decentralization of the physical space and the new space experience thanks to the widespread information networks formed by the interface and interaction technologies (Kut, 2013). The digitalization of the space, which started with the articulation of hardware and software technologies, has started to transform into a new digital space, where technology is no longer just an add-on but begins to define the space itself. In that point, spatial boundaries are blurring. The boundaries of social space have

become blur with electronic communication tools such as telephone, computer and radio. The boundaries are blurred as the physical medium is no longer needed to connect with the digital medium. This uncertainty will become even more uncertain with VR, AR and MR technologies in the future.

Developments in digital technologies have enabled the creation of virtual environments, and the concept of VR and AR has been put into practice. Virtual reality is defined as a communication component that takes place in an artificial environment produced by a computer and in which humans are included as a part of this system (H. Regenbrecht & D. Donath, 1997; Vatansever, 2019). According to P. Milgram and F. Kishino, Augmented Reality (AR) is often confused with Virtual Reality (VR), but it is possible to characterize AR as a type of VR. Both manipulate the experienced reality, but their relationship to the real environment is different. In AR, as in VR, the user views the environment through a device, but while VR offers a fully synthetic environment, AR provides the opportunity to experience the virtual in the real environment of the primary image. AR is a technology that enables the articulation of virtual elements such as pictures, models and sounds on the real world. It is thought of as the middle ground between the virtual environment and simultaneous presence (Milgram & Kishino, 1994). Augmented reality is defined as taking digital or computer-generated information and tactile sensation and superimposing them in real environment, regardless of picture, sound or video. Although visual sense comes to the fore on the basis of this technology, current developments can be used to increase all senses technically (Kipper & Rampolla, 2012). According to Azuma (1997), AR doesn't completely change reality. combines physical and virtual objects through interaction within the framework of reality.

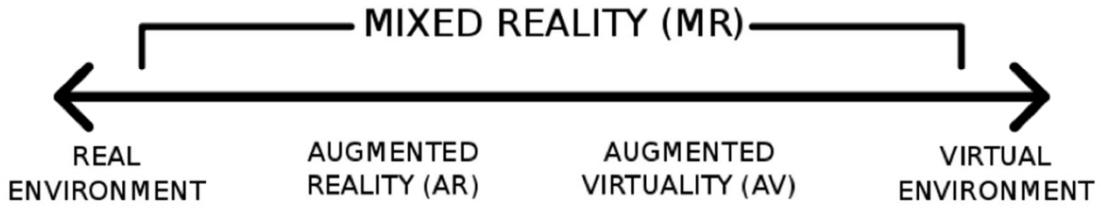


Figure 2.17 The continuum between reality and virtuality (Milgram et al., 1995)

Milgram and Kishino (1994) approach the concept of AR from a different angle and examine AR within the virtuality-reality continuum. On the far left, the environment with only real objects is defined, while on the far right, the world with only virtual objects is defined as mixed reality. In this framework, while virtuality increases in the transition from left to right, reality increases in the opposite case. AR is located at the intersection of virtual and reality in this continuum (Figure 2.17).

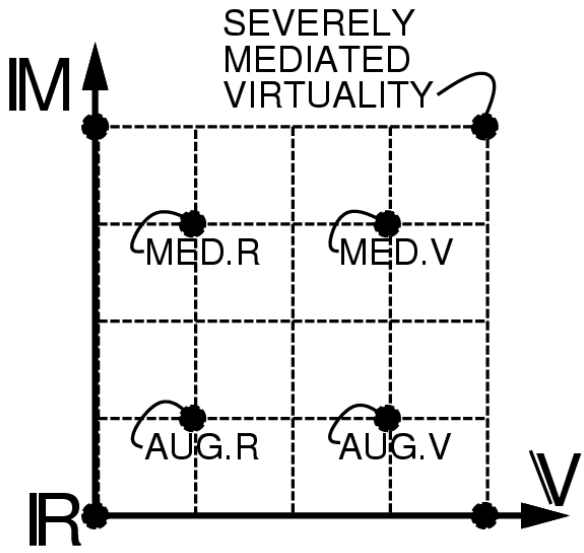


Figure 2.18 Taxonomy of reality, virtuality, mediality (Mann, 2002)

The figure 2.18 was created by Steve Mann (2002) for the classification of reality and virtuality. R point as an origin, denotes reality. V axis shows Augmented Reality (augmented with graphics) and Augmented Virtuality (augmented by reality) continuum. Modification of reality or virtuality, or any combination of these, is also included in the taxonomy. While the design continues in the physical environment, the architects have created an unlimited design space for themselves with the developing digital technologies. Benedikt (1992) describes this space as a niche space between the virtual and physical worlds. According to Schmitt (2001), architecture in 2010 will inevitably be divided into three: physical, virtual and hybrid. Architecture has become more dynamic with spaces formed by the combination of technology and mental space (Augmented Space, Virtual Space, Hybrid Space). Although the structure of the physical space still does not fully allow for the types of spaces discussed, it is predicted that the defined space situations, in which technologies have digitized the physical environment by integrating it, have been able to fully break away from the physical reality with invisible

technologies, and a transition to a new space state without a definite shape and material will take place in the future. In this way, the spaces of the future will be able to meet the mental needs of the user as well as the physical needs.

Ubiquitous computing network are an important element in the emergence of augmented space. Manovich (2002) named this new type of environment as **Augmented Space** and briefly defined it as covering the physical space with variable dynamic information. Manovich was giving the news of the return to physical space and body with the concept of Augmented Space to the discussions of virtual-reality dilemma, disembodiment, and separation from physical space (Manovich, 2002b; Kut, 2013). Revealing the phenomenon of new space surrounded by electronics and visual transmission of information, Manovich emphasizes the necessity of considering the design of this new digitalized space as a fundamental architectural problem. As Manovich (2002) states, at this point where technology comes in its relationship with space, is space reduced to a physical support surrounded by digital technologies? Or are we facing a new spatiality where knowledge and experience become fluid in physicality by transforming the static structure? Augmented space, which acts as a bridge between physical and digital space, allows for new spatial interaction and experience.

As emphasized by Zellner (1999) in *Hybrid Space* "Architecture is recasting itself, becoming in part an experimental investigation of topological geometries, partly a computational orchestration of robotic material production and partly a generative, kinematic sculpting of space". Replacing from technological structures to computational, digital architectures of topological, non-Euclidean geometric space, kinetic and dynamic systems have been observed. In the **hybrid space** understanding, instead of producing architecture with the traditional way of thinking, it is necessary to bring physical and abstract flexibility to architecture with all kinds of media and disciplines.

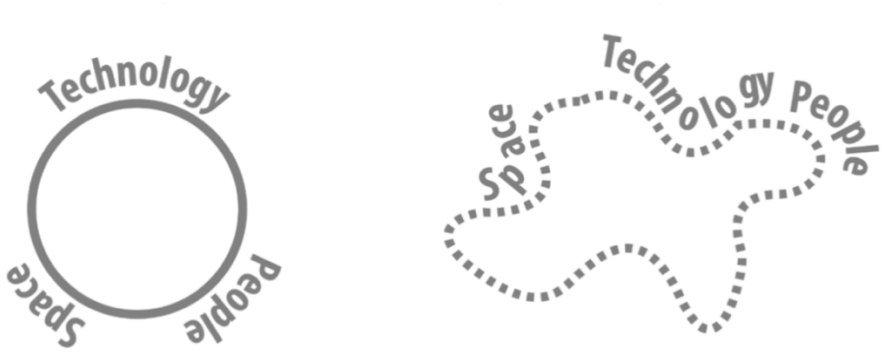


Figure 2.19 From closed and complete structure to open and incomplete Hybrid structure (Wang, 2019)

Hybrid spaces are defined by Adriana de Souza e Silva as mobile spaces that are constantly connected to other users and environments by the Internet and portable devices, and formed by their mobility. Silva underlines that hybrid space is conceptually different from mixed reality, augmented reality, augmented virtually or virtual reality (Silva, 2006). According to Toprak (2019), without the traditional distinction between physical and digital spaces, when there is no longer a need to go outside the physical space to connect with digital environments, a hybrid space is formed, the boundaries between digital and physical spaces are blurred (Figure 2.19). Especially portable devices, interfaces have allowed us to experience virtual space in actual space. Physical and virtual space is no longer without dialogue due to the structures of mobile devices that make it possible to use the internet anytime, anywhere. Always being online blurs the distinction between actual and virtual space. The hybrid space is constituted by a portable device connected to the Internet, by the user who is constantly moving outside.

New forms of occasions and possibilities to know and to interact with the physical and digital space is offered by many interfaces, from an application on an individual smartphone to interactive digital screens installed in the physical environment. As cited Wang (2019), "Compared to the environment's physical characters which are mostly static, these digital features are immersed and embodied within diverse to afford and to enable people's digital placemaking temporarily or permanently". People can capable of, due to A variety of uses of these digital properties and computing technology, interacting with space at different "proxemic scales" rather than only at a single static situation as the physical space does. In Figure 2.20, a conceptual scheme is drawn with summary interaction graphics of augmented space, virtual space and hybrid space within the scope of the subject.

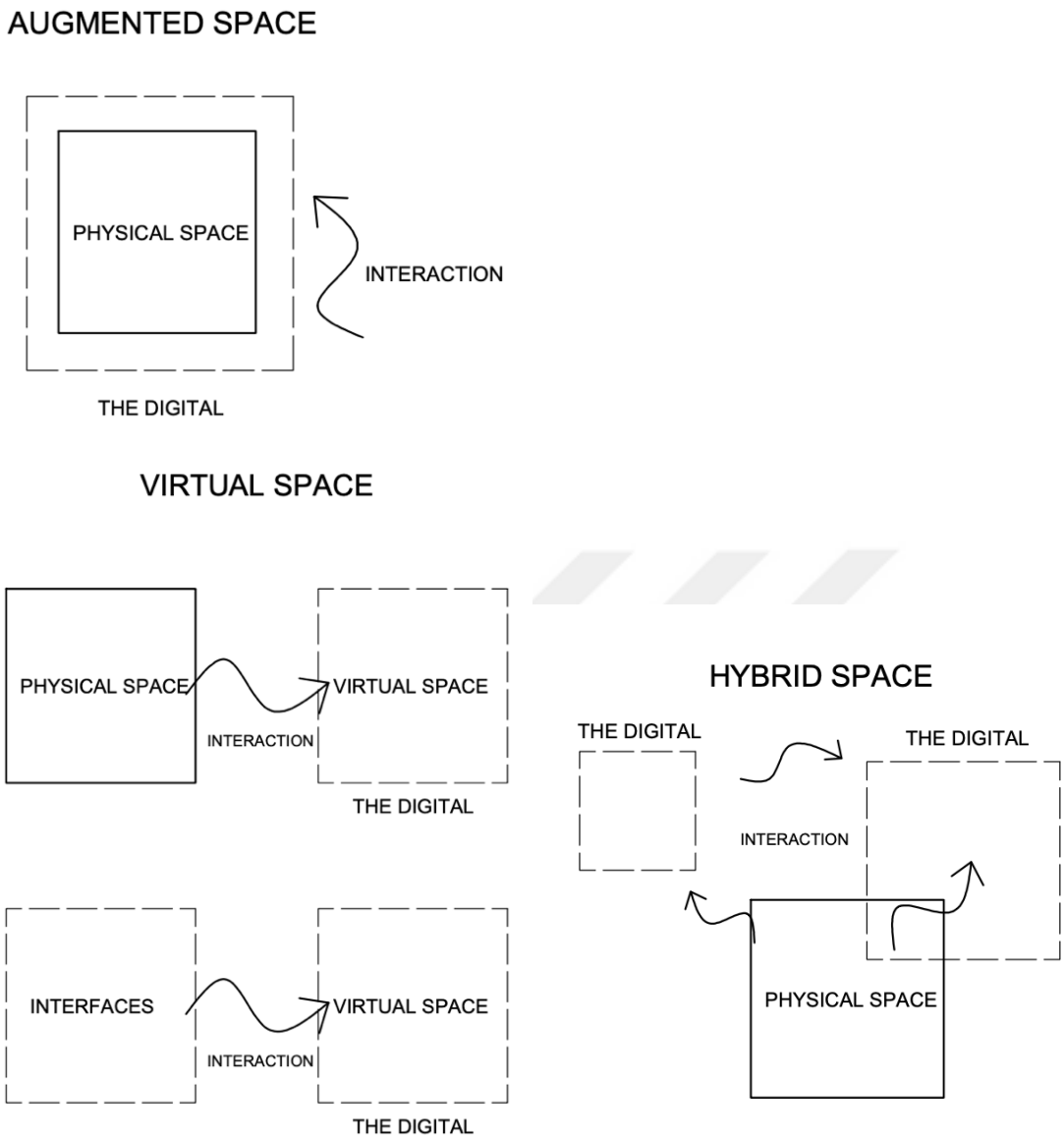


Figure 2.20 Interaction graphics of augmented space, virtual space and hybrid space

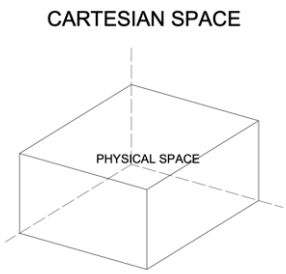
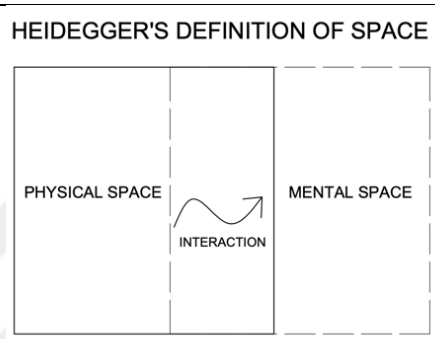
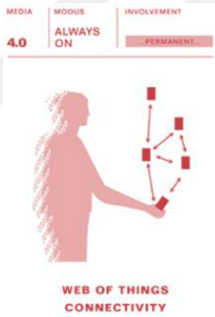
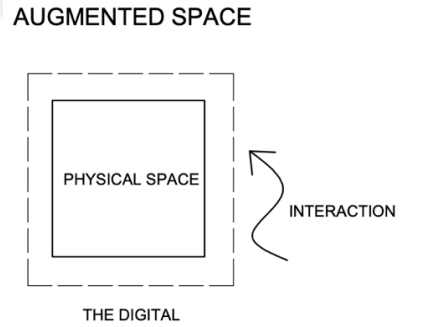
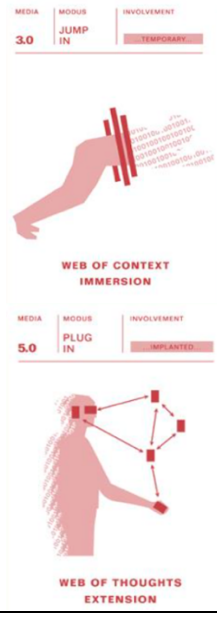
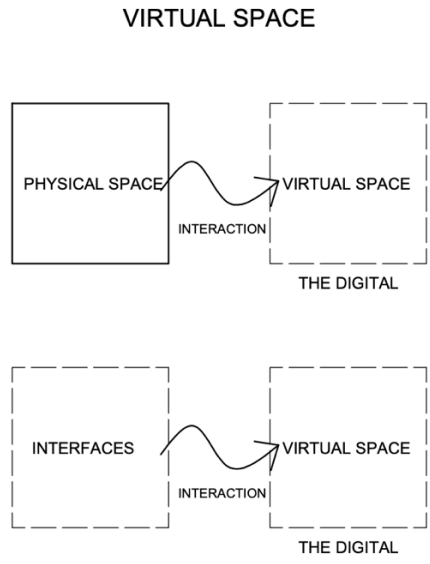
The expanding internet world and the ever-increasing intensity of online activities is having a significant impact on our social and cultural environment, hence affecting the built environment and potentially altering lifestyle. Since architecture is concerned with the condition of the built environment, the current state and development of virtual architecture is certainly not to be ignored by anyone who is concerned with the quality of the physical built environment.

2.3 Chapter Review

To understand digital transformation, first of all, what is digitalization, what is meant by digital technologies and the digital age, the literature reviewed to understand them. In addition to the literature review, content analysis of movies, which is frequently preferred as a method in academic studies, used in this section. The effects of digital technologies in daily life were examined and, most likely, technologies that progressed faster than the thesis writing process were added to the new technologies that were not included in the thesis. On the ground created by digital technologies in the perception and definition of space, examples of virtual space, augmented space and hybrid space transformation are examined. Augmented spaces, created with digital technologies integrated into the physical space; virtual spaces that do not need physical space created entirely in virtual interfaces; and hybrid spaces, which created through portable wireless technologies have been included in the architectural literature. The spaces of the future will consist of interconnected intelligent components that are aware of human existence, can communicate, evaluate and act. The role of the hybrid designer must evolve into the design context of space and interaction so that meaningful spaces can be created those support systems of interconnected smart devices. Space transformation foreseen as can be like an extension of virtuality needed in physical space, like the Upload room in The Upload series; it can also be in the form of spaces detached from physicality, completely surrounded by technologies.

In this part of the thesis, firstly space and digitalization are discussed separately. Then, the effect of digital technologies on the space was brought to the virtual space on the common ground. With Descartes, space, which is the object of existence, has begun to be considered as a defined entity. Subsequently, within the scope of the thesis, Heidegger's spatialization of the definition of space by associating it with experience forms the basis of the idea of virtual space, a conceptual framework was drawn (Table 2.2).

Table 2.2 Chapter framework has been reproduced in association with the work of Müller (2010).

Descartes	Cartesian Space		
Heidegger	Space as A Field Of Experience		
Manovich	Augmented Space		
Mitchell	Virtual Space		

As Manovich (2002) states, at this point where technology comes in its relationship with space, is space reduced to physical support surrounded by digital technologies? Or are we facing a new spatiality where knowledge and experience become fluid in physicality by transforming the static structure? We are now entering the new generation of dynamic architecture that offers context, cognitive and social environments rather than the physical environment.

Chapter 3

Transition of Bank Space

The transformation of banking will be examined to understand the transformation in bank architecture. People used different instruments of exchange to meet their needs, and they needed different methods over time while this exchange was taking place. Banking in the digital age, which is examined within the scope of the thesis, is the result of all these stages of money and finance. The direct impact of this historical process on society and space is clearly due to the obvious link of the economy with human nature. While every development and transformation in technology may not have a social and spatial counterpart; the transformation, crisis and improvements experienced in the economy are observed in human behavior and the design of space.

3.1. Understanding the Concept of Banking

In this chapter, it is tried to understand the starting point of banking, why the banking system is needed, how it needs space and what kind of transformations it has experienced afterwards. First of all, the concept of money and its transformation will be explained. After that, for this purpose, money will be linked to the functions and concepts of the bank. The chapter will be concluded by mentioning the concept of the bank (being a social and cultural experience place) that has changed with digitalization. After this section, which is mostly based on concepts and functions, the next section will move on to the analysis of the bank space.

Banking begins with the discovery that a written promise to pay can take the place of cash payment, or, in other words, banking originates in the need for credit. The banker is a four-tenth century creation, and a Mediterranean creation, although even then banking was not an exclusive occupation but a concomitant of trading (Pevsner, 1970). Hence, in the order of this paper, we begin in the theoretical part by exposing the evolution of banking businesses and banking models as well as presenting the effects of technological change on the functioning of the bank.

"This remarkably modern view of the social function of money has not been sufficiently appreciated. Rodbertus realized that the transition from a "natural economy" to a "Money economy" was not simply a technical matter, which resulted from a substitution of Money purchase for barter. He insisted instead that a monetarized economy involved a social structure entirely different from that which went with an economy in kind. It was this change in the social structure accompanying the use of money rather than the technical fact of its use that ought to be emphasized, he thought. Had this point been expanded to include the varying social structures accompanying trading activity in the ancient world the controversy might have been resolved before it began"

Trade and Markel in the Early Empires – Harry Pearson

In the foreword of the book of McLuhan (1962)'s *Gutenberg Galaxy*, Harry Pearson states that the view of the change in the social structure put forward by Rodbertus in the quotation written by Harry Pearson about Karl Rodbertus was not sufficiently understood in his period. In this respect, it is important to understand the transformation in the function of money and banking, which will be examined in this section within the scope of the thesis. As Chown (1994) emphasized in his book *The History of Money*, "No one can really understand the history of this century, or hope to prescribe for the problems of the next, without some understanding of how money and its management can affect, and affect profoundly, broader, economic, political and social affairs", money and its management must be understood in order to understand the present and make the right decisions for the future (Chown, 1994). How did money as a substitute for barter turn into numbers on computer screens to create another economic culture? What has banking turned into? In this part of the thesis, first of all, the concepts of money, labor and banking will be examined in order to understand the transformation. The transformations of the concepts and the impact of these transformations on culture will be examined by scanning domestic and foreign sources in the literature. First of all, its relationship with money and society will be examined, then the transformation of banking will be briefly mentioned.

The history of consumption begins from the moment that man enters the stage of history. Although it took a long time for people to start production, the consumption function is based on the same process as the history of humanity. Eğilmez (2018) states that people can live for tens of thousands of years without producing and saving, but they cannot continue to live without consuming. Money, finance, labor etc. The history of economics, which covers all these terms and many other terms that are newly included in our lives with technology, begins with consumption.

Money, which is the *medium of exchange* in its most comprehensive definition, serves as a reference point for all economic activities, regardless of the form. It is highly related to the social parameters in which competition, production and consumption are effective. Money, which is the main object of the payment system, differs from other assets with its three essential functions. First, the exchange of commodities and services is provided by money. The second basic function of money is that it functions as a single unit of evaluation for measuring and comparing the value of goods and services. Finally, the symbolic function of money serves as a store of value for future usage (Yazılıkaya, 2021).

Before people settled down, no payment system or any structure pointing to exchange. With the transition to settled life, a system based on the exchange between them was developed by producing surplus goods. Eğilmez (2018) explains this situation with Karl Marx's concept of surplus-value. With the hunting of big game animals, the problem of finding food for the day disappeared, people started to spare time for other things, that is, to produce surplus value in surplus time. In the Neolithic period, people who started to produce from a completely consuming lifestyle began to exchange with what they produced. As the exchange gradually becomes commercial, people and organizations that act like banks emerge (Yazılıkaya, 2021). Only one society, the Peruvian Incas, seems to have developed an organized civilization without the invention of money (Chown, 1994).

Settled life -> Exchange -> Production of surplus value -> Free labor (Land/Pre-Capitalism) -> Wage labor (Capitalism) -> Immaterial labor (Digital labor)

In the background of all the big events in history, a financial secret is hidden. The cuneiform script was used for the first time in the Sumerians in 3000 BC to record the goods stored in the temples and withdrawn from there (Eğilmez, 2018). In Figure 3.1, it is stated in a tablet in Mesopotamia in 1650 BC that Amil-Mirra would pay 330 scales of barley to the owner of the tablet at the time of harvest there (Ferguson, 2020). The credit information passed on the tablet indicates the need for concretization in the exchange system. Subsequently, with digitalization, the data on the computer screens is sufficient for the transactions realized in the monetary system.

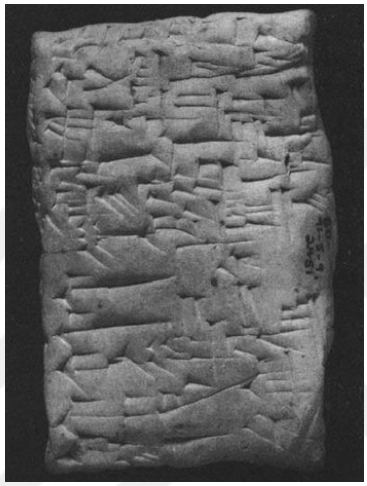


Figure 3.1 1650 BC Clay tablets in Mesopotamia *First "promise to pay"*

The wealth of bankers such as Medici contributed greatly to the developments in art and architecture in the Renaissance (Ferguson, 2020). The emergence of capitalism and modernity is the intersection of two processes that started in the 16th century and showed their main effects in the 18th century, both historically and geographically apart from being reduced to this connection alone (Yırtıcı, 2003).

Economic theory is possible only with a correct monetary theory (Keynes, 1936). As soon as people adopted the money of account (the primary concept of monetary theory is the money account in which debts, prices, and general purchasing power are expressed), the era of barter was followed by the era of money. According to Keynes, money itself derives its character from its relation to accounting money. Because debts and prices are primarily expressed in terms of account money. The acceptance of an agreed-upon metal value criterion is interpreted as a sign of the transition from a natural economy to a money economy (Eğilmez, 2018). The history of coinage begins in about 800 BC when the first

coins were struck from electrum, a naturally occurring alloy of silver and gold, bearing the sign of a half lion as a guarantee of their weight (Chown, 1994).

One condition of account money is permanence. Even if the name changes, there is no change in the corresponding currency (Keynes, 1936). Keynes (1936) defines money in three ways in his *A Treatise on Money*: commodity money, fiat money, managed money. In order to explain the point that the thesis wants to reach, commodity money and fiat money will be discussed. Commodity money consists of actual units of a good, due to its scarcity and cost of production, like other goods, or warehouse receipts, which can correspond to actual units of the good. Fiat money is representative, symbolic money, usually paper, created and circulated by the state. Fiat money was invented in China (Chown, 1994). Representative money begins when money breaks with its objective standard. The evolution of bank money into banknote shape shows the way to representative money. With digitalization, the break from this objective standard of money continues. The origin of money is usually associated with the minting of the first coin in Lydia. Even in the 18th century, Commodity money still dominated, but the use of banknotes is interpreted as a sign of the transition to fiat money. With the French Revolution, the French and British currencies turned into fiat money. The modern bank is an institution that is easier and more advantageous to transact with bank money than with cash, and that has come into existence with the establishment of these habits (Keynes, 1936). According to Keynes, in the evolution of the bank, there are functions such as dealing with precious metals or money transfer, debt settlement, providing cash services and investing in the reputation of the bank. Although banking activities began with the storage of valued metals and jewels in temples (the first known example, *the Red Temple*) and continued in temples in the Greek city-states, modern banking was established by the Medici in the 1300s. The first modern bank 'Amsterdam Bank' was established in 1609 (Koltukoğlu, 2016). In 1694, the Bank of England was established, the purpose of which was to provide financial support to the government (Harvey, 2017).

3.2 History of Bank Architecture

> *"The emergence of such specialized commercial office spaces was a key feature in the development of the modern metropolis. Thus, my analysis draws particular attention to the ways in which banks and their architects sought to express new corporate identities in architecture, articulating new surface forms and iconographical details, together with new relationships between public and private space."* – Black, I.S., 2000

In this chapter, the transformations in bank architecture over time are examined, up to the digitalization of bank branches. Until consumption-based human societies developed the monetary system, they needed places to exchange and maintain their existence. The first places where banking-like transactions were made by the clergy were the temples (the red temple). The understanding of banking in today's sense started with the establishment of the Bank of Venice in 1157. Then, in 1400, The bank of Genovo is exemplified in the historical process. According to Summerson (1977), in 1694 The Bank of England was "arguably the first purpose-built bank in the World" (Black, 2000). In the mid-seventeenth private bankers in London had their origins in goldsmiths operating on a street. At the beginning of the eighteenth century, increasing numbers of goldsmiths were making the transition to banking. This transition has caused *banks* to be synonymous with the term *shop* in historical continuity. Bank samples designed by important architects of the period between the 1800 years were examined from the sources found. In the article written by Thomas M. Shelby (the year is unknown, it is estimated to be 2001 when the references are examined), Benjamin Latrobe and how he shaped the American Banking Architecture is explained. For this, Latrobe's three bank designs were examined. Latrobe was influenced by 18th-century neo-classicism in bank designs, especially the work of Architect John Soane (architect of the Bank of England). The traces of this in the bank designs from the temples continue to be seen in these years. There are ionic porticos at both ends of the rectangular plan. No windows were used on the entrance façade to give a sense of security.

The Italian style was used in bank designs in the 1840s. In banking architecture, Gothic and Tudor design styles were also preferred by the architects. In the 1860s, reform of banking architecture started in London as the center of banking. The confusion in architectural style in the 1900s was also the first sign of environmental concern. In the 1920s, the gradual evolution of standard banking was designed due to aesthetic concerns.

Lloyd (1984) mentioned that Sir Nikolaus Pevsner pointed to the 14th and 15th centuries as the great eras of the Italian merchant bankers; this helps to explain the popularity of the Italian style for the premises of their 19th century British successors. Gilbert Scott, on the other hand, had argued for the use of Gothic on grounds of the profession's medievalism. North Americans have taken the view that Greek temples were the earliest buildings associated with banking, the opisthodomos having been used as a repository for state money. This accounts for the neo-Greek tradition long popular with American bankers (Lloyd, 1984).

The earliest bankers in Britain were private partnerships of the 18th century, often combining banking with some other trade or business, but later acquiring distinct recognition and a code of professional practice. From 1826 in England, but earlier in Scotland, these were later to take over the private banks and establish branch networks, adding a new dimension to the techniques and traditions of banking (Lloyd, 1984). As Lloyd points out in the study, no systematic analysis of the design of British banks had been made until then. In those years, the term "shops" was used for banking buildings and meant "banking-hall, banking-house". Virtually every bank built before 1826 was also a dwelling, usually for a partner and family, perhaps for a manager, but sometimes also for clerks. The bank itself was usually no more than the ground floor (Fig.3.2). The first purpose-built bank in Great Britain was erected by the Bank of England in 1694. In 1724, after the financial "bubble" burst, it was decided to build safer bank buildings. In Figure 3.2, a distinction is made as *dwelling-house* (upper floors) and *place of business* (ground floor) and one of the examples where the difference between spaces has begun to be emphasized by using a different style on the ground floor façade (Black, 2000). The building is Sir Charles Asgill's private banking-house at 1804 Lombard Street. The example of the use of space to differentiate the façade is clearly seen in this building.

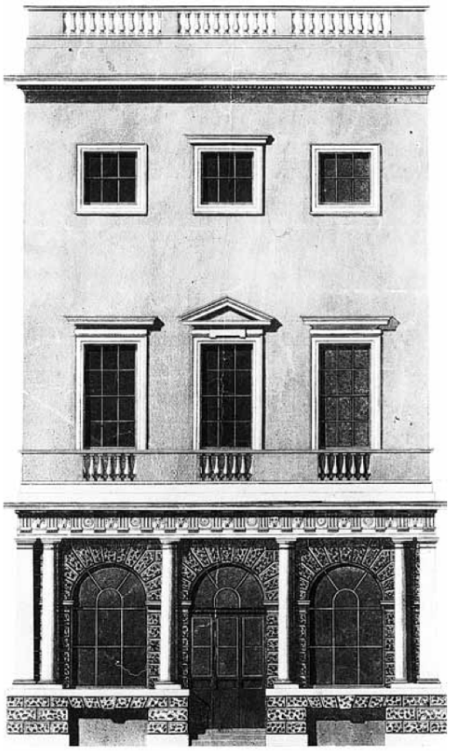


Figure 3.2 Sir Charles Asgill's private banking-house in Lombard Street in 1804

In Renaissance architecture, where Plato's understanding of the universe is effective in the design of structures using pure geometric forms such as squares, circles, triangles and so on. It is possible to see this effect of the antiquity on architecture in many works of the period. The building, which uses geometric forms such as circles, squares, spheres and cubes, has a central plan and a small dome. The facades of the structure, where all the spaces form a certain ratio with each other, are symmetrical. The structure has four separate entrances.

Figure 3.3 Left side: Church Interior; Right side: Bank of England Interior, designed by J. Soane

Figure 3.3 above shows the interior of the church and bank designed by John Soane in the same period. The lack of differences between the interiors in which similar styles are used, except for the changes in the organization of the space depending on the use, is observed that the symbolic language of bank architecture created by John Soane in England of the period is likened to a church to symbolize trust and greatness (Figure 3.4) (Soane, 1820).

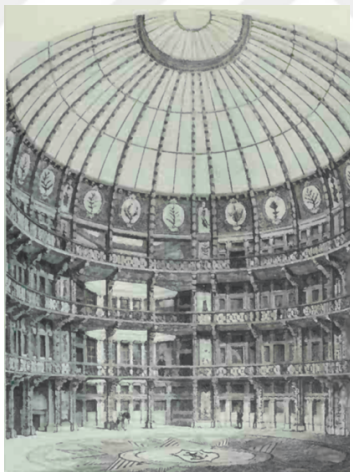
Figure 3.4 Bank of England drawings by John Soane

The first ever national bank established by the Ottoman administration in joint partnership with British, was the Ottoman Bank in 1856. Bank building in Istanbul was designed by Alexandre Vallaury in 1890 having two different façade the first Ottoman organizations, while the main façade looking towards the street was in neoclassical style (Figure 3.5). The historical structure designed for the use of Ottoman Bank is located in Galata; one of the old districts of Istanbul. The building is an impressive structure standing on an important commercial street of the 19th century today named as *Bankalar Caddesi.* The street name can be translated as "Banks Street" which may reference its commercial identity (Sayar et al., 2015). The building today serves as the SALT institution branch in Galata (Figure 3.6).

Figure 3.5 Ottoman Bank Façade (*Ottoman Bank*, 2022)

Figure 3.6 The building today serves as SALT institution branch in Galata (*Ottoman Bank*, 2022)

Valencia, Silk Exchange, 1483, Pevsner, N., 1979



Coal exchange, 1846-49, by J. B. Bunning

Leeds, Corn Exchange, 1861-63, by Cuthbert Brodrick; Pevsner, N., 1979

Figure 3.7 Exchange Space Examples

During this period, merchants and bankers needed indoor spaces not only for the exchange of money, but also for many exchanges. In Figure 3.7 above, a ground floor visual with silk exchange in Valencia in 1483, Coal exchange in 1846 and Leeds, Corn Exchange in 1861 is respectively exemplified. Exchange areas, similar to bazaars, needed high ceilings and large areas.

In the modern period bank architecture, lightening and openness in materials, together with the social democratization process, simpler, user-oriented, trust-based spaces were designed. It is referred to as Trust act- openness bank examples in the literature (Figure 3.8). The most important model of these is The Manufacturers Trust Company Building. The building is a commercial building in Midtown Manhattan, New York City, located on the southwest corner of West 43rd Street and Fifth Avenue. It was the first bank building in the United States to be built in the International Style, and it opened in 1954. The building was designed by Skidmore, Owings & Merrill (SOMCharles)'s Evans Hughes III and Gordon Bunshaft, as well as Roy O. Allen and project manager Patricia W. Swan.

The Manufacturers Trust Company Building

Current Usage

(*Manufacturers Hanover Trust- 510 Fifth Avenue*, 2021)

(*Manufacturers Trust Company Building- Data, Photos and Plans*, 2018)

Figure 3.8 The Manufacturers Trust Company Building and Current Usage

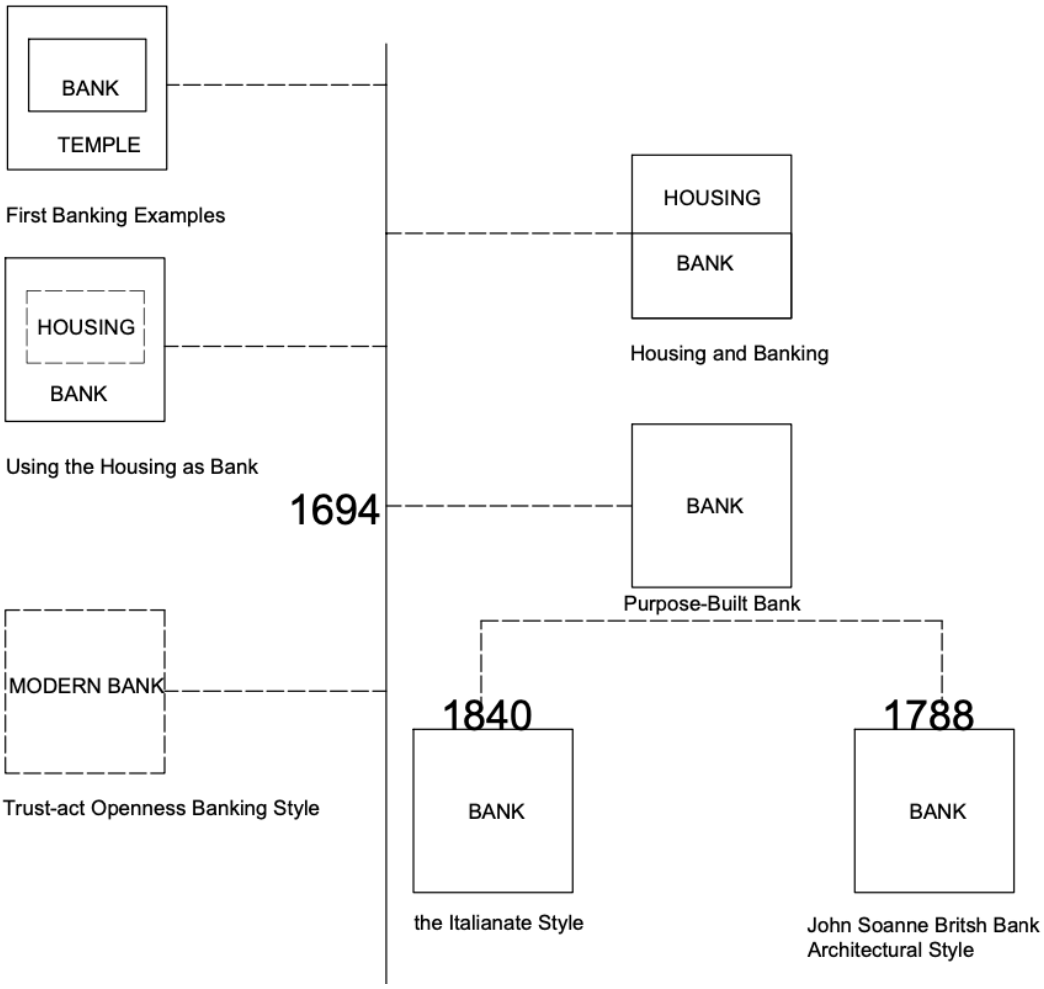


Figure 3.9 Space Utilization Chart from The Temple to The Purpose-Built Bank Building

At the juncture where the modern era banking has come, with the digitization of money and the acceleration of transactions, the bank branch is no longer just a place for money exchange. Banks started to change the spatial content (Figure 3.9) of the branches and started to produce new communication-oriented spatial alternatives instead of the traditional banking experience. In the images below, examples are given of the walking band that Deutsche Bank placed at the branch entrance (Figure 3.10), and the bank branches that ING bank and Capital One converted into a coffee shop (Figure 3.11).

Figure 3.10 Deutsche Bank virtual tour, (*360º Q Gallery Tour*, n.d.)

Figure 3.11 Examples of branches with coffee shop (*Here's How Capital One Combines Coffee with Banking to Cater to Millennials*, 2020)

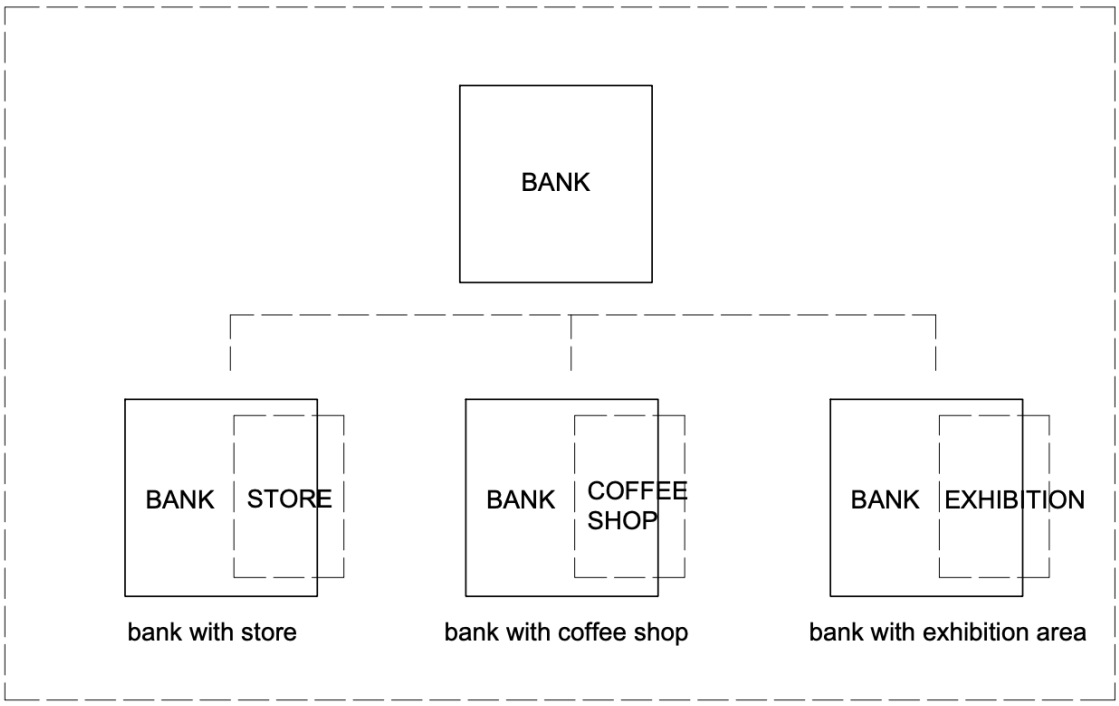


Figure 3.12 Functionally hybrid branch

As an example of multi-functional adaptation of branches, in addition to the banks that allocate spaces for exhibitions and store in their branches, there are also examples of branches that have turned their branches into innovation centers with the integration of digital technologies into the branch interior design. Although this new design concepts of branches are not digitally hybrid, it is functionally hybrid space feature in terms of usage (Figure 3.12).

3.3. Chapter Review

In this part of the thesis, how money affects the bank and social processes and what answers are given in architecture to meet the needs of the affected banking transactions and societies are examined. The analysis differs from other studies in that it consists of reviewing the literature on new banking technology and synthesizing these studies in the context of the economics literature. Until consumption-based human societies developed the monetary system, they needed places to exchange and maintain their existence. This need (banking function in simple terms), which was first met by the clergy in the temples (red temple), evolved in the following periods to a large exchange-hall and safer bankers to use their own houses as banks. The upper store of the houses

was used as a bank and then the whole house was converted into a bank shows that a special place was needed for the banking process. In the first bank designs based on security, there were no windows on the ground floor, and interior design was made to prevent the customer from staying for a long time in the places where transactions were made and furniture was not used. Although the architectural style of the banks, whose basic principle is the security of the money stored in them, changed, the basic design principle did not change. With the technological developments, the security and control of money and financial transactions can be ensured, and spaces with more façade spacing have been started to be designed. In this process, the experience started to gain importance in addition to the transactions carried out at the bank premises.

Chapter 4

Digital Transition of Bank Space

In this chapter, the digitalization and banking intersection is analyzed. The effects of the banking system, which has changed with the money traded in the electronic environment, on the bank branch are the subject of this section. Observation is used as a method throughout the chapter, the morphological analysis method is used to examine spatial transformations in the digitalization of bank architecture. At the end of the chapter, with three-dimensional graphics, user interaction, actual-virtual space and banking space boundary are compared for each technology. The section is completed by revealing the effect of the flexibility of the space boundaries of the new generation digital bank branches on user interaction.

4.1 Digital Transition of Banking System

The chapter starts by exploring the relationship between banks and digitalization, based on existing literature. Finance is one of the sectors most affected by the digital age. Digital transformation is more than just a technological shift, it is additionally has had an impact on the business model, user encounter and working process (Henriette et al., 2015). Even if the work done by banks has not changed basically since the 1950s, the way of doing business under the influence of digital technologies has changed (Cortada, 2007). As the basic transactions are changing, banks have added more supportive and user-friendly transactions to their customers as requirements of the Digital Age (MacKian, 2014). With the addition of new visions and digital transformation, the need for easy accessibility to banks increases. In order to achieve this, within the scope of this digitalization affected way of doing business, banks execute their transactions online through applications. Such as EFT (electronic funds transfer), SWIFT (society for worldwide internet financial telecommunication), and VoIP (voice over internet protocol) also play an important role in shaping banking transactions. Some of these transaction

changes have reduced the customer loyalty to the physical environment, some have transformed the relationship with the bank and new physical spaces are needed.

Academic and sectoral studies show that the banking system has been digitalized to a great extent (Jatic et al., 2017). For instance, in 1997, one of the U.S. Federal Reserve economists highlighted that banking had evolved into the most IT-dense sector in U.S. (Cortada, 2007). This evolution was seen not only in the U.S. but also in each developed country around the world at the same time. However, while the transformation has started, many banks are still in the early stages of this transformation (Felländer et al., 2018). In 2015, Capgemini Financial Services Analysis conducted a survey regarding with modernization of the banking sector. As reported by the results of the survey, almost half of the participants who work in financial services, strongly agreed with the importance of the digitalization and future transformation of the banking sector (Kumar et al., 2015) . According to Feher & Varga (2017), the main motivation of the digitalization of banking is "faster and cheaper" client service. Another motivation of the transformation is that digital technologies modernize and systematize way of doing business (Jones, 2018).

With the development of the internet, digital computer systems, block-chain (a system in which digital records of goods or money are digitally recorded and the transaction trace can be tracked) technologies, the definitions, usage methods and forms of money and banking transactions are changing. Until today, computer technologies are already used in the financial sector in the processing of transaction information, remittance, online payments, etc. used to perform transactions. However, Bank for International, in its "Digital Currencies" article published in 2015, emphasizes that a decentralized (Distributed Ledger System DLS) payment mechanism in digital currency is an innovation that can have implications in various aspects in financial markets and wider operations of the economy. **With the development of digital technology, the *medium of exchange* has changed.**

The definition was given by Cambridge Dictionary (2021);

Digital Currency (digital money, electronic money): *"a form of digital cash-bought from a particular company in order to pay for goods and services on the internet."*

Cryptocurrency: *"a digital currency produced by a public network, rather than any government, that uses cryptography to make sure payments are sent and received safely."*

digital currency and cryptocurrency which is a sub-type of digital currency and the digital asset is the new way of exchange. The subgroup has identified three key aspects relating to the development of digital currencies. The first is the assets (such as bitcoin) featured in many digital currency schemes. These assets typically have some monetary characteristics (such as being used as a means of payment), but are not typically issued in or connected to a sovereign currency, are not a liability of any entity and are not backed by any authority. Furthermore, they have zero intrinsic value and, as a result, they derive value only from the belief that they might be exchanged for other goods or services, or a certain amount of sovereign currency, at a later point in time. The second key aspect is the way in which these digital currencies are transferred, typically via a built-in distributed ledger. This aspect can be viewed as the genuinely innovative element within digital currency schemes. The third aspect is the variety of third-party institutions, almost exclusively non-banks, which have been active in developing and operating digital currency and distributed ledger mechanisms (Claeys & Demertzis, 2021).

Cryptocurrency refers to a type of *digital asset* that uses distributed ledger (Figure 4.1.), or blockchain, technology to enable a secure transaction. The structure of a blockchain is shared, or distributed, rather than centralized, hence why it's also known as distributed ledger technology. Although the technology is widely misunderstood, many central banks are considering launching their own national cryptocurrency (Härdle et al., 2020). According to Harvey and others, the rising of cryptocurrencies poses an existential threat to many traditional functions in finance. Cryptocurrencies embrace a peer-to-peer mechanism and effectively eliminate the "middle man," which could be a financial institution. For example, no bank account or credit card is needed to transact in the world of cryptocurrencies. With a smartphone and the Internet, the potential exists for a revolution in financial inclusion given that over two million people are unbanked (Härdle et al., 2020).

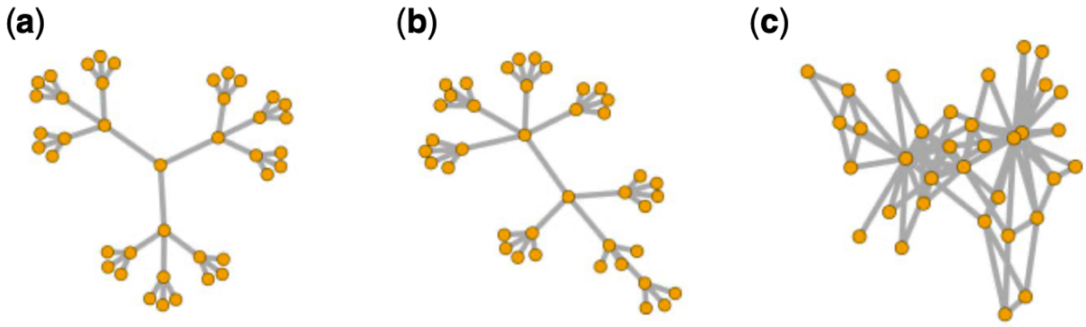


Figure 4.1 Types of networks. (a) Centralized, (b) Decentralized, (c) Distributed (Rahmadika et al., 2018)

The connection graphics in Figure 4.1 are similar to Web 1.0, Web 2.0, which we currently use, and Web 3.0 connection graphics, which have begun to be experienced with crypto money with the peer-to-peer payment method. Figure 4.2. shows the taxonomy of money which based on central bank cryptocurrencies (Bech & Garratt, 2017).

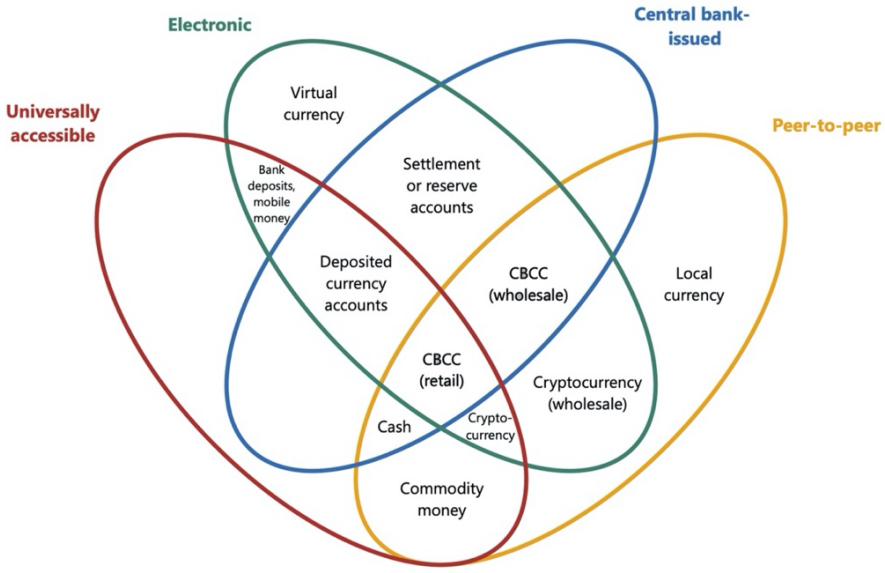


Figure 4.1 The money flower: money's taxonomy

As a result of all these transformations, although the digital currency leaves a permanent impact on the financial system, instead of turning it upside down, it leads to brand new ways of thinking about the payment system and money. An example of Toffler's democratization in the Third Wave is digital currencies. *"And because it*

functions directly between one wallet holder and another, there are no banks that slow down the transaction process. No fees. No restrictions."(Pagliery, 2014, p:4). Nakamoto (2008), the founder of Bitcoin, states that the banks, which were required for transactions in the past, slowed down the process in this system, in addition, instead of the trust environment between banks and the customer, the digital payment system is a system that allows parties to transact with each other without the need for a reliable third person.

Digitalization is rapidly affecting the banking sector, which is one of the largest sectors in Turkey. According to 2021 data, especially with the COVID-19 epidemic, there has been an increase in digital banking transactions in the Turkish banking system, as in the rest of the world. According to TBB May 2021 data, the number of active digital banking customers (Number of Digital Banking Customers = Number of customers using only internet banking + Number of customers using only mobile banking + Number of customers using both internet and mobile banking) has reached 68 million. In total active digital banking transactions, this figure increased by 12 million 151 thousand people compared to the previous year (Figure 4.3).

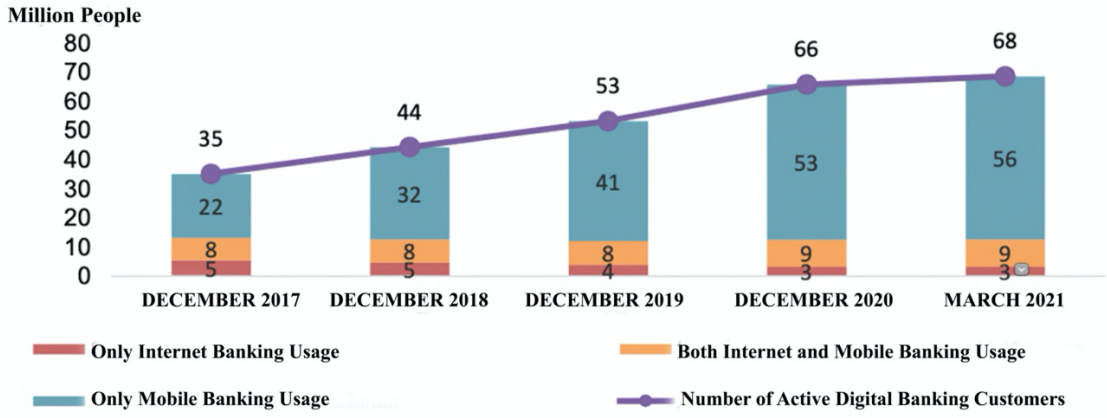


Figure 4.2 Statistics of Internet and Mobile Banking / March 2021, TBB

Banks that determine their strategies use advertisements as a means of expression. İş Bankası, which is the fourth largest bank in Turkey in terms of asset size according to BRSA data, has been continuing its digital banking activities with an increasing trend for many years. When the bank strategy is examined, it is seen in the research that they prioritize sustainable technology and innovation. In the advertisement film (Figure 4.4) made by the bank in 2012, the reference to the iconic future illustrations of the German chocolate brand Hildebrand's release (Figure 4.5) in 1900 draws attention.

Figure 4.3 İş Bankası the Future of Bank (İş Bankası, *2012; İlk Reklam Filmi*)

Figure 4.4 flugmaschine in 2000 (Stewart, 2017)

In another İş Bankası commercial (2018), the "Pepper" welcome robot, one of the innovations realized in the branch with digitalization, is introduced (Figure 4.6). This advertisement is especially important in terms of observing the technological innovation that occurs in the branch. While the welcoming space has its own design dynamics in the design process, this technology is now a part of the welcoming and orientation features of the space. In addition, the sincerity of the conversations with the robot in the advertisement can be read as breaking the cold perception created by the machine in the industrial revolution in the society in daily life, in new technological developments.

Figure 4.5 İş Bank Pepper advertisement (İş Bankası, 2018; Pepper İstanbul Şubemizde)

Another generic bank advertisement is BBVA's free internet branch advertisement dated 1991, which was published at the beginning of the period when Banks of Turkey transitioned to internet banking (Figure 4.7). In this advertisement, which the transition

to digital banking is introduced to customers, it is also underlined that the bank is now only a phone call away. With internet banking, the need for a physical bank space for banking transactions has disappeared. The user who becomes active after the transition from web 1.0 to web 2.0, explained in the second section, can banking transactions with the web 2.0 infrastructure. Another example is the Yapı Kredi advertisement, in which the customer logs into the application with face recognition from their home environment (Figure 4.8). It can be seen that the user, who interacts with the digital interface with face recognition and conducts banking transaction, creates a hybrid space.

Figure 4.6 Advertisement of BBVA in 1991 (Garanti BBVA, 1991; *Video Detay*)

Figure 4.7 Banking at home (*Yapı Kredi ile Silikon Vadisi*, 2018)

Figure 4.8 The evolution of banking systems (King, 2019)

Banking, which started informally, started under the leadership of the community between 1400 and 1950 and was organized depending on the place. Banks began to be the primary financial institution and branches began to primary channels since the 1950s. With the turn of the millennium, banking channels have disintegrated and customers have begun to carry out their banking transactions through different channels. King (2019), predicts that in the future, banks will become even more embedded with digitalization and will be focused on experience and communication under the leadership of technology (Figure 4.9).

4.2 Digital Transition of Bank Architecture

In order to adapt to these transformations in banking, it is necessary to reassess the branches that act as interfaces based on customer needs (Shirai & Yamagishi, 2017). Since human relations are also important in banking, they still need physical bank structures to communicate closely with their customers. Banks closely monitored the changes that occurred throughout history and adapted quickly. While adapting the technology to their operations and branches, they took the customer to the center. Today, many banks are trying to adapt digital technologies to their branches. The spatial structure changing continues to transform with technologies such as face recognition, online video wall art installation etc. which are being used by banks today. Changes in the space after the war and the Great Depression constitute an important place for branch architecture. Because the transformations took place ideologically. For example, the post-war branch

design has an ideology that prioritizes the customer; the facades that became transparent after the Great Depression are about regaining the loss of confidence in banks after the crisis with the theme of “openness” (Williams, 2010). Customer-based design continued to gain more importance in the process with the human-centered environment created by the digital age.

Atanasoff-Berry Computer (ABC) is claimed as an early "digital computer” in the Encyclopedia Britannica. The first digital computer was built in England in 1943. With the invention of digital computers that create the basis of other technologies, the finance sector has started to experience a magnificent change with the whole World. The transformation examples as follows (Figure 4.10): the back office disappears as the banking services and storage areas execute in the back office at the branches disappear with the use of computers. With this transformation, the existing space has disappeared and new space design necessity has emerged for the use of computer technology.

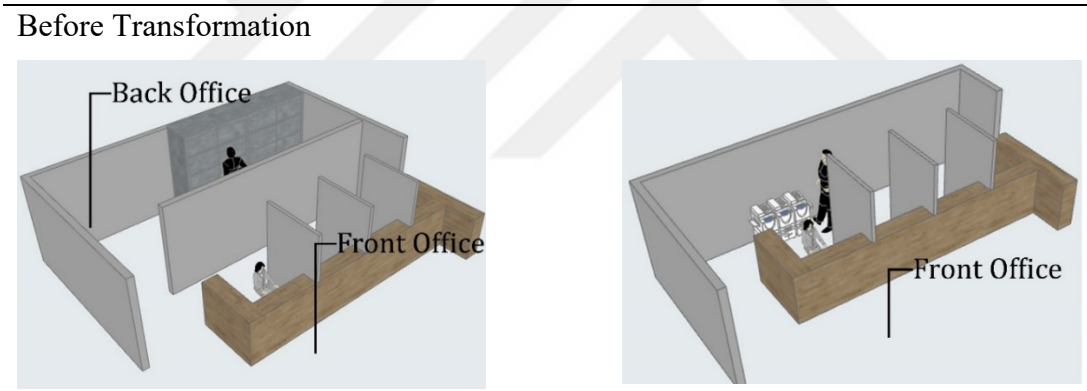


Figure 4.10 Illustration of Spatial Transformation by Electronic Digital Computer

In 1939 Luther George Simijan invented the *Bankmatic* automated teller machine (Hayashi et al., 2003) but in the scope of digitalization concept, online ATMs were based. Technology advanced ATM system was dated in the early 1970s (Hayashi et al., 2003). According to King (2019), when the first teller machines were launched in the 70s, in-branch tellers were used to helping customers. Referring to the views of Kamel (2005), ATM technology has increased the efficiency of the community, which lead to decreasing costs, and enhancement of quality to customer services. In the branch reviews, it is seen that ATMs lead to different alternative designs in bank architecture design. With the aim of 7/24 service, ATMs are located on the facade of the bank in order to provide services

even if the bank is closed. In addition, individual ATM terminals are located within the bank and without being connected to the branch are also observed. Structurally, it can be divided the ATMs into two; the front screen part which serves, and the rear part where the storage is provided (Figure 4.11).

Before Transformation

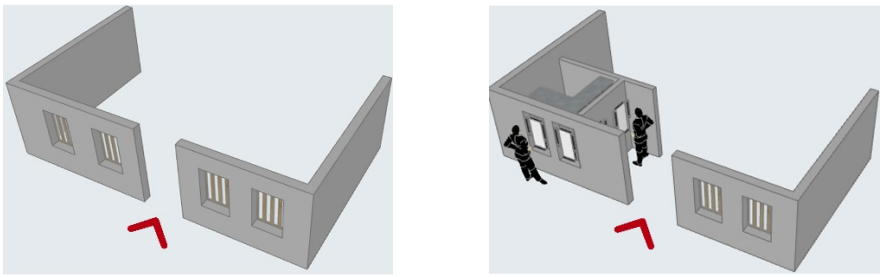


Figure 4.11 Illustration of Spatial Transformation Under ATM Effect

Tablets have enhanced customer-facing business processes, such as face-to-face counselling processes in the banking industry (Nueesch et al., 2014). The use of the tablet which known as GRIDpad created by Jeff Hawkins (Walker, 2011) and manufactured by Samsung, in banking dates back to 1989 (Judd, 2017). However, as of 2009, the developments in tablet technology have created the new generation tablets that we use in branches today (Fujioka, 2013). The tablet has caused both functional and appearance changes in the space (Figure 4.12).

Before Transformation

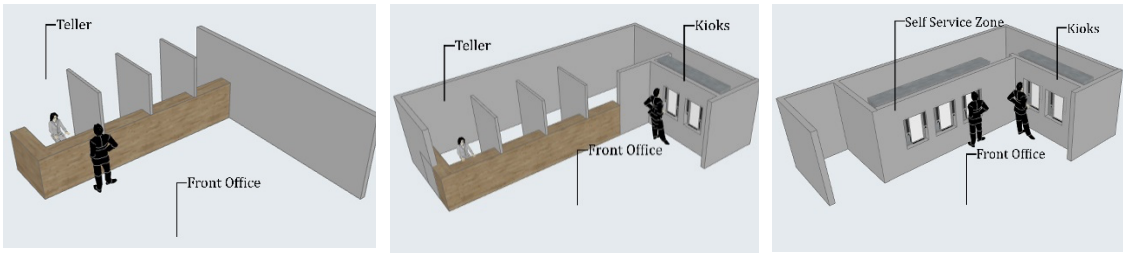


Figure 4.12 Illustration of Spatial Transformation Under Tablet Effect

Ivan Sutherland presented the very first theoretical idea of Virtual Reality in 1965 (Kim et al., 2009). As claimed by Kim et al. (2009), Virtual Reality or also known as Virtual Environment is described by Sutherland as: “Make that virtual world in the window look real, sound real, and respond realistically to the viewer’s actions”. VR

technology has been developed with web-based 3D graphic software and motion sensors. Distinctive service experience is provided to customers in areas created specifically with virtual reality technology. As stated by Liao et. Al (1999), the virtual banking system is presently in the forms of “ATM, phone banking, home banking and Internet banking”. Since then, VR technology started to enter branches. This technology caused both functional and appearance changes in Branch design. The type of transformation was illustrated in Figure 4.13.

Before Transformation

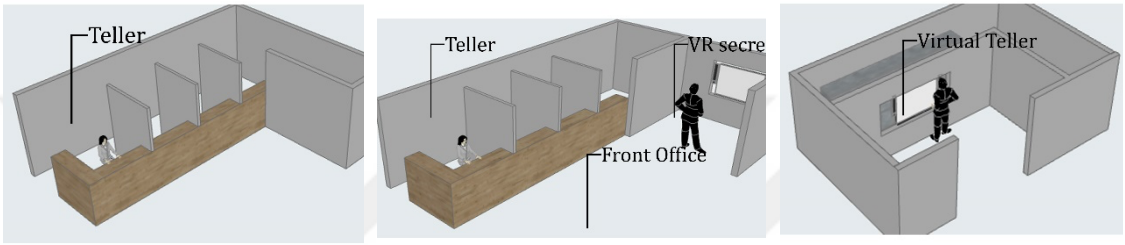


Figure 4.13 Illustration of Spatial Transformation Under Virtual Reality Effect

With the recognition technology, changes regarding the bank's self-service and security services were observed. Digitized branches with the face recognition feature have provided security in this way and this kind of transformation causes to be destroyed the section reserved for security at the branch by A-type transformation. The type of transformation was illustrated in Figure 4.14.

Before Transformation

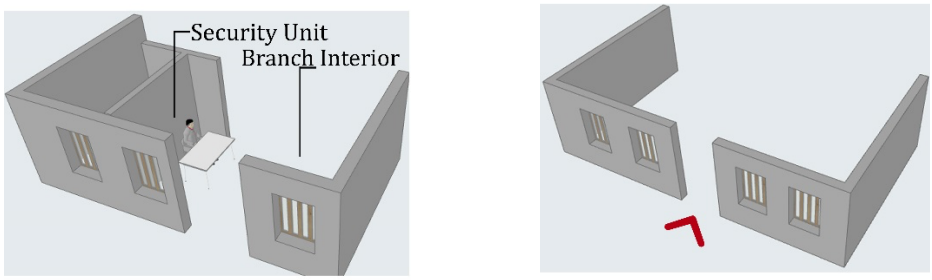


Figure 4.14 Illustration of Spatial Transformation Under Face Recognition Effect

Figure 4.15 Transition chart created by the author

According to King (King, 2010, p:73), the core function of the branch was defined as follow;

> *"The core function of the branch moving forward will be about establishing the relationship with the customer at inception, and extending that relationship through an advisory sales process and excellent customer support systems. It is conceivable that all of the transactional elements within a branch will be moved to automated banking within electronic banking centers, automated branches, ATMs or the Internet within the next 10 years. What then is left?"*

This forecast was issued in 2010, and nearly all of the predictions came true by 2020. In general Picture, so many branches are being closed down because of to get rid of unnecessary financial burden. According to a Forbes report from 2020, opening a new branch costs between $2 million and $4 million, costs between $200,000 and $400,000 per year to operate, and takes roughly ten years to reach full potential of producing $1 million in yearly profit. Banks save a lot of money if they prefer to close more branches faster. On the other hand, studies indicate that customers still need branches.

Some studies show that the role of the branch must change in the future to survive. As a result of technology adoption diffusion and pressures resultant from shifts in consumer behavior, if branches do not adapt the new design challenges, it will be seen the business model for such made completely unsustainable from a cost-benefit perspective. Many transactions that take place in banks are canceled today or if they can be done through digital channels, this will reduce the need for a branch. According to King, traditional branches will inevitably disappear unless they significantly change their operational practices. In the Branch Transformation in the Digital Era study conducted by Danny Tang (the Leader of Channel Transformation for Banking and Financial Markets at IBM) in 2018, new banking distribution channels; In terms of its experience-based flagship, sales and relationship with the customer, Satellite is classified as digitalization as self-service and mobile banking. In new service models, a shift from staff-assisted to self-service is observed as the branch becomes digital. However, these changes may not find immediate response in the customer experience. For example, with technologies such as interactive kiosks and virtual wires, customers can get support from staff who are not there to perform transactions within the branch.

As the tendency towards digitalization increases in bank of Turkey, a decrease is observed in the number of branches. In parallel with the World, banks of Turkey are also turning to digital banking channels and determining their future strategies by considering the needs of the digital age. In this context, the vision, mission and strategies of the banks that are in the top ten in terms of asset sizes according to the Banks Association of Turkey data were analyzed on the banks' web pages. The vision, mission and strategy reviews of the 2020 and 2021 annual reports of the banks of Turkey were obtained from the official websites of the banks. Quigley (1998) defines vision as the most basic expression of a company's values, goals and purposes. These goals, attitudes and objectives give information about the future of businesses. Mission, on the other hand, is the statement that forms the basis of the company compared to its competitors and explains what it does, in what way and for whom, in line with this vision (Soygür, 2018). A well-defined vision and mission values are required for strategic planning. Banks develop a well-defined vision and mission for continuity and reliability. In the process, these vision and mission definitions may change in parallel with the transformations in banking and social life. For example, with the integration of digitalization and technologies into banking, many banks have added this technological transformation to an important point in their strategic goals.

In a study based on the vision and mission content analyzes of the banks by Soygür (2018), when the 2018 data of the banks examined in Table 4.1 are compared, it is observed that the emphasis on digitalization and technological infrastructure has increased among banks in a short time (Soygür, 2018). In the more recent study of Güler (2020), mission and vision comparisons of banks of Turkey were made and it was emphasized that the tendency to digitalization and technological structure showed a lower rate in terms of strategic planning compared to the worldwide, especially in terms of state-owned banks. According to the May 2020 Economic Developments and Banking System report of the Banks Association of Turkey (the effect of the corona epidemic on the data is also included in this study), the number of branches in deposit banks decreased by 184. While it decreased by 141 in private capital deposit banks, 115 in foreign capital deposit banks and 6 in public capital deposit banks, it increased by 2 in development and investment banks and by 76 in participation banks (TBB, 2021).

Table 4.1 Change in the number of branches over the years

	Banks of Turkey	Bank's strategy	Change in the number of branches over the years 2017- 2018-2019 -2020- 2021	Changing
1-	Ziraat Bank	Advanced technologies, digital solution, e-banking	1,781-1,773-1,763-1758-1723	steady decrease
2-	Halk Bank	Digital solutions, social responsibility	969- 994- 998-1011-1009	
3-	Vakıf Bank	Efficiency	927- 951-946- 938 -934	
4-	İş Bankası	Sustainable, environmentally friendly, technology and innovation pioneer	1,355-1,281-1,241-1,181	steady decrease
5-	Garanti Bank	Quality human resources, technology efficient banking	945- 934- 918- 902 – 870	steady decrease
6-	Yapı ve Kredi Bankası	Current technology, sustainability	866- 854 -854-845- 824	
7-	Akbank	Reliability	801-781-771- 719-713	steady decrease
8-	QNB Finansbank	Environmental sustainability, continuity, transparency	580-542-542 -515-465	
9-	Deniz Bank	Digital investment, e-commerce, sustainability	697- 711-709-707-690	

The Table 4.1 above shows the changes in the number of branches between 2017 and 2021 according to The Banks Association of Turkey data. The date range starts from 2017 for the data to be based on the same source. The reason for this is that the reports published specifically for banks on the number of branches of The Banks Association of Turkey are dated to 2017. By adding the content analysis to the table, a relationship was tried to be established between the change in the number of branches and the visions of the banks. In general, there is a decrease in the number of branches of all banks in 2021. When analyzed by date range, a continuous decrease is observed in the number of branches of four of the nine banks between the specified years. When we look at the content analysis of these four banks, it is seen that only three of them adopt technology

and digitalization as a vision and mission. Aiming at digital solutions and setting it as a business strategy, Halk Bank continued to increase the number of its branches until 2021. Yapı Kredi and QNB Finansbank, on the other hand, maintained the number of branches for two consecutive years despite a decrease, and QNB Finansbank does not include digitalization in its current strategy.

In the era of digitalization of money and transactions, banks focused on digital transformation not only reducing the number of branches and turning to internet banking, but also designing their existing branches and newly designed ones in accordance with digital innovations. The interior design of the new generation bank branches is more dynamic and this dynamic effect is emphasized by the lighting. The façades have wide spans and a store feature since the modern period architecture. These branches, designed at the physical and digital interface, are defined as *Phygital Branch* by Akbank in Figure 4.16. In the new branch design, the counters between the customer and the teller are completely shifted to designs called *Conversation Bars*. It turns into more flexible spaces.

Figure 4.16 Galata Branch of Akbank (Akbank, 2018; *70. Yıl'da Akbank'tan Bankacılıkta Çığır Açacak Adımlar*)

One of example is the high-tech branch of Credit Union, which opened in Rexburg. In this branch, there are a visual conference room, interactive kiosk and even a 3D printer corner. In addition to all these, the Rexburg innovation center makes their branches beyond the banking sector where the technology will be experienced. With the internet pages that allow digital branch navigation and reference to the physical space in the digital environment. Firstly, a scanned 3D model of the branch is displayed on the website (Figure 4.17). Branch entrance does not differ much from standard branches. Instead of the teller, there are two virtual teller kiosks at the entrance (Figure 4.18). For banking transactions, the user can individually conduct his own transactions by using the digital wall, member media workstation. If any teller is needed, a virtual teller and virtual conference room (Figure 4.19) can be used for digital transactions. In addition to banking transactions, the other most important feature of Credit Union's branch in Rexburg is that it creates a technology experience center for its customers. 3D printer and virtual reality experience spaces were created in the branch (Figure 4.20).

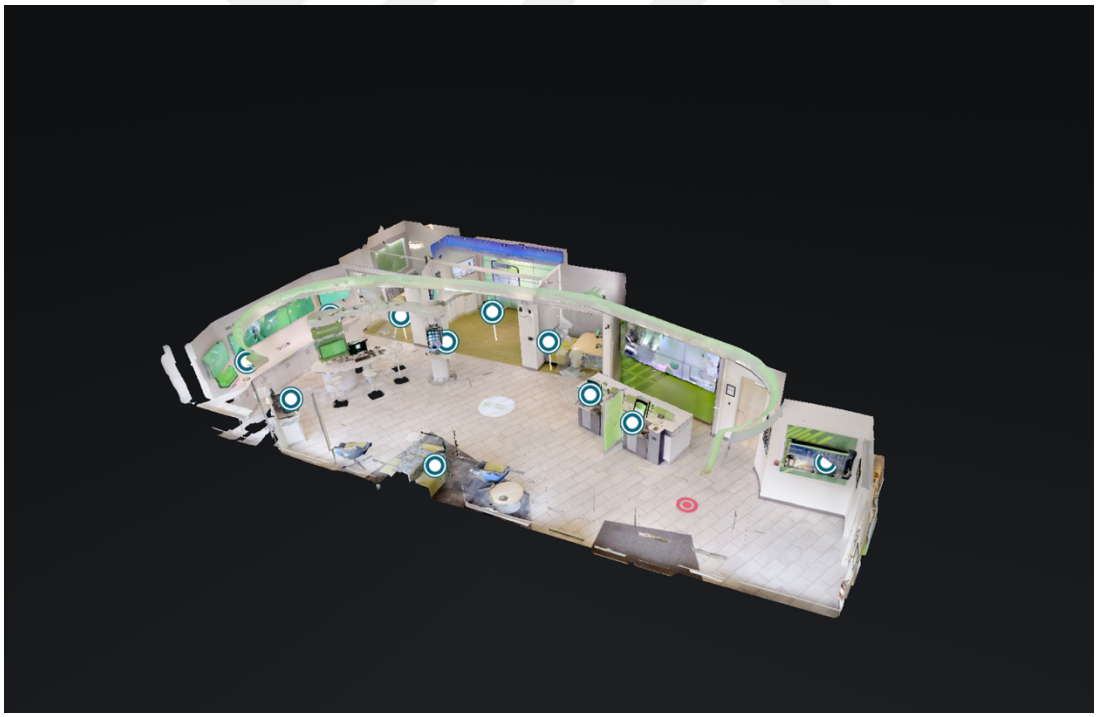


Figure 4.17 Rexburg Innovations Center 3D model visited virtually in Internet Page (*Explore Rexburg Innovations Center in 3D*, n.d.)

Figure 4.18 Rexburg Innovation Center Virtual Tellers (*Explore Rexburg Innovations Center in 3D*, n.d.)

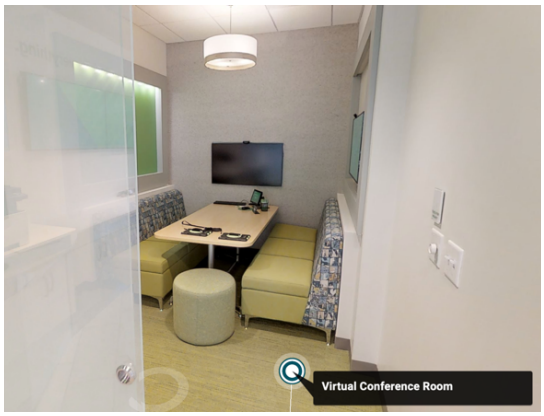


Figure 4.19 Rexburg Innovation Center Virtual Conference Room (*Explore Rexburg Innovations Center in 3D*, n.d.)

Figure 4.20 Rexburg Innovation Center Virtual Reality Experience Room (*Explore Rexburg Innovations Center in 3D*, n.d.)

Being one of the first examples of new generation digital bank branches, Rexburg Innovation Center positions the banking experience of its customers who still need a branch in a different direction through digital channels. Academic studies show that, it is

observed that banks still need physical spaces for customer trust and sustainable brand value. Despite the decrease in the need for the branch, which was emphasized in the previous sections, it will not be completely exhausted, and branches should adapt themselves to the digital age in line with these predictions. During this adaptation (spatial transformation), space creates an area of interaction between the bank and the customer.

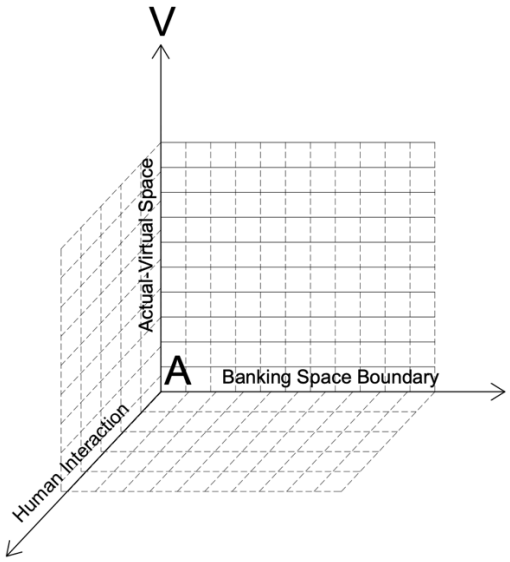
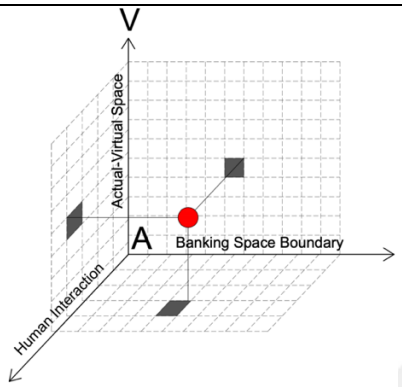
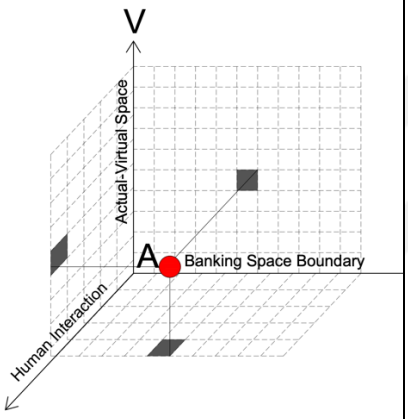
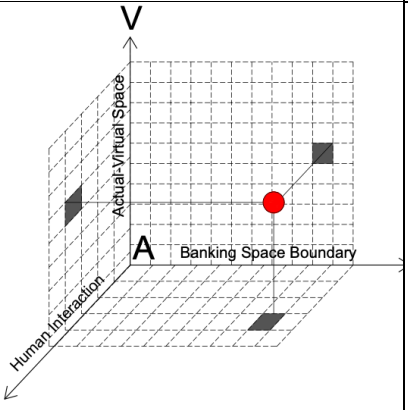
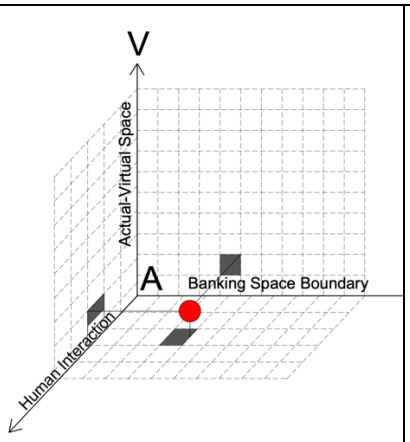
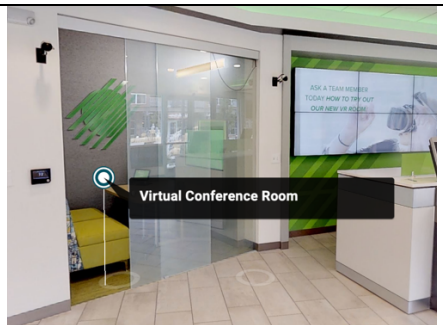
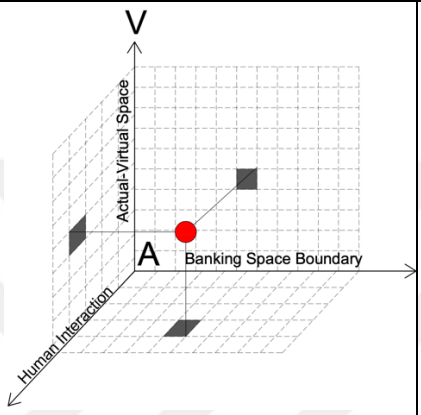
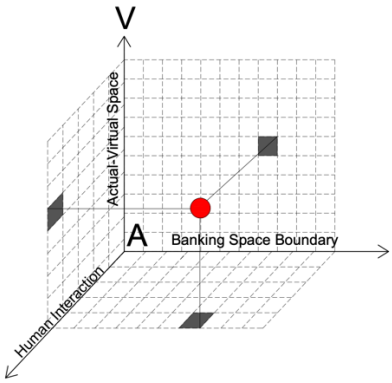
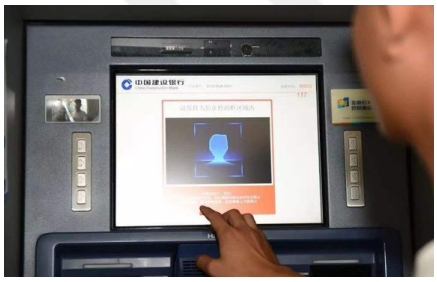
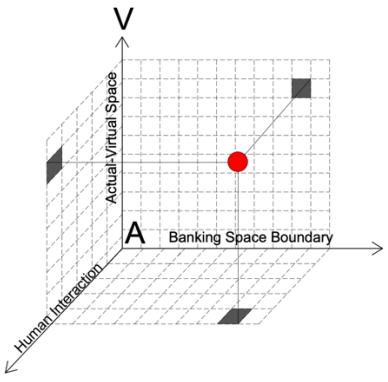


Figure 4.21 Proposed three-dimensional taxonomic framework for classifying, created by the author

With the digitalization of banking, the boundaries of the bank space and the change in the definition of boundaries and its relationship with user interaction is expressed with the 3D graphic (Figure 4.21). One extension of the 3D plane is actual-virtual space, the other extension is human interaction, and the third extension is the bank space boundaries. At the intersection of these planes, new technological elements in the space are examined. The actual-virtual plane defines the space situation from physical space to virtual space, applications, and transition to digital interfaces. Banking space boundary shows the transition of bank space boundaries with digitalization. In other words, whether a limited physical space is still needed for banking transactions with this new technology is being examined.

Table 4.2 A-V Space, Human Interaction, Banking Space Boundary three-dimensional taxonomic framework

Digital wall		 Digital Wall (Skinner, 2018)
Interactive Digital kiosk		 Interactive Digital kiosk (*The Present-Day Future. 3 Myths about Video Banking*, 2018)
Application Interface		 Bank Application (*Online and mobile banking*, 2021)

Virtual Conference Room		 Virtual Conference Room (*Explore Rexburg Innovations Center in 3D*, n.d.)
Robot greater		 HSBC Pepper (Boisvert, 2019)
Face Recognition		 Face Recognition (Delacharlerie, 2018)
Virtual Reality		 Virtual Reality (*Türk mühendislerden VR bankacılık uygulaması*, 2016)

In Table 4.2, digital technology examples are located in the 3D plane shown in figure 4.21. The digital wall creates a hybrid surface between the actual and virtual space, and the user's interaction with the space is more than the classical branch design. In the example of the interactive digital kiosk, an increase in the level of human interaction is observed in terms of mutual communication with the wires compared to the digital wall. Despite the virtual conference room is supported by digital technology, it needs physical space and creates new space alternatives. The rapid increase in internet banking has reduced the bank's dependence on physical space. With applications, at any moment connected to the internet, interaction is established with the space at different scales and hybrid spaces are created. With banking applications, the space limits of the bank are exceeded and direct interaction with the user is ensured. Robot greater is a mobile technology that is not integrated into the space. Although it is technically no different from a digital kiosk, it is used in branches due to the way it communicates more closely with the user. Face recognition is used in conjunction with many other technological environments and is used as a security add-on in ATMs, as well as for security purposes in bank branches. In the following years, with the further development of technology, the examples in the films examined in the second part can be met with the use of face recognition and increase the interaction between the customer and the place. Virtual reality, on the other hand, offers a whole new field of experience. Although they are not widely used in branches yet, users will be able to perform their banking transactions and provide a different venue experience in the spaces designed in the virtual environment in the future.

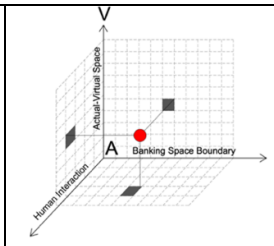
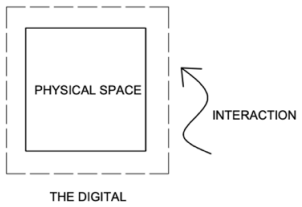
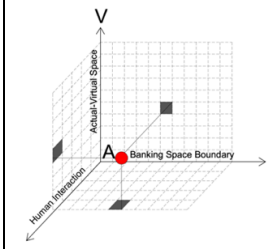
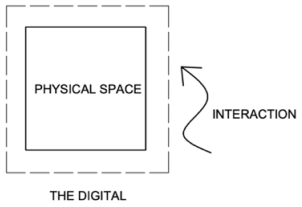
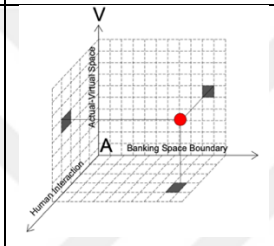
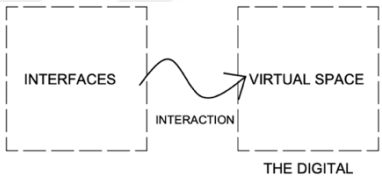
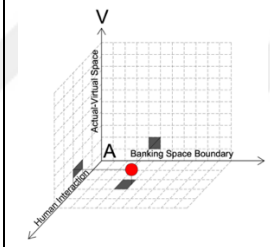
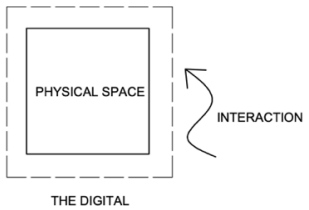
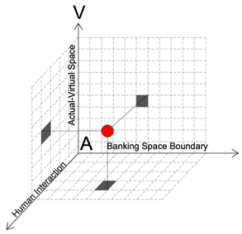
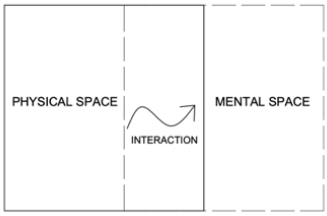
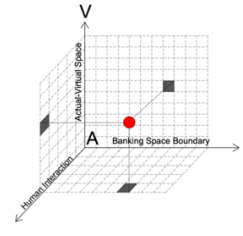
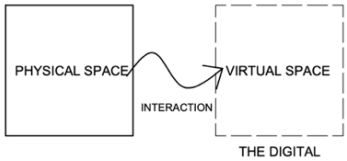
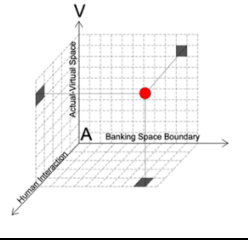
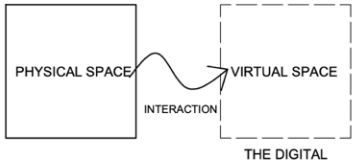
4.3. Chapter Review

In the last part of the thesis, the digitalization of banking, the banks' strategy on digitalization and as a result of this the decrease in the number of branches are examined. Even though the number of branches decreases, the need for branches continues, but the meaning of branches for banks and the duty they undertake have begun to change in the digital age. With the integration of digital technologies into the branches, bank branches digitalization has started, and in the first part of the section, the changes brought about by these technology integrations in the space are analyzed morphologically and shown with a time-chart.

With the digitalization of money, money exchange and other banking transactions have started to shift to digital channels. Digital interfaces in branches are used by the user to perform transactions directly in most branches, and this enables the individual to interact with the space and surfaces. Just as the passive user in Web 1.0 became active with Web 2.0, people started to take an active position in the space with the digitization of the space. Space now interacts differently with each user and their experience and gains meaning.

Technologies used and examined in the Rexburg innovation center, which is one of the best examples of a digital bank branch, and encountered in bank advertisements, were examined with 3D graphics in terms of their effects on the space. The main 3 elements determined in the study consist of actual-virtual space, bank space boundaries and user interaction, which were discussed in detail in the previous parts of the thesis. After this review, the current position of the space is expressed with actual space, hybrid space and virtual space graphics in order to predict the future of the space.

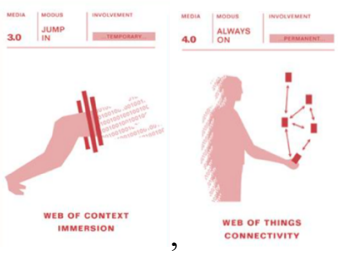
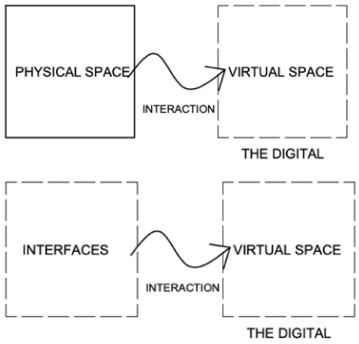
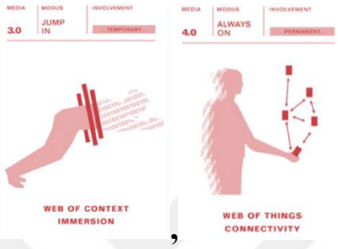
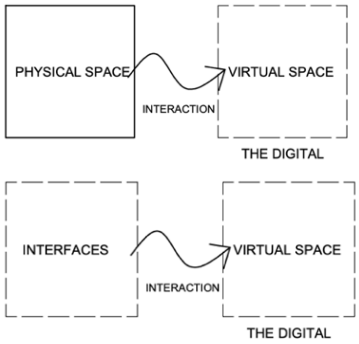
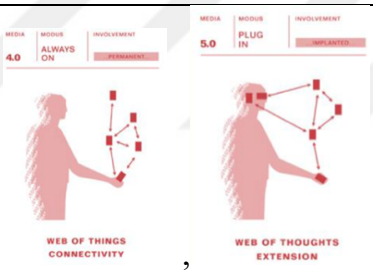
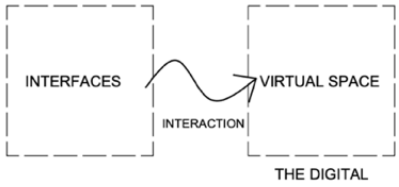
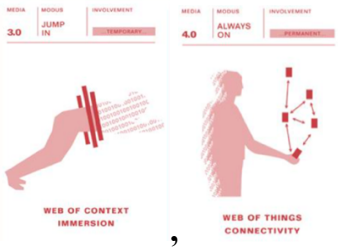
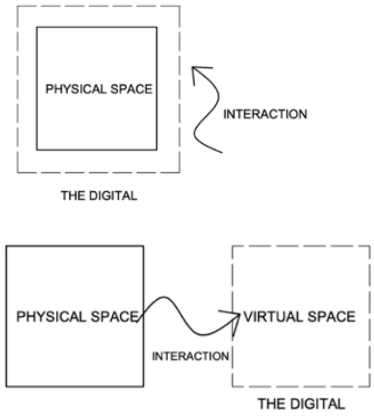
Table 4.3 Digitalization of Space

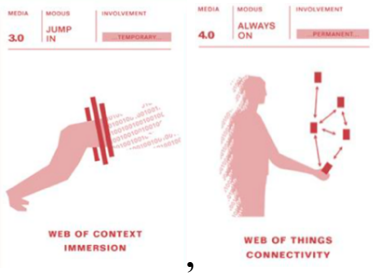
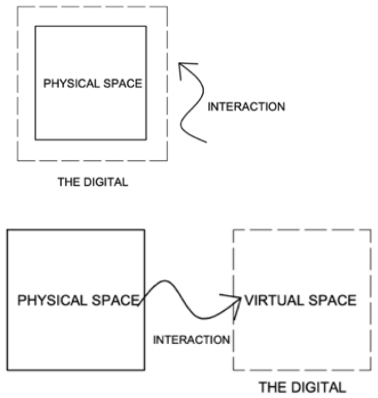
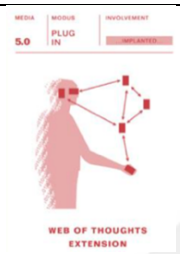
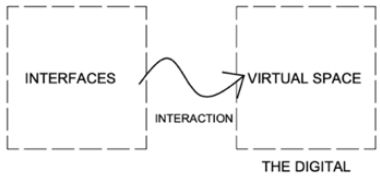
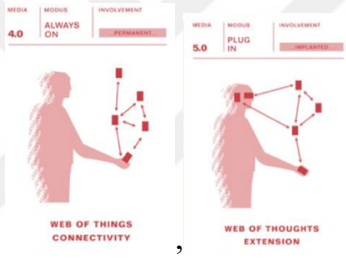
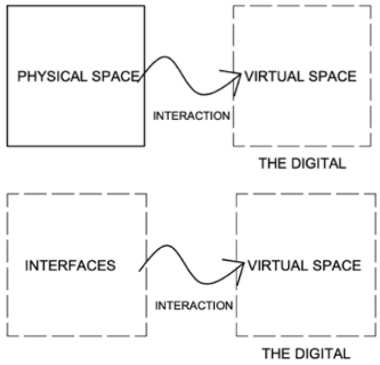
Digital wall			
Interactive Digital kiosk			
Application Interface			
Virtual Conference Room			
Robot greater			
Face Recognition			
Virtual Reality			

The selected technological examples are associated with Müller's (2010) web 2.0, 3.0, 4.0 and 5.0 classification. In the context of Müller's (2010) connection between the generations and technologies of the web and the body, the medium turns into an extension of the body with web 3.0. Web 4.0, which is categorized as *Always On*, ensures that data can be continuously received and processed with face recognition and retina recognition technologies. Currently, the web is emotionally neutral and web 5.0, in other words *Symbionet* web, allows users to interact with the avatar created by neuro technologies that detect their emotions and respond with real-time facial expression.

For example, digital wall has been associated with web 2.0 user-internet interaction in terms of user-space interaction. With the digital wall, the user has switched from passive interaction to active interaction. Existing space provides relation with humans with actual space which is covered by digital technologies. Interactive digital kiosk, virtual conference room and robot greater also show 3D graphics feature similar to digital wall and are associated with web 2.0. Application interfaces, face recognition and virtual reality technologies are located further away from the origin and closer to the virtual space in 3D graphics (Table 4.3). Human interaction also increases with this virtuality and the blurring of the bank space boundaries.

Table 4.4 Future Projections of Digital Space

Digital wall		
Interactive Digital kiosk		
Application Interface		
Virtual Conference Room		

Robot greater	 ,	
Face Recognition		
Virtual Reality	 ,	

Today, the digital wall, interactive digital kiosk, virtual conference room and robot greater which form the intersection of physical space and digital space, are associated with web 3.0 and web 4.0 in the foresight of the future, and it is predicted that the interaction of the user with the space will increase with the support of technology and the transition from physical space to virtual space will increase. Application interfaces, face recognition and virtual reality are associated with web 3.0, 4.0 and 5.0 in the foresight of the future (Table 4.4). The effect of these technologies on the space in the future is predicted to increase the hybrid characteristic of the space and to establish a space interaction with the technology which embedded in the body and space, anytime and anywhere.

Chapter 5

Conclusions and Future Prospects

5.1 Conclusions

The developments in physics and technology in the second half of the 21st century have affected architecture and the way the space is handled, like many other disciplines. According to the theory of relativity, time is not absolute. The time-space dualism, which has been discussed by philosophers since ancient times, has opened up new areas of discussion on the basis of the theory of relativity. Different space alternatives can be considered, designed and experienced with the interfaces, which can be considered as any surface and piece of space where people can communicate, perceive and be perceived physically and mentally, developed with digital technology. Starting with the question of how the new digital culture and life style have been in the Digital Age, and what the predictions are for the future; and what the changes are in banking system in the digitalization process and the effects of these changes in the space are discussed in this thesis.

In the Digital transition of everyday life chapter of the thesis, firstly, the definition of digitalization was made and then examples of everyday life in the digital age were given. With the ubiques computing network, people are in communication with each other via wireless connections anytime, anywhere. With Early Capitalism, abstract space (political-economic space) with a political dimension was created by designers and planners with government incentives. Changing production and consumption patterns depending on the developing technology, digitalization and globalization in the information age have created today's *consumer society*. Cities and spaces designed as a result of this were designed to serve consumption due to the market conditions of capitalism. Space production has changed in direction with both the demands of the changing conditions of daily life and their demands on the production of space, especially

after the post-industrial capitalist mode of production. The individual of the consumer society has begun to be defined as a Prosumer, that is, both a producer and a consumer, with web 2.0 and web 3.0, where interaction has become widespread. This new user profile interacts more with the space with digital technologies. The spread of this interaction has been realized with the digitalization of the space. Within the scope of the section, scenes from the movies were examined for the future prediction. In the movies examined, in the Digital Era where the individual is placed in the center, the space sometimes turns into only an interface under the influence of digital technologies; sometimes, it has been observed that mixed space designs, including physical, virtual and hybrid, needed for the new virtual environment. At this point, space analysis has been made for two different definitions as digitalization of space and digital space. Digitization of space can be defined as the integration of new technologies into space every day. The digital space, on the other hand, is considered to be the effect of the space on people, whether it is completely virtual or the individual's creating a new experience area with a virtual environment. In the transition from the digitization of the space to the digital space, the actual space is associated with the cartesian space, the virtual space with the experience space of Heidegger, and the augmented space with the hybrid space in the continuum framework created by Milgram and Kishino. Hybrid spaces are formed at the intersection where actual and virtual lined. Hybrid is actually defined as the product of mixing two or more different things. In the literature within the scope of the thesis, the hybrid space is described as digitally eclectic with the combination of both technology and physical space and it is seen that as the space that occurs when people communicate with other people and their environment.

In the Transition of Bank Space chapter of the thesis, the transition in the monetary system has been examined. With the transition of money to the electronic system, changes have started to be observed in the bank spaces, and the bank has taken a more flexible form. The bank branch is now more of a place of experience than just a place for banking transactions. It has been observed that cafes, exhibitions and library areas have been added to the bank space in the digital age. In the past, due to security precaution, areas were not designed for customers to spend time at the bank. The digitization process of the Banks of Turkey is also parallel to the world. According to academic research, most banks have included sustaining the requirements of the digital age among their future goals. Although the number of branches is decreasing, banks still need physical branches in

order to communicate effectively with customers. Banks that operate through alternative digital channels have also made their branches more digital. With technologies such as digital wall, interactive kiosk etc., the space transforms into an interface between the bank and the customer. In the previous section, similar space design was defined as hybrid space. In this section, the changes in the venue make the new branches show hybrid characteristics. Branches that show a functional hybrid feature with spaces such as cafes, exhibitions, etc. also show hybrid features in form. In addition to these, banks provide digital references to the physical places of their branches with virtual tours on their websites and enable them to be experienced.

As a result, the interaction and space boundary terms, which emphasized on all this conceptual framework, are examined in the actual-virtual space in 3d plane. With the virtualization of the space, the interaction with the user also increases. Especially in the future, with the semantic feature of web 3.0, this interaction and digital space relationship will gain more importance for the designer.

5.2 Societal Impact and Contribution to Global Sustainability

Space becomes the subject as well as the object of the social transition process. All kinds of social, artistic, economic and political activities are a part of the dialectical process between space and people and make creative interaction possible. Creative interaction is achieved by establishing a dialogue between the past, present and future space. In this thesis, architecture's own transition process is examined in the parenthesis of the digital age. This thesis discusses the potential of introducing digitalization in the architectural design and space interaction methods, according to the new technologies. New Technologies are not always considered by the architects in the decision-making process. Developments under the influence of digital technologies are rapidly changing the perception of the physical environment and the interaction with it. Usage of the digital technologies has become an increasingly crucial aspect of daily life which produces more ubiquitous interactions between individuals and space actively or passively. Understanding and questioning the augmented space, virtual space, and hybrid space approaches exemplified in the thesis will enable the creation of new living conditions and

alternatives in space design or criticism. In this thesis, it is emphasized that the social impact is reconstructed in the context of social sustainability as a result of space design and the role of the designer at this point is emphasized. It is underlined that the new spaces to be designed using the banks' influence on social life and their position as a community leader (community-led banking) and hybrid space design will ensure both technology-integrated and to interact with the user. As can be seen in the examples examined, bank spaces offer new areas of experience to the user. This is the experiences in the context of social activity, with both technology and space alternatives created in branches. Also, it changes the culture of space because the sociability of the space is significantly promoted by digital technology. This thesis emphasizes the transformation in space in both view and sets an example for new academic and sectoral studies to be made.

5.3 Future Prospects

The future prospects of the thesis are to be a guide for similar academic studies and to raise awareness for the spaces to be designed in the future. Space no longer only exist on its own, also emphasizes the potential for a semantic relationship between objects, individuals and space. The spaces of the future will consist of interconnected intelligent components that are aware of human existence, can communicate, evaluate and act. The role of the hybrid designer must evolve into the design context of space and interaction so that meaningful spaces can be created that support systems of interconnected smart devices. Space transformation foreseen as can be like an extension of virtuality needed in physical space, like the Upload room in The Upload series; it can also be in the form of spaces detached from physicality, completely surrounded by technologies.

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CURRICULUM VITAE

2012 – 2017	B.Sc., Architecture, Erciyes University, Kayseri, TURKEY
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SELECTED PUBLICATIONS AND PRESENTATIONS

C1) Parlak Bicer, Z. Ö., Karaaslan, N., Şahin, M., Yıldırım, E., Biçer, C., 2016, "Hasta Odalarının Mimari Mekân ve Yapı Elemanları Performanslarından Kullanıcı Memnuniyet Durumunun İncelenmesine Yönelik Örnek Çalışma: ERÜ Gevher Nesibe Hastanesi" iste-c Proceedings Book, International Science and Technology Conference, iste-c 2016, 13-15 July, Vienna, Austria, sayfa: 462-473

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