URBAN SCREENS

CREATING A NEW HYBRID CONNECTED COMMERCIAL SPACE

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New Media & Digital Culture

15 June 2012

Universiteit Utrecht

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ABSTRACT
Around the turn of the 19th century an enormous rise of outdoor advertising and billboards started commercializing urban space, transforming cities in to marketplaces, influencing and affecting the aesthetic value of urban space, and impacting urban culture; A similar change can now be seen within our contemporary society. With the fast rise of urban screens and the start of embedding pervasive and ubiquitous computing (Internet of Things) technologies in to the fabric of urban artefacts, cities are becoming smarter and more pervasive, enabling cities to remember, interact, correlate and anticipate on their inhabitants. This trend can also be situated within the commercial space of cities, creating a more pervasive, engaging and social commercial landscape via the use of urban screens.

INTRODUCTION

It is 2054; John Anderton has been identified by the Precrime unit as a murder suspect. In his effort of trying to escape, he walks through a mall hoping the escape from the Precrime, but ironically he gets identified by targeted advertisements. "…Lexus. The road you're on, John Anderton, is the one less travelled". "John Anderton! You could use a Guinness right about now". "Get away. John Anderton… Forget your troubles…"

(MINORITY REPORT, 2003)

This was a scene in the 2003 Steven Spielberg movie Minority Report, a movie that already addressed smart technologies. The movie has an underlying premise that by 2054 our way of life has been transformed by highly sophisticated technology. Technology that recognizes us by name; it knows our likes, dislikes and interests. It could read our minds, know our secrets, and anticipate how we will behave. These technologies utilize super intelligent computer screens, monitors and holograms which are an integral part of the environments we live in. These technologies seem a little far-fetched and fictional, but already technology is being developed to bring this kind of world closer to our reality. Used technologies in the movie are already subsequently introduced or are being developed. Multi-touch interfaces similar to the once used in the movie are developed and distributed. In 2007 Microsoft released their Surface with a multi-touch interface, but now these technologies are commonplace to many people. With the release of the Microsoft's Kinect gesture technology was introduced, which also starred in the movie.

The movie also uses retina scanners to identify people. This technology was introduced by Global Rainmakers Incorporated in 2010, and already in use. The Bank of America installed hundreds of these types of scanners, and United States Air Force will be installing them. The technology is evolving rapidly, already able to capture the iris from a distance of ten

feet. Future devices might read irises from more than 30 feet. It can even process hundreds of iris scans per minute, meaning it can be used effectively in crowded public spaces.

The Japanese company NEC developed an advertisement that follows a similar idea like the advertisements in Minority Report, with a camera installed inside an electronic billboard that reads passing faces. Using facial recognition technology and an internal computer, it can determine gender and age and combined with demographics it targets the best possible and relevant advertisement possible. In this we see that facial recognition technology is a rising trend in the digital signage industry. Advertising agencies and content producers are embracing it in search of return on investment. It can provide audience measurement data on age, gender, the amount of time a person looked at the display and the total number of viewers. This technology now already is being optimized in to generate 'gladvertising/sadvertising'. This software will soon be capable of capturing the mood of consumers. These emotions are fundamental to human experience, influencing cognition, perception and everyday tasks like communication and shopping decisions, which would give advertisers a great way of catering their advertisements. And knowing that that in the future, according to the report '*Up Front and Personal: Digital Out-Of-Home Communications (2011)',* two in three people expected to be city-dwellers by 2050 advertisers will be looking for new possibilities to capitalize on opportunities to reach consumers in urban areas with smarter advertising.

Looking at these urban and advertising developments this thesis situates a changing commercial urban landscape due to rise of urban screens, which will become more pervasive and will follow the Internet of Things (IoT) trend which can change the way people experience urban space. This change was also signaled by McQuire, Martin and Niederer who stated that taken New York's Times Square Spectacolour Board as point of origin it clearly formed a new advertising platform, and "by 2005 cumulative changes in technology, urban space and public culture had all contributed to the pervasive sense that something new was emerging" (9). Though we can't predict the future, according to Weber, Rabaey, and Aarts IoT does have a great potential in becoming reality. IoT, which builds upon pervasive and ubiquitous computing, is "the vision that technology will become invisible, embedded in our natural surroundings, present whenever we need it, enabled by simple and effortless interactions, attuned to all our senses, adaptive to users and context-sensitive, and autonomous" (5). It is characterized by an environment where technology is embedded and hidden in the background, which is sensitive, adaptive, and responsive to the presence of people and objects. It augments activities through smart non-explicit assistance, which preserves security, privacy and trustworthiness while utilizing information when needed and appropriate. It will be used to support human contacts and accompany and individual's path through the modern world.

This thesis will be building upon the notion of the Internet of Things (IoT) which already had different terms to it like ambient intelligence, calm computing, ubicomp, pervasive computing, but first was signaled as "ubiquitous computing" by Mark Weiser, as he in 1991 stated that "the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" (78). With this Weiser already

argued the idea that miniaturization and ubiquity of sensors would eventually lead to the disappearing of computational elements and the potential for computing as procedure, as visible hardware and as protocol, to move into an invisible background. The idea of the IoT is dominantly characterized as a sense that internet connectivity is becoming increasingly ubiquitous and pervasive, and that eventually everything including mundane physical artifacts will be connected. Based on this concept and the rise of smarter urban screens this thesis will answer the following question; How will the rise of urban screens and the Internet of Things influence the commercial urban experience within urban spaces? This question is build on the idea that urban society is on the verge of stepping in to a new urban commercial landscape, which will with the rise of IoT and urban screens change our urban commercial experience stimulating social interactions with city architecture, brands and citizens.

This idea is supported by Schieck who saw a new form of architectural space emerging which is different from what we have known. Physical and virtual components are starting to merge in various ways which can be seen in urban screens, which are becoming closely connected to 21st century's narrative of urban space. Large projections of displayed information are becoming more ubiquitous in urban spaces, digital information is getting embedded in physical construction materials, and architectural surfaces are being transformed in moving images. Also McQuire, Martin and Niederer see a changing urban landscape stating that "Urban screens of various scale – from the small handheld screens of mobile phones to the large screens dominating the streetscapes of global cities – exemplified a new urban paradigm produced by the layering of physical space and media space" (9).

In order to answer the following question, how will the rise of urban screens and the Internet of Things impact the commercial urban experience within urban spaces?, this research will start with examining which developments contributed to the development of our contemporary commercial landscape. By looking in history this thesis will illustrate how urban screens came to be as we know them today, but will also illustrate how it impacted urban space and culture around the turn of the 19th century. This change and impact can be seen as one of the biggest commercial changes in urban space which now, as this thesis will argue, again can be seen within our contemporary urban society. Eventually this thesis will show that various technological and culture developments through history have changed the way people experience urban spaces, but also will show the change towards the rise of the smart cities. Smart cities are according to Mark Shepard rising because computing is just bound to the desktop anymore. It spills out onto sidewalks, streets and public spaces, meaning that information processing capacity is getting embedded within and distributed throughout the material fabric of everyday urban space, showing a more connected environment in which people interact with artifacts and systems that collect, store and process information about them on a daily basis (20). This rise of the smart cities stimulated by the IoT will be used to examine how urban screens are becoming more pervasive and engaging by interacting with citizens, who will stimulate the social intercourse with urban space and citizens.

THE RISE OF THE COMMERCIAL URBAN SPACE

Outdoor advertising is one of the biggest contributors to commercializing urban space, but it isn't bound to our contemporary society. It dates back at least 5000 years. According to Taylor & Chang the first recorded sign of outdoor advertising occurred in Egypt, "where notices of rewards for the capture of runaway slaves were printed on papyrus and posted" (284). But the Egyptians were also known to inscribed hieroglyphics on obelisks to direct travelers. Merchants were known to carve sales messages into stone tablets which they placed along public roads. Later Babylonian merchants were among the first to realize the value of hanging a sign above their place of business. By doing this they identified their trade and called attention to their merchandise. Ancient Greeks further used axons to list the order of contents at public games. Later during the Roman Empire signs were starting to get more importance. More signs were used within the urban spaces to indicate their merchandise in order to get attention from travelers. During the medieval times the outdoor medium was also widely utilized in Europe. The French began posting written proclamations in cities. European businesses were often required to hang a sign in order to identify themselves. A real revolution within outdoor advertising came in 1450, when Johannes Gutenberg invented a movable type. This allowed for circulating handbill and posted bill, which became highly popular. This period can according to Huthamo also be addressed as the Gutenbergian Revolution; a period in which communities grew and the hold of capitalism became stronger, which resulted in a gained importance of public advertising (16). By the 17th century the new technology was adapted to outdoor signs, which changed urban space leading to the widespread of great swinging sign boards through cities. At first the posting of these signs was somewhat primitive. Usually a boy was given a fistful of bills to post, which eventually led to the posting of bills over others. Therefore it didn't take long until some advertisers wanted exclusive rights to post bills in desirable locations. This first place for commercial advertising appeared in 1740, when a London clothing merchant officially posted his bills on official proclamations. Enterprises began to acquire legal rights to use certain surfaces and rent them out for advertisers. This practice came to be known as 'placard advertising' in London, were advertising space was rationally divided into framed 'lots'. Later this same idea was introduced in the United States naming it 'billboard'. This 'technology' back then could be summarized as: "like the buildings rising in growing metropolises, billboards contributed to the accretion of commercial centre's and formalized the incursion of pictures and texts to the public sphere" (17). At the end of the 19th century the billboard had become a prominent part of the urban environment. New dynamics were added to these billboards with the introduction of electricity. By applying it on billboards Broadway became known as the 'Great White Way', referring "to the electrified advertisements and illuminated shop windows that turned the street into luminous attraction after dark" (22). Lanterns and spotlights were placed upon the billboard, which can be seen as the early urban screens.

When looking into this history we see that cities have provided important spaces for advertising and urban screens or as Bernstein stated in his book *Advertising Outdoors,* "advertising began outdoors" (12). Through the use of window displays, signboards, billboards posters and other forms of outdoor advertising advertisers have sought to capture the attention of people wandering through true urban spaces. Though, early scientists already

wrote about the significance of urban spaces and cities. V. Gordon Childe can be seen as one of the most important. His writings and findings addressed three revolutions that shaped modern cities as we know them today. He also stated the first cities arose around 4000 BCE in Mesopotamia. Without disregarding the importance of these findings, this research will merely focus on how modern (mobile) technologies changed/shaped urban culture and commerce. In looking at cities as a social institution Lewis Mumford's writings can be seen as one of the most influential writings. In his work "What's a City" Mumford addresses that the city can be seen as a "theatre of social action" (91). Art, politics, education, commerce and more all serve only to make the "social drama... more richly significant, as a stage-set, well designed, intensifies and underlines the gestures of the actors and the action of the play" (91). Mumford's idea on the theatre of social action or urban drama lines up with the findings of Jane Jacobs who talks about the city as 'street ballet' or the idea by William Whyte that a good urban plaza should function like a stage. Jacobs and Donald Appleyard even urged planners to fulfil human needs for fantasy and exoticism. According to them the city "has always been a place of excitement; it is a theatre, a stage upon which citizens can display themselves and be seen by others" (92). Mumford describes the city as a related collection of primary groups and purposive associations. And in its complete sense the city can be seen as a geographic plexus, an economic organization, an institutional process, a theatre of social action, and an aesthetic symbol of collective unity. Though Mumford argued that the focus on the physical changed the social role of the city; "In the development of the city during the last century we expanded the physical plant recklessly and treated the essential social nucleus" (93). Mumford also marks with the merging sources of power, transport, and communication inhabitants don't use cities in a traditional manner anymore. He states that "even without intelligent public control, the likelihood is that within the next generation this dissociation and decentralization of urban facilities will go even farther" (95). This illustrates that with the rise of technologies urban space and the use of this space is changing.

CITIES IN TRANSITION

Melvin Webber also addressed this change in 1968. In his article "The Post-City Age" he wrote; "We are passing through a revolution that is unhitching the social processes of urbanization from loca-tionally fixed city and region" (550). He argued that due to the explosion of technology and science employment is shifting from production of goods to services and the increasing ease of transportation and communication is dissolving the spatial barriers to social intercourse. Due to these changes a new large scale urban society emerged which was increasingly independent of the city. In the past societies had been spatially and locally structured, now they are pluralistic and mobile. Throughout human history social organization coincided with spatial organization. During the preindustrial society people interacted almost exclusively with geographic neighbours. With the coming of large-scale industrialization the strictures of space, stimulated by the ease of travel and communication, were rapidly eroded. Technological improvements dissolved the glue that held

together the spatial settlement and reduced the frictions of space which eased long-distance intercourse.

Later in 2001 Saskia Sassen wrote on the changing urban landscape due to the integration of new technologies. In her article "Cities in Transition" Sassen describes how globalization and information technology changed relationships among cities and reconfigured the physical arrangement of activities within urban space. Sassen does argue that spatiality became less relevant due to new technologies, but she refutes Webber's idea of the diminished importance of cities due to new technologies. She states that cities even became more important (555). She illustrates that new information technologies restructured cities. She sees nodes of intense business activity emerging along "cyber router" or "digital highways" (555). She discerns agglomeration and centralization across physical space and within cyber-space. Transterritorial centres of intense economic activity combined with centrality in electronically generated space. Telecommunications and globalization have emerged as major forces which shaped the organization of urban space. This reorganization raged from the spatial virtualization of growing number of social and economic activities to the reconfiguration of the geography of the built environment for these activities. These developments repositioned the urban and the urban centrality.

These changes can also be seen in the work of Manuel Castells. He stated that spatial experience of contemporary urban/city life is expressed both through "the spatial flows" and "the space of places" (572). With this he means that urban life is expressed through both the electronic, computerized network of telecommunications through most of the new global economy is conducted and the physical world of neighbourhoods and local business nodes within metropolitan regions where people live their day-to-day live and develop personal, familial relationships and individual identities. He even states that the world has entered a new age, 'The Information Age', which is characterized by a new "network society" and the "informational city" (572). Castells argues that advanced telecommunications, Internet, and fast, computerized transportation systems allow for simultaneous spatial concentration and decentralization. This created a new geography of networks and urban nodes throughout the world, countries, and between metropolitan areas. These developments also changed social relationships. These are characterized as simultaneously by individuation and communalism, both processes using, at the same time, spatial patterning and online communication. Both spatial flows as the space of places are more and more intertwining, which brings Castells to a new theory. The theory of cyborg cities or hybrid cities (578).

These hybrid cities are based on the interaction between the physical and digital space. Al sorts of data flows are intertwined within city life, and can also be called a Hertzian landscape. According to Adrian Mackenzie this notion of the Hertzian landscape refers to a landscape of data transmission. A landscape in which topographical distinctions don't matter anymore. Wireless data networks are woven together which create a landscape that overlays and overflows topographical and geographical differences between various points. This new Hertzian landscape transforms public space in a way that it reactivates urban public space. Data flows differently in the fabric of urban places. It takes new paths without physical connection. These flows of information are synchronized to the movement of people and are

remarkable parts of everyday domestic, commercial and organizational infrastructure of everyday urban life.

These digital information flows created these new hybrid cities. De Souza e Silva refers to it as hybrid spaces, which arise when virtual communities (cyberspace), with the use of mobile/digital technologies and interfaces, migrate in to physical spaces. Interfaces define our perceptions of the space we inhabit, but also the type of interaction we engage in. Interfaces can, according to De Souza e Silva, be defined as "communication mediators, representing information between two parts, making them meaningful to one another (261). Human-computer interfaces traditionally were defined as communication relationships between a human and machine. The interface translates the digital information from computers to humans, so it can be understood. De Souza e Silva proposed a further conceptualization of social interface, which not only reshape communication relationships but also the space in which the interaction takes place. In her argument she states that mobile/digital devices now reshape this social space even more. These devices/interfaces can now be compared with micro computers and create a more dynamic relationship with the Internet, because it is embedded in outdoor everyday activities. Therefore we can no longer address the disconnection between physical and digital spaces, which gave the rise of hybrid spaces, which are mobile spaces that are created by the constant movement of user who carry these mobile devices that are continuously connected to the internet and other users. Hybrid or connected spaces are the merge of the physical and the digital within a social urban environment which is created by the mobility of users who are connected via mobile/digital technology devices. The exponential growth of portable communication technologies have contributed to the possibility of being always connected to digital spaces. Due to mobile internet connections people are constantly connected to the internet, so they do not perceive physical and digital spaces as separate entities. The borders between physical and digital spaces become blurred and no longer clearly distinguishable.

These changes due to digital technologies also have their influences on the development of commercial urban screens within urban spaces. First in 1976 the landmark Spectacolour Board on the old New York Times building changed in to a programmable electronic sign. This change can be seen as the rise of a new medium, which attracted keen interest from a range of advertisers. A second significant development in large-screen technology occurred in the mid 1980s with the release of Sony's JumboTron and Mitsubishi's Diamond Vision. These screens had the capacity to display full color video at much better resolution, which meant that they soon began to find a home ate premium sporting venues, as well as in high-visibility central city locations. Driven by this rapid expansion of large screens LED technology got introduced within urban space. The rapid rise of LED technology within urban space underpins a range of new products such as 'media façade' systems developed by a German-based company, enabling entire buildings to be clad in a surface that remains relatively transparent from the inside, but supporting large-scale video images when seen from the outside. These developments in LED technology has according to Scott McQuire "propelled architecture towards a new role as [...] 'media buildings': structures with the primary function of providing information rather than habitation" (47). This rise of public screens and 'media buildings' has, according to McQuire, become one of the most visible

signs in contemporary urbanism, which is symptomatic of the emergence of what he calls the media city; a city in which the spaces and rhythms are radically different to those in classical theories of urbanism. “The physical scale of contemporary cities, the distribution and heterogeneity of their populations, and the forms and speeds of circulation that characterize urban life, all depart from previous models” (47). Also a city in which media has changed. From a centralized distribution of newspapers, film, and electronic information, to decentralized forms of distribution enabled by digital networks. Contemporary media are becoming mobile, pervasive and instantaneous, changing the city in a media-architecture complex (47). “This is manifested by the proliferation of spatialised media platforms – what the industry calls ‘place-based’ media such as public screens – as well the production of hybrid spatial ensembles, such as the novel forms of co-presence generated by wireless mobile devices” (47). The full implications of this new media city are coming more to the fore with the extension of digital networks. The media city is designed to foreground the way that our experience of space in contemporary social life now emerges through a complex process of co-constitution between architectural structures and urban territories, social practices and media feedback. “The convergence of ubiquitous ‘real time’ media with urban space has become a constitutive frame for a distinctive mode of social experience, a new way of binding in Henri Lefebvre’s terms, cognition and affect to space” (48).

These developments due to digital technologies and the rise of urban screens already show a changing urban commercial landscape and already argued the impact of these changing. Though to get an even better perspective on these changes this thesis will also examine historical discourses on the impact of urban screens on the experience of urban spaces, or as Huhtamo also argued; “The emergence of public media displays did not take place automatically. There is nothing self-evident in the roles they came to play in urban spaces and beyond. It happened as a consequence of economic, political and social developments that were accompanied by discursive commentaries, cultural debate and social struggle” (26).

BILLBOARD IMPACT

The rapid proliferation of billboards and or urban screens vividly transformed the urban streetscape. It constituted one of the first and most visible instances of what now commercialization of public space is called. In the article ‘Public Sites Versus Public Sights: The Progressive Response to Outdoor Advertising and the Commercialization of Public Space’ Laura Baker examines the intense provocations towards the commercialization of public space. According to Baker by the turn of the 19th century outdoor advertising had become a lightning rod for debates over the impact of what was called the ‘juggernaut of commercialism’ and a big subject of reform efforts worldwide (1188). In her research she tries to historicize the underlying debate on the relationship between culture and power. These elements play an important role in the legitimization of consumer capitalism, because of the increasing self-consciousness turn to culture as an instrument of both class constitution and social uplift. The debate on this started with the expansion of commodity manufacturing and retail combined with improvements in printing technologies which created a big growth in outdoor advertisements.

The expansion of outdoor advertising was part of a larger, dramatic increase in advertising volumes. Bill posting, the distribution and display of poster advertising had developed into a specialized branch of advertising like advertisers, printers, publishers and advertising specialists. It even got bigger when the Bill Posters' Association sought to improve the industry's profitability and reputation by regulating business practices including adopting the Billboard. Instead of providing their services to local businesses they provided it to large-scale consumer product manufacturers, which secured high volumes and nationwide sales. This marked the start of a new type of advertising. No longer price competition and availability were communicated. They started to build a brand identity by using catchy slogans and great graphic and colorful imagery. Billboards had the present one thought, quickly and dominantly. It was the new mass market advertising method. Marketers even argued that billboards were distinctly superior to newspaper and magazine ads. This period not only marked a new advertising era, it also marked a new discourse/debate; The Billboard Problem. Advertisements suffused not only the static public space, but also mass transit vehicles. In 1908 civic reformer Horace McFarland started complaining the changing urban landscape. Outdoor advertising permeated the urban landscape. People lived surrounded by the advertisements. The visual environment with commercial messages started to transform entire cities in marketplaces. It threatened to become the principle art of public space.

The opposition to outdoor advertising came from a variety of sources. These opposition were willing to allow the "commercial utility" of outdoor advertising, but were unanimously opposed to the perceived excesses and abuses of the practice. The concerns focused on lowering of residential property values by billboards, because it blocked passages of air and light, backsides were used as dumping grounds for garbage and as public urinals, it even stimulated hiding places and retreats for prostitutes, juvenile delinquents and criminals. Thought the biggest concern was the aesthetic value of urban spaces. It was ugly and it offended the aesthetic sense which injured the city. Yet these concerns weren't even the biggest concerns. "Billboards were conspicuous agents of an emergent consumer culture, seemingly everywhere and always inviting urban inhabitants to embrace new habits, tastes, and values based on commodity consumption" (1193). Billboards menaced not only character but also environment. Outdoor advertising was condemned as crude, vulgar and shocking to the eye, debased arts that, willfully or ignorantly, disregarded standards of good taste and threatened the aesthetic value of their surroundings. In order to compete to this up rise of outdoor advertising reformers tried to legally regulate outdoor advertising, by proposing legislation modeled on public nuance laws that would impose height and other limitations. Eventually these reformers saw a major victory in zoning outdoor advertising; the removal of outdoor advertising in many of the residential sections of major cities.

Just like Baker, Kurt Iveson also addresses the bigger influence of outdoor advertising or commercial space on urban spaces, but examines contemporary outdoor advertising. In the article "Branded Cities" Iveson states that there have been "significant changes in both the quantity and form of outdoor advertising" (2). Urban advertisement once was dominated by static billboards and shop signs, no advertisements commonly adorn bus shelters, buses, train stations, trucks, scooters, taxi's, public toilets, rubbish bins, newsstands, fruit stalls,

flower stalls, and public telephone booths. Looking at specialist media companies they now also display advertisements on screens in lifts, foyers, shopping malls, airports, in-shop displays and more. Traditional static billboards and signs are increasingly changing in to screens which can display video and animated advertisements. These trends aren't restricted to a few large wealthy cities, but are placed in hundreds of cities across every populated continent. According to Iveson these advertisements are starting to receive some overdue critical attention. Iveson states that most research was focused overwhelmingly on the representational content of advertisements, and how particular advertisements might play a role in shaping people's experience of self and place. Though Iveson states that these are important question he also argues that less attention has been paid "to equally important questions of form, focusing on how technique and technologies of outdoor advertising have evolved and mutated" (3).

He argues that the issue of form is absolutely vital for the understanding of the wide public sphere. Our society is immersed in advertising as the dominant mode of communication, whether one wishes it or not. It structures choice by establishing a scale of priorities and social preferences in the use which society makes of collective resources. Therefore Iveson seeks to address three key questions in his article. First, what are the factors behind the contemporary growth and transformation of outdoor advertising? Second Iveson addresses how changes in form of outdoor advertising will impact the use of urban outdoor spaces, and third he tries to seek how a more democratic outdoor media landscape can be build in order to address any potentially harmful impacts of new outdoor advertising arrangements for urban public realm.

In many cities outdoor advertising can be pretty ubiquitous, but according to Iveson cities can be seen as a democratic space (12). It is according to him about finding the right balance between the architectural aesthetic value and the commercial value of the city. Though, this balance seems to be increasingly under threat. Outdoor advertising have become ads on wheels; advertising on buses, taxis, metro's etc. But why does this really matter? Historically outdoor advertising has been critiqued as an intrusion of crass commercialism in cities at the expense of civic beauty and order which embodied the common good. Outdoor advertising undermined the civic reformers efforts to improve the moral and civic character of the people through architecture and civic design. Billboards destabilized architectural and landscape design's to properly form cities and citizens. Many attempts tried to reach aesthetic order and land-use control by introducing planning codes. In the UK the so called 'Clutter Code' was drawn up by the planning Minister in 1960, designed to address the billboard problem in British cities. This resulted in the removal of 220.000 advertisements by 1963, and further 40.000 were re-sited. This criticism of outdoor advertising can according to Iveson be called a 'ceremonial' normative model of public space (12). "In this ceremonial model of public space, good public space is space that privileges the civic order over and above private market interests" (12). Within this model the people tend to be imagined by elites as a passive audience for ceremonial, monumental and architectural displays which might exercise civilizing influence. Many critics on outdoor advertising protested its effects on spatial order and appearance. But outdoor advertising also affects democratic political life or social heterogeneity. Iveson emphasizes that urban

public places "are important because of the variety of forms of public address they can sustain, both embodied and mediated" (15). In this Iveson illustrates the changing urban landscape due to the emergence of a constant changing outdoor advertising. His biggest concern is the monopolistic position outdoor advertising has created. Both embodied and mediated public places are intertwined, which in his view affects the democratic urban landscape.

The idea of making and remaking urban places due to outdoor advertising can also been seen in the work of Cronin. In her work 'Advertising and the metabolism of the city: urban space, commodity rhythms' Cronin explores the role of outdoor advertising in organizing urban space. She examines the ways in which UK outdoor advertising companies segment and price certain areas of cities, and routes to and around cities. She argues that outdoor advertising continually makes and remakes city space. In order to argue her findings she uses Lefebvre's concept of city rhythms and argues that outdoor advertising acts to align the urban rhythms of travel and work with commercial rhythms of product innovation, promotion and the commodity's lifecycle. In this it creates an urban time-space of commodity rhythms. This can have important implications on how people experience cities and engenders new connections between commodities and people moving around the cities. Cronin emphasis on the significance of urban outdoor advertising beyond that of its textual content and commercial impact of individual campaigns. Just like Iveson they both don't look at the message of outdoor advertising, but analyze how commercial spaces within urban spaces change the way people experience cities. She considers Lefebvre's emphasis on the structuring interaction between linear and cyclical rhythms, and the interaction between the bodies of people in cities and the fabric of urban itself, to look at the impact of outdoor advertising in a different way. She states that in Lefebvre's work the body is central in any analysis of space and cities; "Through the mediation of rhythms (in all three senses of 'mediation', means, medium, intermediary), an animated space comes into being which is an extension of the space of bodies" (17). Cronin argues that advertisers attempt to exploit this animated space, by adjusting to and tapping into the linear rhythms of commuting to work that are linked to the cyclical, bodily rhythms of sleep, walking and work. Things or objects can be seen as having 'social lives' and 'biographies', and with the knowledge that a person does not end with limits of his physical body, advertisers try to connect these 'biographies' of their commodities in to the open space of a person. In doing this the biographical unity of a person may be revised or expanded. Advertising attempts to target and inhabit everyday commuting and shopping routes by tapping in to the everyday rhythms of life and becoming part of the fabric of urban experiences. Because of this interwoven function of outdoor advertising advertisements mark the experience of time. Commercial rhythm aligns with the everyday rhythm of life. When inhabitants can't recognize the new advertisements within an urban scene it can jar the temporal framework of the urban every day. "At these disquieting moments, the normally unrecognized comes to the fore – here, the way in which advertising frames our experience and understanding of the passing of time in specific spaces" (11). When looking at advertising this way the impact on cities goes beyond the potential commercial effects of individual campaigns and the textual content of specific advertisements. According to Cronin "[a]dvertising's well-established presence in city space and the way it functions through constant, rhythmic innovation has a significant effect. This

commercial temporality and the spatial organization of advertising-rich routes into and around cities becomes part of our taken-for-granted experience of urban space" (12). Advertising in urban spaces creates a time-space of 'commodity rhythms' that attunes people to the rhythms of commercial innovation and promotion. It links our embodied, biographical movements in the city with the biographies of commodities.

This impact on the dynamics and rhythms of public space is also argued by McQuire. As more large urban screens are launched, it is becoming more of a global issue. Though we don't really know whether emerging global infrastructure of public urban screens can be used in a way that it activates public participation, or that it only will be used for advertising messaging, we do know that a key advantage of these large urban screens is their capacity to promote new forms of shared experience in symbolic locations. In this respect McQuire states that "the emergence of a new generation of screens positioned in pedestrian spaces such as city squares is significant" (61). In this other rhythms can be explored, instead of being constrained to the immediate need to seize the attention of a fast moving target. We could look at how urban infrastructures might facilitate the polyphony or what according to McQuire Lefebvre calls polyrhythmia, of cosmopolitan public cultures – the intertwining of the digital with the non-digital. A good example of these changing rhythms and intertwining is the Federation Square, which can be assigned as a media-dense space comprising a variety of platforms such as large screens, LED signage, wireless networks, a growing range of interactive capabilities and more; a space in which digital interactive technologies and urban screens are intertwined in traditional public spaces as street life, city squares, cafés, and public cultural institutions, which create entire new urban dimensions. The rhythm of people is connected to physical and digital technologies. People's embodied and biographical movements are connected to the biographies of commodities, which McQuire calls a 'relational space' (48). Personal and face-to-face encounters are routinely punctuated by ongoing interactions, which are sustained by complex technological systems. The biggest effect of this process is that particular sites and social situations have increasingly been stripped of inherent qualities like stable dimensions, enduring appearances and secure meanings. The relation between city boundaries and physical spaces are becoming increasingly contested and susceptible to new forms of mobility and digital technologies.

THE RISE OF INTERNET OF THINGS IN URBAN SPACES

The previous developments already show the smarter interaction between people and technology or physical artifacts, which can be seen in a new trend called 'The Internet of Things'. A term which was also named as pervasive computing, ambient intelligence, but was first described by Weiser as ubiquitous computing. In his article "The Computer of 21st Century" Weiser tries to conceive a new way of thinking about computers. A way of thinking that takes into account "the human world and allows the computers themselves to vanish into the background" (78). When pushing computers into the background embodied virtuality will make individuals more aware of the people on the other ends of their computer links, which will reverse according to Weiser "reverse the unhealthy centripetal forces that conventional personal computers have introduced into life and the workplace" (89).

Ubiquitous computer can reside in the human world and pose no barrier to personal interactions. With the transparent connections between locations and times ubiquitous computers can bring communities closer. When almost every object can obtain a tab or computer information will become more accessible, it will overcome the information overload. Technologies can than fit and adapt into the human environment, instead of forcing humans to enter theirs.

Weiser' way of thinking about how computers or technology can disappear in the background is now becoming more visible within our urban landscape; a landscape in which a network arises which will connect all objects. Vehicles, machine components, domestic consumable durables and other objects are being embedded in a network of things – the internet of things. Though, we can't look in to the future we could argue that this is becoming a reality. As Kevin Kelly stated in a lecture he gave about the internet; "In 5000 days, less time than it takes for a child to progress through the school system, the world had been transformed" (Kranenburg et. al. 5). And looking at the speed this transformation occurred Kevin Kelly stated that the upcoming 5000 years will do no different. "Everything will be part of the web. Every item, every artifact… will have some sliver of connectivity that will be part of the web… The environment will become the web" (Kranenburg et. al. 5). Already this transformation can be seen. The most simple example is Nike+ - shoes connected to a network. And with the development of Radio Frequency ID's (RFID), making it possible to uniquely identify and track almost any physical artifact, dropping below one cent cost this transformation is becoming even more reality, making it technically possible and economical feasible. This doesn't necessarily mean that it will happen, but it illustrates that the technology is and can already be easily used. And knowing that Weiser' thinking has become reality we could argue that we are heading towards the internet of things. Weiser was one of the first to address the problematic issue of the interface of everyday life and interactions. He noticed that 'windows' or screens (desktop/notebook screens) were never meant for individuals, but instead for systems and large companies. Therefore he began to wonder how best to access this virtual world not only through keyboard and mouse, but intuitively and using all computers' potentiality making it disappear. This disappearance refers to physical disappearance, the miniaturization of devices and their integration in other everyday artifacts, but can also refer to mental disappearance; a situation in which computers and technologies can still be large, but aren't perceived as a computer because people discern them. In achieving this Weiser came up with tabs, pads and boards. Tabs referring to micro computers embedded in a badge, which could be connected to wireless system and identifying other objects, which now can be recognized as RFID. Pads had to become the new interfaces. Touch enabled 'paper' like surfaces which wirelessly was connected to other devices and could be carried around easily. Information was retrieved from the terminals and could easily be reshaped and rearranged through this tabs. Information could now be taken to any place anywhere, making it freely accessible and shareable, adopting technology to the human world. These devices are now commonplace in the form of mobile urban screens (smart phones/tablets) that are connected server terminals which stall all the information (cloud computing).

Though Weiser could be seen as one of the first recognizing what we now call the internet of things, the first real research started in 2001. A cluster of 17 projects (The Disappearing

Computer) started to address a wide range of themes and issues in order to see how information technology could be diffused into everyday objects and settings, which could lead to new ways of supporting and enhancing people's lives that go beyond and above of what they could do with the personal computer back then. The project hosted various projects like 'Workspace', aiming to augment working environments through spatial computing components. Organizations started to do more research. The European Technological Platform EPoSS did research addressing the internet of things as "a world-wide network of uniquely addressable interconnected objects based on standard communication protocols" (Kranenburg et.al. 10). Microsoft also addressed the idea of the internet of things in 2003; "As people find more ways to incorporate these inexpensive, flexible and infinitely customizable devices into their lives, the computers themselves will gradually "disappear" into the fabric of our lives" (Kranenburg et. al. 12). Cisco foresaw the IoT and the number of devices connected to the Internet eventually exceeding the number of people populating the entire planet. Current research of the European Research Cluster, which is sponsored by the European Commission's Seventh Framework Programme, is focused on enhancing Europe's competitiveness in the information society. The UK government even has allocated a 5 million dollar grant to develop the IoT in the UK. Another project is the Internet of Things Architecture, which addresses the Reference Model and possibly several Reference Architectures relayed to IoT domain, and plans to generate different reference architectures according to abstract requirements for the technology, creating design guidelines for real systems. In 2011 the fourth Annual Internet of Things Europe Conference was organized, showing that this conference and all the other (government sponsored) organizations are a sign that IoT is not a contemporary idea of the future, but can really become our future. And since the technology that enables IoT is already in use we can agree that IoT will come to play a major role in urban society. One of the most discussed, but one of many, IoT enabling identification technologies is RFID, an identification technology that can be seen as the cornerstone of the upcoming IoT, and already is used in many appliances (*Internet of Things in 2020,* 2010). Besides RFID there are several technologies that could enable IoT. Near Field Communication (NFC) is becoming a more prominent technology within the landscape. More interfaces are embedded with this technique, which brings more opportunities like interacting with other devices. Easy and quick information sharing, payments etc. In Asian countries NFC already is a dominant technology, which influences every day urban life. Both RFID and NFC represent just a small aspect of the overall debate since the IoT applications will mainly consist of smart objects e.g. all forms of sensors, actuators, small devices connected together using radio/wireless technologies but also wired technologies. According to Kranenburg et.al. IoT applications will be used in a wide range of innovative areas like industrial automation, smart grids and smart cities.

It are these smart cities that are important to this research. In the book 'Sentient City: Ubiquitous computing, architecture, and the future of urban space' Mark Shepard explores the experience of living in a city that uses networked digital technologies to remember, correlate, and anticipate. The book imagines a variety of future interactions that take place as computing leaves the desktop and spills out onto the sidewalks, streets, and public spaces within cities. Cities are smart and are getting smarter. "Information processing capacity becomes embedded within and distributed throughout ever-broader regions of

contemporary urban space" (10). In everyday life people interact with artifacts, systems, and spaces, which collect, store and process information about them, or are activated by the movements and transactions of people. Computer technologies now increasingly play a mediating role within urban life. Data clouds of the twenty-first century are descending on contemporary city streets, sidewalks, and public spaces. People now leave entire data tracks by checking in with RFID chips/tags, connect to open Wi-Fi and mobile networks, and are registered by face recognition cameras. In an article by Mizuko Ito, Daisuke Okabe and Ken Anderson they analyse the new connection with cities through the use of technology. They argue that technology and in special mobile devices are becoming "the central node of the ensemble of portable objects that urbanites carry with them as they negotiate their way through information-rich global cities" (1). They see these (mobile) technologies as an interface to urban space. (Mobile) Technologies and infrastructure is tied to local situations, and intersects with the physical infrastructure of the city. Though they don't isolate the mobile phone, but approach the mobile phone as a part of more portable objects that interfaces with the city; "the information-based 'mobile kits' of contemporary urbanites" (67). With this approach they differentiate three kinds of urban interfacing; cocooning, camping, and foot printing. The first, cocooning, refers to the shielding off people within public spaces, like using a portable media player, books, or immersed in to mobile phones. Urban inhabitants create a sort of private space bubble. Camping refers to the act of doing information related work within a nice spot in the city (coffeehouses, streets). This idea of camping aligns with the work of Mackenzie. He argues that the flow of information (supported by Wi-Fi) is synchronized to the movement of people, and became remarkable parts of everyday domestic, commercial and organizational infrastructure. In this case Mackenzie refers to London, were people depend on day to day basis on the flows of information. Without these flows they can't manage their daily life practices. Due to these internet connections and information flows people leave traces, or as Okabe and Anderson describe it as footprinting. Footprinting refers to the various transaction and loyalty schemes through which people leave traces in a particular location.

Upcoming identifying technologies will create an "urban infrastructure capable of sensing and responding to the events and activities transpiring within city" (Shepard 20). This can make cities capable of reflexively monitor its environment and the behavior of its inhabitants, becoming an "active agent in the organization of everyday life in urban public space" (Shepard 20), and changing the experience of the city.Throughout history cities have always been inscribed by various information layers, shaping urban experiences. But now, as Shepard also endorses, with the rise of IoT we can situate new experiences within urban spaces. Cities are becoming smarter with the integration of communicating internet enabled identifying technologies. Within these cities urban screens are getting more important and as claimed earlier is this thesis more pervasive. So what is the impact of the rise of IoT and urban screens on experiencing commercial urban space?

Urban spaces and public arena's provide temporal and spatial mechanisms for generating and promoting various social interactions. It, according to Schieck, generates a stage for events and activities on which people negotiate boundaries of a social and cultural nature (273). In this city architecture plays an important role in the construction and reflection of

social patterns. Not only plays it an important role in reflecting social patterns, it also plays an important role in generating movement patterns and the co-presence between people, which provides an platform for rich and diverse social interactions. And as the internet of things is becoming more important in our contemporary society, we can also see that pervasive computing or IoT is becoming increasingly part of our built environment. Physical and virtual urban components are starting to merge in various ways which can be seen in the rise of urban screens. Urban screens are becoming closely connected to twenty-first century's narrative of urban space. Large projections of displayed information are becoming more and more ubiquitous in urban spaces. Digital information is getting embedded in physical construction materials, and architectural surfaces are being transformed into moving images (i.e. Toren op Zuid, Rotterdam). In this Schieck sees a new form of architectural space emerging which is different from what we have known (243). She wonders what happens to urban spaces when the architectural material is becoming a media screen, because "these moving images may play a vital role in our perception of the space around us and our understanding of the public realm that embraces them" (243). Due to the embedment of pervasive computing the combination of the physical architecture with the virtual information and representation on the building facades they now can be seen as both an interface with, and the generator of, diverse social interactions. Most of these screens serve mainly commercial purposes, showing objects in different scale and proportions. This illustrates that commercial space via urban screens is changing within urban spaces. Looking at the Las Vegas strip which grew by various experiments, mistakes, wild visions, pragmatic solution, and chaotic collage becoming 'collective art' freed from limitations of architectural theory and high-art taste, it grew to become a mass medium revealing dreams, fantasies and desires of American mass culture. Now this has taken a step further, with the introduction of LCD (Liquid Crystal Display) screens dominating the skyline. Mainly driven by advertising appearing in various shapes, sizes and orientations, they generated a scattered landscape of advertising images broadcasting new dreams and fantasies. Another example of a media facade is the NASDAQ building in Manhattan housing a curved high-tech LED display, broadcasting up-to-the-minute financial news driven by events, market highlights and advertisements and transforming urban perception through time. Advertisement is also combined with urban art. A good example is the CASZ screen in Amsterdam which uses an urban screen as a stage for the moving image with a high quality of film and visual arts. 80% of this screen programming is used for art and 20% for advertising related programming, engaging people to this screen via art to eventually engage them to advertising. An even more engaging example is The Crown Fountain by Plenze located in Chicago which features a shallow pool with two glass block towers displaying a projected video strongly related to its social context. It broadcasts community related images in a kind of open air gallery displaying the faces of thousand Chicago inhabitants, which sprouts water out of the mouths of these inhabitants at the last minute of displaying. Besides engaging urban screens and pervasive computing technologies can also be connecting. The Telescope, located in New York and London, houses a giant electronic telescope through which people could send real-time messages or use other media to the other side of the world. In this way people are in real-time connected (displaying inhabitants) to a different location in a different time zone within urban space. More than connecting power, urban screens can also

let people participate creating a user generated urban display. A good example was an interactive installation by Rafael-Lozano Hemmer in Rotterdam. The installation called Body Movies explored the intersection between new technologies, urban space and active participation, by establishing architectural and social relationships through projecting parts of portraits when the shadow of inhabitants were in front of the architecture, creating a collective experience and embodying different representational narratives. Sort of the same approach was Under Scan. Over thousand video portraits were projected on urban floors activated by the shadows of the urban inhabitants, trying to establish eye-contact. When an inhabitant looked away the portrait also looked away, making the inhabitants participate with virtual and physical elements within urban space.

An example that brings connecting, social en engaging all together comes from the project 'Nice to Meet You'. This project illustrates how technology can be used to visually improve urban areas under construction. A company called Bonnier Properties was building a shopping centre in Hornstull Stockholm, the construction which is inevitably an eyesore and headache for residents. But rather than just leave the construction tunnel as is, the company decided to do something positive which would appease residents in the area. They installed a social digital artwork of a forest in the tunnel, which was constructed of speakers, projectors and Microsoft Kinect sensors, so whenever people walked by this forest a new leaf was added with which people could interact via the sensors and connect via Facebook.

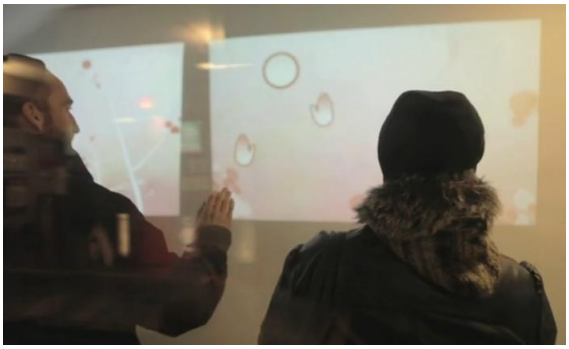

Fig 1: Transforming urban spatial construction sites in to fun, social, interactive urban screens. Engaging citizens on a social level.

Fig 2: Via sensors and gestures citizens could really interact with these urban screens. Creating a social space around a construction site.

INTERNET OF THINGS AND URBAN SCREENS

The given previous examples illustrate the pervasive and engaging character of urban screens, which can also been seen within the commercial use of urban screens. More and more brands are using digital technologies within urban spaces in order to engage their audience with their brand. A good example comes from the brand EVOC in promoting a product that prides itself in durability and protection they challenged people to break their product which was placed on a billboard. By hitting, kicking and punching in to their backpack people tried to break it, eventually nobody could break it. But with every punch and attempt the impact would end up taking a photo of the person hitting the billboard and

posting it up on the main site. This resulted in 97 hits recorded per hour, lots of coverage on both online and offline media and a 220% increase of fan activity on Facebook.

Fig 3: Queensday Amsterdam, gamified experience during peeing. Via sensors citizens can act with urban artifacts, stimulating interaction.

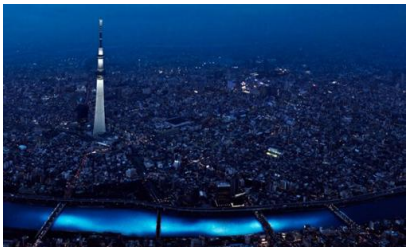

Fig 4: Panasonic turned an entire river into an urban screen.

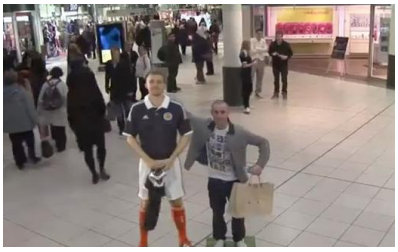

Fig 5: Adidas is letting people interact with their favorite football players via augmented urban screens.

In an attempt to change a big part of urban space Panasonic turned the entire main river in Tokyo blue in using more than 100.000 LED lights. Looking it from above it looks like a giant snaking beam of electricity. The reason was to celebrate the famous fireflies during the Tokyo Hotura festival, connecting a brand to urban society and urban space.

During Queensday, one of the biggest events of the year in the Netherlands, people flock the streets to have a lot of fun, but due to the enormous crowd people mostly end up choosing to pee in the canals or other urban places. In order to change this behavior the local water authority came up with a brilliant idea of creating a game out of peeing into urinals. With punters being rewarded for their pee strength and distance and using sensor technologies, the pee was transmitted on to a large urban screen meaning that it turned into a big vanity urban game; the person with the best score won the prize of year's free water charges. The great thing about this project is the engaging and immersive character, by making the message fun and merging the physical everyday live with digital layers.

For promoting the Scotland football jersey Adidas came up with an Augmented Reality project, which gave fans the change to stand beside and interact with their International footballers. Standing in front of a big urban screen, people could see themselves standing near an augmented football player, engaging them with a brand and urban screens.

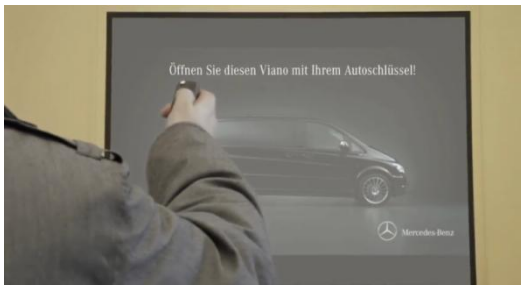

Fig 6: By using the car key, people could activate the billboard.

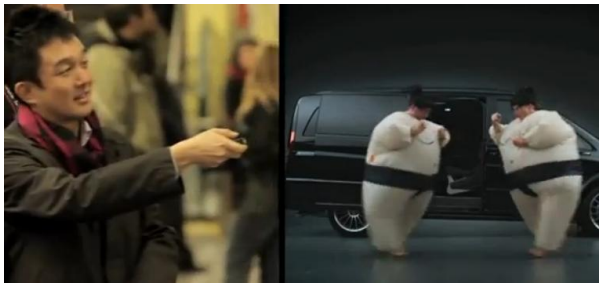

Fig 7: People who are interacting with the Mercedes-Benz urban screen via their car key and winning prizes.

In Berlin Mercedes-Benz had come up with a great project by letting people interact with urban screens in an underground station. Aiming to get more awareness around the new large Viano range, people could control the billboard by using their own car key activating

various movies on the billboards, to eventually win prizes and getting more engaged with Mercedes-Benz by interacting with urban interactive artifacts.

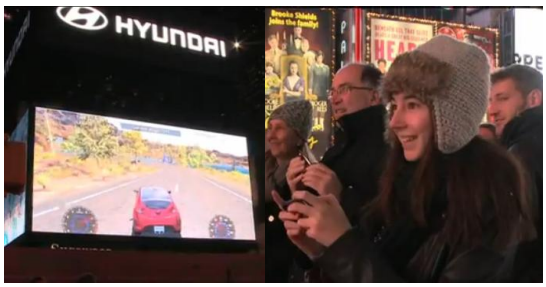

Fig 8: Hyundai placed a giant interactive urban screen on Times Square for promoting their new car model. By downloading the Hyundai app, citizens could use their own iPhone to control the giant screen and play the game

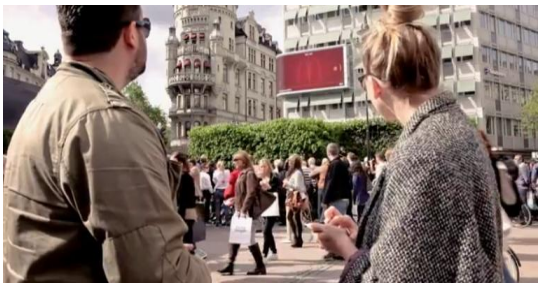

Fig 9: An interactive urban screen by McDonalds, allowing citizens to play against each other via the giant urban screen. By winning people achieved coupons.

Another car manufacturer Hyundai tried to get more attention from their consumers within urban space (New York Time Square), by giving them the opportunity to play the Hyundai game (including their new car) on a giant urban screen. By connecting their iPhone and downloading the app, people could play the game in front of a great audience of spectators, being totally immersed in to the interactive urban screen and into the brand. A same project was launched by McDonalds in Sweden, creating a simple concept letting inhabitants take control over the urban screen turning it in to a personal game. By completing the game in 30 seconds people could win coupons for free food in the nearest McDonalds. With the use of mobile technologies and location based service people could easily connect to billboard, getting immersed in to the urban screen and engaging with the screen, the brand and the environment. Spectators also got engaged, which created a social interaction between people, urban screens and the brand.

Though these examples illustrate a more instant new urban commercial experience, it already shows a fundamental different urban commercial space by engaging people to urban screens via more pervasive technologies. It also that art forms are more used within the use of urban screens and commercial communications. As Julia Nevárez argued that “within the visual saturation of images, designed advertisement for consumption of goods and ideas, art has also become part of the packaging of Times Square’s experience” (173). This isn’t just bound to Times Square but can also be seen to other similar areas within cities intending to attract more tourists or other citizens. Art is becoming a part of the consumption logic that constantly reinvents itself in order to attract and engage audiences and change their perspectives, so the processing of the information won’t be defused and forgotten. Though, most urban screens have the purpose of displaying advertisements, in order to stand out of other advertisements art is being more embedded into commercial communication. In the given examples we can also see this emerging use of art within commercial communication via urban screens by using big screen technology, experimental communication and colorful engaging imaginary which attracts citizens by its newness and appealing design.

The rise of IoT in urban space has changed the way people experience urban screens, which before was perceived as one way communicating billboards, being static and non-interactive, we now can see people interacting with urban screening, merging the physical with the digital

world. Schieck also argues that urban big screens are beginning to form a vital part of the visual perception of the cityscape. “Dynamic moving images generate new architectural material, affecting our perception and understanding of the space around us”, suggesting that a new form of urban space is emerging which is fundamentally different from what we have known (248). Across the world various experiments are embedding new connected technologies in an attempt to augment to urban public domain through the support of social interactions. Unlike the much used pre-programmed commercial monologue, the input and feedback of participants or urban inhabitants are becoming an integral part of the public space, using projections, robotics, sound and local sensors. These new forms represent a critical example of using the new media in the urban space not only reproducing and reinforcing existing space, social structures or change encounters, but also promoting new social forms.

Going further on this fundamentally new commercial urban space, we can even see technologies arising within urban space that are situated within the movie Minority Report. Steven Spielberg’s movie already addressed smart technologies. The movie has an underlying premise that by 2054 our way of life has been transformed by highly sophisticated technology. Technology that recognizes us by name; it knows our likes, dislikes and interests. It could read our minds, know our secrets, and anticipate how we will behave. These technologies utilize super intelligent computer screens, monitors and holograms which are an integral part of the environments we live in. These technologies seem a little far-fetched and fictional, but already technology is being developed to bring this kind of world closer to our reality. Used technologies in the movie are already subsequently introduced or are being developed. Multi-touch interfaces similar to the once used in the movie are developed and distributed. In a scene in Minority Report Tom Cruise walks through a shopping mall as camera’s or scanners, which are lined on the ceilings and walls, scan his retinas which pop-ups custom-made advertisements. This future is now becoming reality. The Japanese company NEC developed an advertisement that follows a similar idea with a camera installed inside an electronic billboard that reads passing faces. Using facial recognition technology and an internal computer, it can determine gender and age and combined with demographics it targets the best possible and relevant advertisement possible. In February 2012 Plan UK launched their campaign “Because I am Girl” in a shelter in London equipped with facial-recognition technology, meaning it only served the ad when a woman passed by. When men passed the shelter they only saw a URL. This shows a new way of interacting with urban inhabitants, showing only the relevant ad to the right person. Though this way of creating relevance is forced upon the person, it does show the power and possibilities of creating more relevant advertising, making commercial communication more engaging and more efficient.

In this we see that facial recognition technology is a rising trend in the digital signage industry. Advertising agencies and content producers are embracing it in search of return on investment. It can provide audience measurement data on age, gender, the amount of time a person looked at the display and the total number of viewers. This technology now already is being optimized in to generate ‘gladvertising/sadvertising’. This software will soon be capable of capturing the mood of consumers. When smiling and showing other emotions

thousands of tiny facial muscles are at work. With emotion-recognition software it is possible to create a 3D face map, pinpointing 12 key trigger areas like eye and mouth corners. Then a face-tracking algorithm matches these movements to six basic expression patterns, which will correspond to emotions. These emotions are fundamental to human experience, influencing cognition, perception and everyday tasks like communication and shopping decisions, which would give advertisers a great way of catering their advertisements.

According to the report '*Up Front and Personal: Digital Out-Of-Home Communications (2011)*' this digital out-of-home advertising innovation is driven by the trend toward mega smart cities. With two in three people expected to be city-dwellers by 2050. The growth of the world population between 2009 and 2050 is expected to increase by 2.3 billion, passing from 6.8 to 9.1 billion. The biggest growth is expected in urban areas; a gain from 2.9 billion, increasing it from 2.4 billion in 2009 to 6.3 billion in 2050. This shows that urban areas are expected to absorb all the population growth at the same time drawing in rural population. This will result in a decrease in rural population, and most likely a decrease of 0.5 billion rural population by 2050. Urbanization is expected to continue rising in both the more developed and less developed regions. By 2050 urban dwellers will likely account for 86 percent of the population in more developed regions, and 66 percent in less developed regions. 69 percent of the world population is expected to be urban by 2050. This urbanization have and will continue to have a great impact on lifestyles and digital communications. Internet and other data access will be available everywhere and anywhere, which will result in that citysumers will be spending a large proportion of their lives out of home. In the UK already 42% of the time spend is out of home, an increase of 33% from 1990 to 2010. These trends are stimulating advertisers for looking to capitalize on opportunities to reach consumers in urban areas with smarter advertising technologies.

Though these Minority Report like urban commercial applications seem intrusive, futuristic and could be scary, this thesis already argued that historical discourses have shown great resistance towards the rise of static one dimensional standard billboard's changing urban culture and experiences, it eventually blended (more regulated than in history) into the everyday urban life, meaning that new technologies can always get resistance from urban society, but eventually can blend in to every day live. Something that is illustrated with the given examples in the contemporary urban space, showing a more engaging, pervasive interaction with urban screens and brands, stimulating urban experiences and social interactions. Or as Schieck would argue; "The combination of the built environment with digital information and representations displayed on the building facades, both embedded in the urban space, can be seen as both an interface with, and the generator of, various social interactions" (252).

This idea is also shared by Audrey Yue, stating that the installation of large urban screens in the postmodern media cities is a fundamental part of urban regeneration. Urban screens can now be seen as cultural infrastructures that can merge architecture, urban design, landscape architecture, economic development, the arts, and natural and cultural history, producing new public spaces and civic agencies as local sites of social change. And by screening content and engaging audiences across time and space, urban screens are also

the frontiers of transnational exchange. Urban screens are key sites for assessing the quality of cultural participation, radically transforming the experience of the screen and the visual anthropology. Urban screens are, according to Yue, "interfaces that intersect actual, virtual and mobile experiences to produce a whole new behavioral context that further engages actual and virtual space, information and people", creating a transnational contact zone for global and local mediascapes connections and identities (275).

The technologies shown in Minority Report are slowly merging in our daily reality, which will create new Out-of-Home communications and advertisements. For years Out-of-Home advertisement was a static one way message medium. Today IoT and engaging, pervasive and interactive urban screens are stimulating interaction with the city, brands and citizens, generating a new commercial space which enhances social intercourse within our urban spaces.

CONCLUSION

This thesis started with arguing that the commercial urban space and the experience of urban space is changing due to the rise of urban screens and the IoT; a change that isn't bound to our contemporary society. Urban outdoor advertising has always been one of the biggest contributors to commercializing urban space, and dates back at least 500 years. Though, the biggest rise of outdoor advertising started at the end of the 19th century with the introduction of billboards and the use of electricity within urban space, turning urban space into a luminous attraction after dark. This rapid proliferation of billboards and or urban screens vividly transformed the urban streetscape. It constituted one of the first and most visible instances of what now commercialization of public space is called, which led to intense provocation because the rapid change of the urban landscape. People lived surrounded by the advertisements. The visual environment with commercial messages started to transform entire cities in marketplaces. Billboards threaded the lowering of residential property value, because it blocked passages of air and light, the backsides were used as dumping grounds for garbage and as public urinals, it even stimulated hiding places and retreats for prostitutes, juvenile delinquents and criminals. Another concern was the aesthetic value of urban spaces. It was ugly and it offended the aesthetic sense which injured the city. Yet these concerns weren't even the biggest concerns. Billboards were seen as conspicuous agents of an emergent consumer culture, seemingly everywhere and always inviting urban inhabitants to embrace new habits, tastes, and values based on commodity consumption. Billboards menaced not only character but also environment. Outdoor advertising was condemned as crude, vulgar and shocking to the eye, debased arts that, willfully or ignorantly, disregarded standards of good taste and threatened the aesthetic value of their surroundings. Billboards destabilized architectural and landscape design's to properly form cities and citizens.

Eventually through legislations and urban planning the traditional urban billboard landscape got more regulated, merging into the fabric of urban materials and architecture and becoming part of everyday city life linking our embodied, biographical movements in the city

with the biographies of commodities. This changed with the explosion of technology and science shifting employment from production of goods to services and dissolving the spatial barriers to social intercourse due to the increasing ease of transportation and communication, creating a new large scale pluralistic and mobile urban society. Technological improvements dissolved the glue that held together the spatial settlement and reduced the frictions of space which eased long-distance intercourse. Globalization and information technology changed relationships among cities and reconfigured the physical arrangement of activities within urban space happening around 'digital highways' or 'cyber routes', experiencing urbanity and urban life through the 'spatial flows' or digital space, meaning expressing through electronic, computerized network of telecommunications, and 'the space of places' or the physical space, which got more intertwined creating a new urban space – hybrid space. These hybrid spaces are based on the interaction between the physical and digital space. Al sorts of data flows are intertwined within city life, migrating physical spaces with digital spaces, transforming public space in a way that it reactivates urban public space.

These technological developments within urban spaces also influenced the developments of urban screens, changing urban screens in big screen LED displays, getting more pervasive and engaging. This rapid rise of LED technology within urban spaces introduced a range of new products such as 'media façade' systems propelling architecture towards a new role as 'media buildings': structures with the primary function of providing information rather than habitation. This rise of public screens and 'media buildings' has become one of the most visible signs in contemporary urbanism, which is symptomatic of the emergence the media city; a city in which the spaces and rhythms are radically different to those in classical theories of urbanism. Cities in which media have changed, becoming mobile, pervasive and instantaneous, changing the city in a media-architecture complex.

Al this technological urban development's has led to, as this thesis argues, a changing urban commercial landscape. Though, this thesis has argued that this new commercial urban landscape will be pervasive, but also more engaging creating interaction with brands and other inhabitants, which stimulate social interaction with citizens and brand, creating a better social space which will change our contemporary urban experience. While history has shown that the rise, at the turn of the 19th century, of 'urban screens' or billboards had a big impact on urban society, culture and the aesthetic value of urban space, this thesis has argued that a similar big impact and change is emerging within urban space, but now stimulating interaction with cities and its citizens, instead of, as history has shown, influencing urban society in a negative way. Where urban society at the turn of the 19th century and the explosion of 'urban screens' within urban space, were more connected to society and the physical space, society later got more connected to the digital space, meaning interaction with urban space and its citizens got more mediated via digital technologies, this thesis now argued that the merge of the physical and the digital space build upon the notion of IoT and the rise of a more pervasive, engaging and interactive urban screens is generating a more engaging social space between the city, citizens and brands. Though IoT can seem futuristic, the first steps towards IoT and the creation of smart cities are already visible within urban spaces. RFID chips are more and more embedded in various applications, creating smarter, more engaging, pervasive and interactive urban

screens, which are emerging within urban landscapes, connecting citizens to city architecture, brands and other citizens, and interacting with artifacts, systems and spaces which will collect, store and process information about them, or are activated by the movements and transactions of people. More scientist and research projects are funded by governments to develop and examine IoT, to eventually let the computer disappear in the fabric of architecture, diffusing information technology into everyday objects and settings spilling out onto the sidewalks, streets, and public spaces, leading to new ways of supporting and enhancing people's lives within urban spaces. Computer technologies now increasingly play a mediating role within urban life. Data clouds of the twenty-first century are descending on contemporary city streets, sidewalks, and public spaces creating an urban infrastructure capable of sensing and responding to the events and activities transpiring within urban spaces, which will make cities capable of reflexively monitor its environment and the behavior of its inhabitants, becoming an active agent in the organization of everyday life in urban spaces and changing the experience of the city.

And since urban spaces and public arena's provide temporal and spatial mechanisms for generating and promoting various social interactions. It generates a stage for events and activities on which people negotiate boundaries of a social and cultural nature. In this city architecture plays an important role in the construction and reflection of social patterns. Not only plays it an important role in reflecting social patterns, it also plays an important role in generating movement patterns and the co-presence between people, which provides an platform for rich and diverse social interactions. And as the internet of things is becoming more important in our contemporary society, we can also see that pervasive computing or IoT is becoming increasingly part of our built environment. Physical and virtual urban components are starting to merge in various ways which can be seen in the rise of urban screens. Urban screens are becoming closely connected to twenty-first century's narrative of urban space, showing, as the examples in this thesis have shown, a more engaging and interactive way of communicating with their citizens which stimulates social interactions with the city itself, brands and the citizens. So due to the embedding of pervasive computing the combination of the physical architecture with the virtual information and representation on the building facades they now can be seen as both an interface with, and the generator of, diverse social interactions.

This illustrates that the ideas of commercial urban screens as presented in the movie Minority Report aren't that futuristic. Though the rise of IoT and urban screens for commercial use can bring a more engaging, interactive and pervasive urban commercial landscape, becoming an integral part of the environments we live in and changing our contemporary urban experience by stimulating social interactions, this thesis should note that these technologies can also be intrusive. In a ubiquitous computing environment where the computer has disappeared in the fabric of physical artifacts, the city is becoming an interface and the human beings are becoming information spaces, concerns towards privacy and security are and should be a big part of the debate on IoT. The idea that artifacts can control human urban behavior can and is very intrusive and shouldn't be forgotten, and should therefore be an important topic in the development of IoT and urban screens for commercial use in urban spaces. The increasing ubiquitity of IoT requires new regularity

approaches to ensure privacy and security. Privacy by design, privacy impact assessments, and privacy enhancing technologies should, according to Kranenburg, be considered and must be allowed to develop in order to promote trust and confidence for these new technologies (47). The first steps towards these new regulations are already made by the Expert Group from the European Commission advising policy makers that IoT is here for a long term and therefore should bring into account the long term effects. A good example of creating these new regulations started in 2006 when the Information Society Commissioner Vivian Reding announced the Commission's intention to scrutinize Radio Frequency Identification by opening a very broad and exhaustive debate on different policy aspects such as security, health, privacy, standardization, environmental and more. This debate was highly active within the press and all stakeholders could give their input through public consultation and a series of workshops. The intense debate resulted in structured policy thinking and the creation of an RFID expert group including representatives from governments, data protection authorities, companies, standard organizations consumer group and privacy advocates (Kranenburg 55).

These developments concerning the regulations towards IoT illustrate the seriousness of this subject and the willingness to succeed, making the rise of IoT and urban screens for commercial use even more possible, and when succesfully regulated urban screens and IoT could really create the new hyrbid commercial space, that stimulate social intercouse between inhabitants, brands, city artifacts and other citizins.

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Around the turn of the 19th century an enormous rise of outdoor advertising and billboards started commercializing urban space, transforming cities in to marketplaces, influencing and affecting the aesthetic value of urban space, and impacting urban culture; A similar change can now be seen within our contemporary society. With the fast rise of urban screens and the start of embedding pervasive and ubiquitous computing (Internet of Things) technologies in to the fabric of urban artefacts, cities are becoming smarter and more pervasive, enabling cities to remember, interact, correlate and anticipate on their inhabitants. This trend can also be situated within the commercial space of cities, creating a more pervasive, engaging and social commercial landscape via the use of urban screens.

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