

MOBILE DEVICE USAGE ON CAMPUS SPACES:  
IMPLICATIONS ON DESIGN AND BEHAVIOR

by

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Presented to the Faculty of the Graduate School of  
The University of Texas at Arlington in Partial Fulfillment  
of the Requirements  
for the Degree of

MASTER OF LANDSCAPE ARCHITECTURE

THE UNIVERSITY OF TEXAS AT ARLINGTON

December 2011

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## ACKNOWLEDGEMENTS

I would like to first thank my thesis committee for their continued support during this process. Extreme gratitude is owed to Dr. Pat D. Taylor, my committee chair, for his thought provoking input and guidance during this research as well as my time at the University of Texas at Arlington. I would like to extend thanks to Professor Hopman for his time and valuable contributions and to Dr. Taner R. Ozdil for his enormous help with establishing the methods and his direction throughout the past three semesters. Finally, I would like to thank Dr. Dana Dunn for providing insight into the field of sociology.

I am also thankful for my classmates who have provided support throughout my research. The rich diversity of backgrounds and experiences has been very inspiring during my time in the program.

Finally, I would like to thank my family, who has made it possible for me to continue pursuing my interests. My parents, David and Julie Herman, my siblings, Joseph and Mary Herman, and Richard Albanese have provided tremendous support over the past year despite the distance.

November 18, 2011

## ABSTRACT

### MOBILE DEVICE USAGE ON CAMPUS SPACES: IMPLICATIONS ON DESIGN AND BEHAVIOR

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This study explores the relationship between place, behavior, and technology in order to identify how users interact with the physical features of public space while interacting with mobile technology. The introduction of digital media has altered the way in which individuals engage socially within places (Gergen 2002; Hampton 2009; Humphreys 2005; Kleinman 2004; Louv 2011; Paulos 2003; Small 2008). The private nature of mobile device use modifies the social atmosphere in public spaces (Caballero-Munoz 2006; Eriksson 2007; Humphreys 2005; Paulos 2003; Srivastava 2005). For example, mobile phone users often block out others within their vicinity both physically and mentally in order to tend to the social networks with their phones (Humphreys 2005). This research examines behaviors of people using mobile devices. Social norms are documented in the literature review as well as the collected data (Goffman 1963; Whyte 1980).

Public places provide opportunities for economic, social, and cultural exchanges that promote community because they supply a shared space (Carmona 2003; Eriksson 2007; Hampton 2009; Whyte 1980). Behavior in these public spaces is documented by Goffman

(1963) and Whyte (1980); however, social interaction is evolving with communication technologies (Ashbrook 2001; Caballero-Munoz 2006; Glaeser 2011; Louv 2011; Small 2008; Walsh 2008). For instance, mobile devices challenge traditional concepts of space and time (Caballero-Munoz 2006; Paulos 2003; Rettie 2005). Also, the growing use of mobile technology encourages private interactions within public places (Caballero-Munoz 2006; Eriksson 2007; Humphreys 2005; Paulos 2003; Srivastava 2005). This influences the way in which users conceptualize their identity, engage with each other, and interact with the physical world (Caballero-Munoz 2006; Hampton 2009; Rettie 2005; Srivastava 2005). Studies suggest that interacting with physical places can be used to battle the negative effects of technology (Louv 2011).

Video recordings were used in this study to capture users coping with mobile device usage in a public places. The camera recorded at two plazas – the Central Library Plaza and the Maverick Activity Center Plaza -- on The University of Texas at Arlington campus at a variety of times. Field notes and observations were taken and coded in order to identify potential themes (Corbin and Strauss 1990). These data were then compared to secondary data on behavior in public spaces extracted from the literature review. Maps that represent device usage and mobility at fifteen minute intervals were then created in order to spatially examine the data. The earlier identified themes were then used to analyze data on each mapped frame. This data was encoded to study how device usage influences use of public space.

In the course of the passive observations it was found that mobile device usage was lower in more complex environments. In both the observed plazas on the University of Texas at Arlington campus, the majority of the device users were engaging with a mobile device in their hands as opposed to talking with it to their ear. The presence of organized events was positively correlated with reduced device usage. In addition, device usage was higher among participants in unfocused interactions, a behavior type identified by Goffman (1963). Device users were also more often observed in motion than sitting or standing. Seating at the Maverick

Activities Center was more likely to be occupied by device users while sitters at the Central Library were more likely to be without a device. Finally, sun was found to influence the location of users with a device in their hand.

Design implications were identified to respond to elements like social interactions, mobility, event participation, seating, sun, temporary installments, time of use, and zones of activity. This study concludes that places are not devolving but evolving with the introduction of mobile devices into the public sphere. Places must become more competitive to attract users who are increasingly able to choose their location due to the mobility of communication technology. Universities will likely reconsider their public spaces in order create more comfortable and fulfilling places that respond to the increasing presence of mobile device usage.

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CHAPTER 1  
INTRODUCTION

1.1 Background

This study focuses on the effects that mobile device use has on user behavior in public places with regards to physical design on university campuses. These effects challenge established concepts of space and social proprieties. Data gathered during the literature review and from observation form the basis for examining the relationships between place, behavior, and mobile technology. The results have implications on the way in which space is conceived of and designed (Caballero-Munoz 2006).

1.2 Problem Statement

Relationships between place, user behavior, and mobile technology are constantly evolving (Caballero-Munoz 2006; Putnam 2000). This paper works to establish an understanding of the impacts of those relationships on the design of physical places. Design benefits from reflecting on the effects of technology because it shapes the way in which our society interacts (Caballero-Munoz 2006).

The effects of mobile technology on public space can be observed in a variety of ways. These points are elaborated on below.

- *Interaction*: Technology is affecting norms in behavior by changing the way people interact (Gergen; Humphreys 2005).
- *Face-to-Face Communication*: Mobile devices change the societal values of face-to-face communication (Small 2011).
- *Place*: Technology alters an individual's perception of place (Rettie 2005).

- *Public and Private*: Mobile technology is also changing society's views on public and private activities (Rettie 2005).
- *Space and Time*: Mobile device technology challenges concepts of space and time (Rettie 2005).

### *1.2.1 Interaction*

Technology affects behavioral norms within society by perpetually introducing new elements that people must learn to cope with (Humphreys 2005; Small 2011). One must first understand typical behavior in public spaces before the introduction of mobile phones to understand how mobile technology affects social interactions (Humphreys 2005). Goffman (1963) provides models for social interactions in public spaces. Research from Humphreys (2005) suggests that mobile devices change the ways in which users “understand the social relations around cell phone use and how they negotiate these relations in public space.” The fast integration of mobile phones into communities raises questions about adaptive changes in customs and identities of both individuals and society (Caballero-Munoz 2006).

### *1.2.2 Face-to-Face Communication*

Historically communication is thought to be most effective when executed in person (Kleinman 2004). Evolving technology has allowed users to interact without sharing space or even time. For instance, text messages can immediately distribute correspondence over distances and be answered by the receiver at his or her leisure. This type of mobile technology has put additional demands on users who are constantly available for contact (Kleinman 2004). The prevalence of this technology calls for studies that illuminate how devices influence social relations and processes. Previous studies have examined the “power dynamics of social relations in face-to-face as well as telephone interactions” (Humphreys 2005, p 827). Mobile devices provide a useful medium in which to explore face-to-face social relations within public

spaces because they have permeated the public realm through the evolution of wireless technology (Humphreys 2005).

### *1.2.3 Place*

Technology also affects individual and societal understandings of place by reducing the need for shared location to communicate in real time (Carmona 2003). Place is a valuable concept for individuals and communities because it connects them both to a physical space (Carmona 2003; Rettie 2005; Trancik 1986). Memories and values are therefore projected onto tangible spaces. Mobile technology can reverse the positive effects of attachment to place by challenging the need for a defined, shared setting (Carmona 2003). This development calls into question the future form of public places in society.

### *1.2.4 Public and Private*

Mobile technology changes social constructs of public and private activities and therefore spaces by introducing traditionally private acts into the public realm (Eriksson 2007; Hampton 2009; Humphreys 2005). Telephones used to be geographically confined to private places like the home or office. With the advent of mobile phones, telephone conversations were freed from traditional use and space. This has resulted in the privatization of public space. Mobile phones “can be used habitually to insulate the individual from the social diversity of urban public spaces and completely remove the public realm from everyday experience” (Hampton 2009 p 9). The technology can essentially undermine the value gained from being in a public place. Traditionally being engaged in private activities in public is shunned because it muddies the “image of the division or gradient between public and private activities” (Eriksson 2007). As a result, mobile phone technology often changes the atmosphere of public spaces for users as well as for those around them (Hampton 2009; Humphreys 2005).

### *1.2.5 Space and Time*

Finally, mobile technology causes conflicts in conception of time and space by enabling users to communicate despite differences in location and time (Paulos 2003). Spatial and

temporal constraints in communications are challenged by mobility. Space is no longer a necessary component in communication. Real time presence is also no longer required for successful correspondence (Rettie 2005). This shift in mindset has implications on the way a person conceives of and experiences public places.

Each of these areas represents ways in which mobile technology influences public spaces. Changes in experience of public space as a result of shifts in interactions, conceptions, and values have implications on the design of space (Caballero-Munoz 2006). This study addresses the design implications that come as a result of technology influencing behavior in public spaces on university campuses.

### 1.3 Research Objectives

The objectives of this study are:

- To identify how users interact with the physical features of public space while interacting with mobile technology using Whyte's model (1980).
- To identify the implications that behavioral changes as a result of technology use have on the design of public space.
- To compare and contrast the tendencies of mobile device users with those who are not engaging with a device on university campuses.

### 1.4 Research Site

The site used in this study is the campus of The University of Texas at Arlington. Data were gathered from the plaza to the west of the Central Library and the plaza to the east of the Mavericks Activity Center. Both of these outdoor campus places offered a variety of different contexts, seating, and plantings. These differences helped to inform the influence that design had on the users of mobile phones.

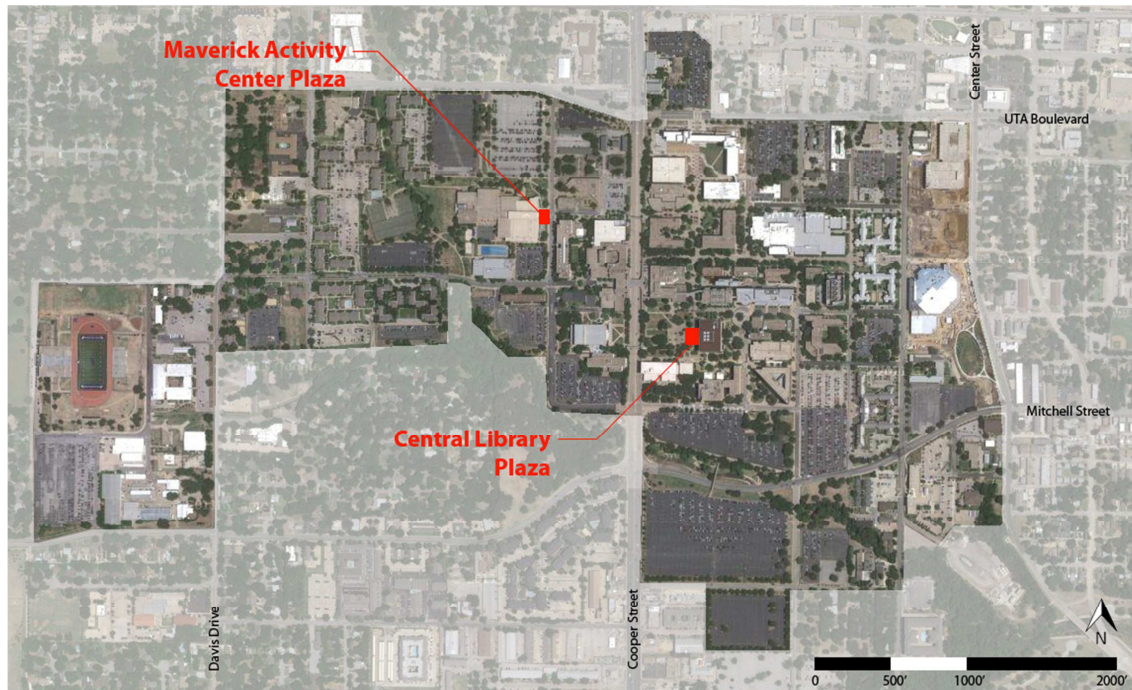


Figure 1.1: The University of Texas at Arlington Campus 2011

### 1.5 Research Questions

The questions that drove this research are:

- Does mobile device use affect the types of activities and social interactions that go on in a public space on a university campus?
- How do mobile device users alter their behavior on campus spaces?
- How must design evolve to address the use of mobile technology in public places?

### 1.6 Definition of Terms

Absent presence: A mental state that describes when someone “is physically present, but is absorbed by a technologically mediated world of elsewhere” (Gergen 2002; Kleinman 2004).

Continued partial attention: A condition in which one keeps tabs on everything while never truly focusing on anything; concern comes from the fact that it can results in mental strain (Small 2008).



Mobile devices: Personal, portable electronic devices that are often capable of a variety of computing and communication tasks.

Place: Space that has been given a contextual meaning derived from cultural or regional content (Trancik 1986).

Placelessness: The casual eradication of distinctive places and the making of standardized landscapes that results from insensitivity to the significance of place (Relph 1976).

Public space: A physical and social interface “between different people and a set of urban interests, both regarding consumers, suppliers, dwellers and jurisdiction” (Eriksson 2007); A region freely accessible to members of the community in which people go for group or individual activities (Carr 1992; Goffman 1963).

Social capital: Connections and networks among individuals that result in reciprocity and trustworthiness (Putnam 2000).

Space: A void with the potential of physically linking things (Trancik, 1986).

### 1.7 Methodology

This study uses passive observations to gather data about how people use mobile devices within public spaces. The researcher collected video recordings and written observations of activities in the Central Library plaza and the Maverick Activities Center plaza over several weeks. Then the recordings were observed repeatedly to develop notes about how users interacted with mobile devices and their physical environment.

Observation forms, notes, and video recordings were then analyzed using selective coding in order to develop an understanding of the usage of campus spaces. Statistical analysis was also performed in order to compare device usage overall and within each site.

### 1.8 Significance and Limitations

There are several opportunities for this study to provide valuable contributions to the field of landscape architecture. First, it examines the cognitive effects of technology on an individual as well as a society. Mobile devices can cause changes in the way an individual

perceives himself or herself within the general population. This affects the daily routines of urban inhabitants by influencing the interpretation of one's environment (Paulos 2003). By examining the effects of mobile phones on behavior in public place, this study contributes to the understanding of cognitive effects of technology.

This study also contributes to the understanding of social relationships and how they are evolving with technology. Portable technology's overwhelming presence in public space challenges the desired intimacy of certain environments (Small 2008). For instance, the introduction of a mobile phone into a meeting between friends can create conflict by inserting a constant threat of interruption. This has implications on face-to-face communication and expectations about accessibility (Kleinman 2004).

The effects of mobile technology are also valuable to the study of place. First, the infrastructure of a place is projected to change with the evolution of mobile technology. It is expected that:

“digital telecommunications networks will transform urban form and function as radically as networks of water supply and sewers, electricity, and mechanized transportation, telegraph and telephone have previously done. By supporting remote and asynchronous interaction, electronic networks will further loosen many of the spatial and temporal linkages that previously bound human activities together” (Carmona 2003, p 24).

In addition, this study contributes to the understanding of relationships between society and its environment (Carmona 2003). The relevance of place to social interaction is affected by mobile devices. Often the devices “increase the occurrence of the concurrent interactions, creating absent presence in face-to-face interaction as presence is diverted to phone interaction” (Rettie 2005, p 29). As methods of social communication evolve, the public realm must reflect the changes in values (Carmona 2003). Physical space will need to reflect the

changed conceptions of time and space through “new metaphors for visualizing, interacting, and interpreting the real-time ebb and flow of urban spaces” (Paulos 2003).

Finally, the study of the effects of the mobile device on behavior in public is significant to the field of urban design and landscape architecture. The built environment influences patterns of human activity and social life because site characteristics influence where settlements form (Moudon 1997). The designer simultaneously contributes to evolving trends and reacts to existing patterns (Carmona 2003). For instance, studies show that more time spent with new technology results in a decline in per capita visits to national parks (Small 2008). A decline in interest in places, like parks, could result in a reduction in that type of work for designers (Carmona 2003). The field will need to evolve to the demands of users. Landscape architecture seeks to strengthen the relationship between the individual and nature to answer “one of the great architectural, urban planning, and social challenges of the twenty-first century” (Louv 2011, p 135). Technology challenges the relationship between user and environment and therefore impacts landscape architectural pursuits.

Limitations of the study include its location on a university campus. This limits the study to a certain segment of the population and a certain category of public space. For example, the campus is primarily used by students and faculty and therefore may not be considered public. Also, the study is limited to its location within the region. Other regions will likely have different campus usage patterns based on weather, terrain, or plant material.

In addition, this data gathered in this research is limited to the two observed campus plazas. The results of the study will therefore be limited to and reflect the qualities of these spaces. Elements designed to engage mobile device users, for instance through the use of barcode technology, were not observed in this study. These interactive elements would likely have an affect on the level of engagement of a device user within a public space.

This study also is limited by the amount time in which it was conducted. There were twenty hours of footage observed for the purpose of this research. A more comprehensive study could include a larger sampling of users through additional filming.

In addition, this study does not seek to understand the perspective of individuals. This limits the understanding of the absent presence condition within public spaces as well as the motives users have for utilizing particular spaces. Experience and meaning, which is key to the consideration of place, will remain the focus of future research.

Finally, this study uses the broad term “mobile device” to describe hand held media in general. These may include cell phones, smart phones, tablets, mp3 players, etc. Each of these may require different levels of attention to operate. Because of the angle and distance of the camera from the users of the spaces, these data could not be accurately recorded.

### 1.9 Summary

The primary objective of this thesis is to identify how users interact with the physical features of public space while interacting with mobile technology using Whyte’s model (1980, 1988). This is done using passive field observations and qualitative analysis through theoretical sampling and selective coding (Taylor and Bogden 1998). This will further the understanding of the relationship between place, user behavior, and mobile technology.

This study contains five chapters. The first chapter is titled Introduction and frames the problem of mobile phone technology’s influence on behavior in public places. A basic review of the study is also included in this chapter. In the second chapter, Literature Review, the core concepts surrounding the relationships between place, behavior, and communication technology are examined. The third chapter, Research Methods, reviews the approach to data collection and analysis. In the fourth chapter, Analysis and Findings, themes identified through the research are reviewed. The final chapter, Conclusion, discusses the implications of the findings on landscape architecture as well as future research.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

Three elements are examined in this study: Place; user behavior; and mobile technology. Each element possesses individual qualities yet each influences the other. For example, the qualities of place affect the types of activities in which people engage and can also encourage or deter the presence of communication technology. Similarly, behavior influences the social atmosphere and attitudes toward place and guides the development of communication technology. Finally, communication technology affects place by altering the user behavior that is intrinsic to a place's meaning.

In this study, place refers to campus public space. Also examined in the literature review is the behavior of users of public space. Goffman (1963) and Whyte (1980, 1988) are used to establish behavioral norms and link them to space. The third section of the literature review looks at communication technology which has altered the way in which people relate to one another as well as space. In this study, place, user behavior, and communication technology are acknowledged as the major elements influencing social life of modern public space.

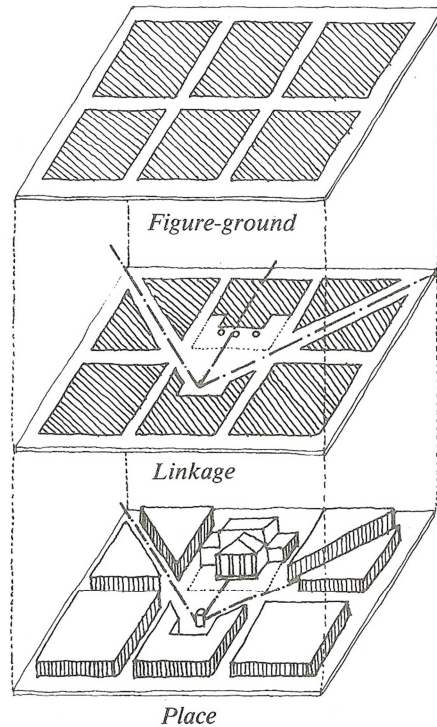
#### 2.2 Place

##### *2.2.1 Place Theory*

Places are physical spaces that have social, personal, and cultural meanings attached (Eriksson 2007). Places are directly experienced and full of meanings, physical objects, and activities (Seamon 2008). They are sources of identity for both the individual and the community, and they provide deep emotional and psychological ties necessary for the development of self and society (Relph 1976; Trancik 1986). For example, public places provide a physical space for individuals and society to invest and derive meaning over time

(Carmona 2003). An individual's relationship with a public place therefore can help inform an understanding of oneself within the context of a society.

Place theory is a type of urban design theory identified by Trancik (1986). Place theory examines the cultural and human characteristics of physical space.



*Figure 2.1: Urban Design Theories (Trancik 1986 p 98)*

The identity of a place is the “persistent sameness and unity which allows that place to be differentiated from others” (Relph 1976, p 45). This identity has three components. The first is the place's physical setting. The second component includes the activities, situations and events that occur at a place. The third includes the individual and communal meanings created through experiences (Seamon 2008).

Many critics have contributed to the understanding of place theory. Projects for Public Spaces identifies four key attributes of successful places (Carmona 2003). These include

comfort and image, access and linkage, uses and activity, and sociability. Lynch also identified different elements that contribute to one's understanding of place. They include landmarks, districts, nodes, edges, and paths (Lynch 1960). Norber-Shulz (2007) offers two components of place which include space and character. Space defines the physical organization of elements while character identifies the general atmosphere of a place.

Place is a valuable concept within this research because it orders intentions, experiences, and actions spatially (Seamon 2008). For example, intangible concepts and feelings toward one's home are frequently assigned to a physical place. In addition, the physical world informs the image of home (Relph 1976; Seamon 2008; Trancik 1986). This means that space and place have a contingent relationship because they inform one another.

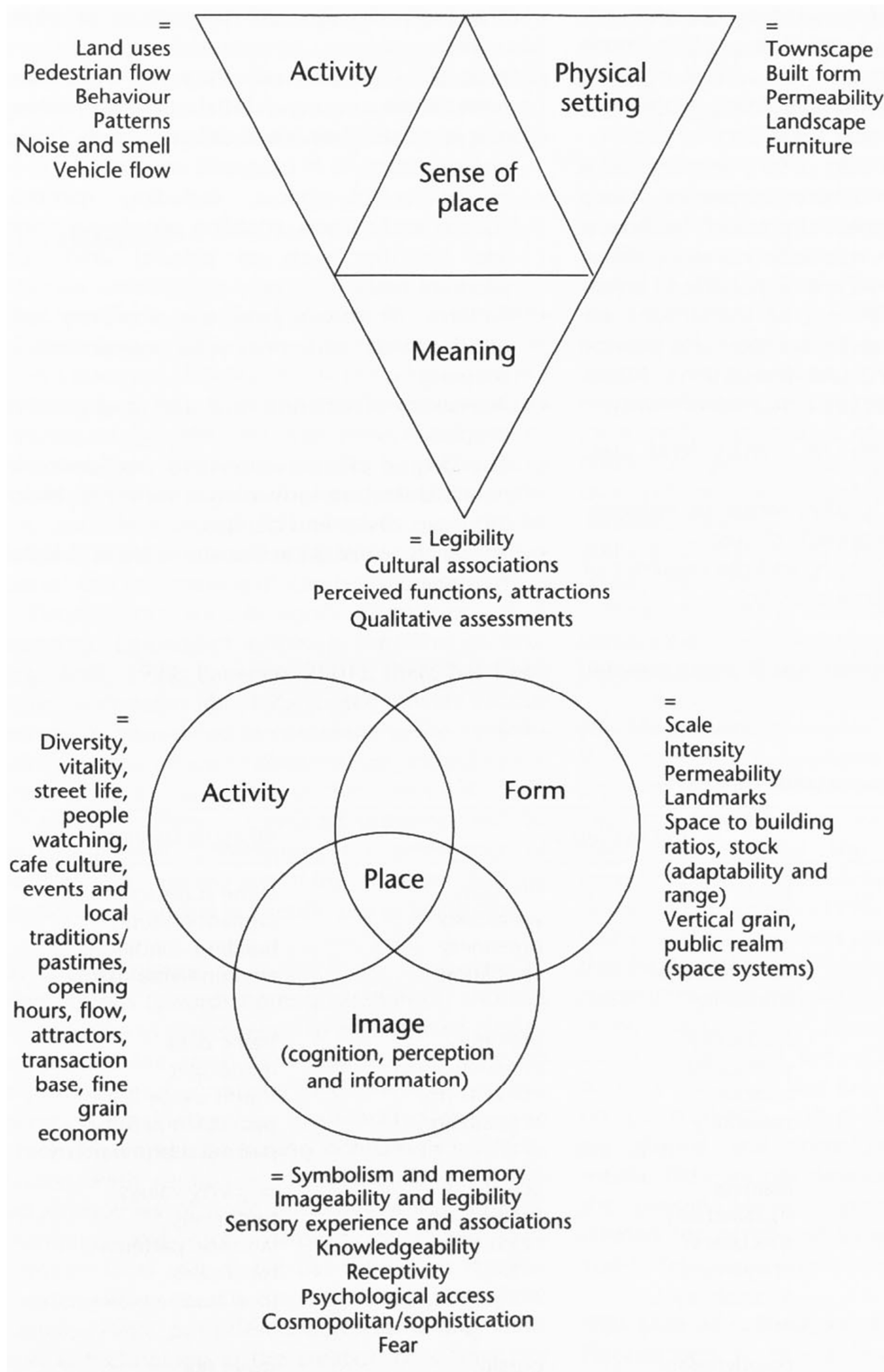


Figure 2.2: Components of Place (Carmona 2003)



### 2.2.2 Urban Form

Urban form is constantly evolving to reflect societal needs (Mumford 1961). Place theory works to understand the physical world by studying its cultural and human characteristics (Trancik 1986). In addition, urban morphologists are able to identify how societal ideas and values transform over time by studying the tangible outcomes of different periods in history (Moudon 1997). Urban morphology, the study of the city as a human habitat, is valuable to this research because the introduction of mobile devices may cause change in the use of the city and therefore the form of the city (Hampton 2009).

Carmona identifies four eras of city form that respond to the values of that generation (2003). They include the traditional city, the industrial city, the post-industrial city, and the Information Age city. Some scholars argue that the current city faces challenges of the diminished value of place (Carmona 2003). Others insist that modern cities enable the more fluid exchange of ideas due to their heightened density. Physical proximity fuels creativity that makes cities ideal for the development of ideas (Glaeser 2011). These transforming values will undoubtedly be reflected in the ever evolving urban form (Mumford 1961).

#### 2.2.2.1 The Traditional City

The traditional city was characterized by its central market place and its existence prior to large-scale industrialization (Carmona 2003). The form of these early cities could be either organic or planned (Carmona 2003; Mumford 1961). Development was limited by three factors: Transportation; materials; and building methods.

Transportation methods and speeds determined the placement of routes and markets within the urban fabric (Carmona 2003). The rest of the city was developed around these paths and centers for trade. Cities that developed around river ports are organized differently than those that developed near rail road stations (Williams, 2006). In addition, the availability of materials for construction limited the types of development that took place. For instance, access to quarries enabled construction with stone. Finally, building methods determined the

types of structures that were able to be built (Carmona 2003). For example, taller structures emerged over time as building methods evolved.

The three identified factors -- including transportation, materials, and construction techniques -- controlled the form of the traditional city (Carmona 2003). Due to these limiting factors, changes in the urban form happened slowly. As a result of such gradual evolution, inhabitants of these cities were able to develop a sense of stability and continuity within their physical environment (2003).

#### 2.2.2.2 The Industrial City

The industrial city was developed around machinery that enabled production (Carmona 2003). This era is represented by the massive migration of people from farm to city to find work in centers of industrial production. This population movement caused overcrowding within the urban fabric and led to urban disillusion (Carmona 2003; Mumford 1961).

The Chicago School identified urban settlement patterns with their Burgess Rings of Concentric Development model (1923). This model identified the center of the city as the Central Business District, which was surrounded by zones of manufacturing. Residential zones were found around the outside of the city (Carmona 2003).

#### 2.2.2.3 The Post-industrial City

The post-industrial city came in response to disgust with overcrowded cities and optimism toward the abilities of technological developments to solve those problems (Carmona 2003). It was driven by the Modernist movement at the end of the Nineteenth Century and the first half of the Twentieth Century (Carmona 2003; Rowe 1978; Trancik 1986). In this model, the city was seen as a center of service and consumption (Carmona 2003). Planners, instead of recreating the densities represented in earlier cities, worked to create flowing spaces between buildings. This resulted in decentralized residential land uses.

The widespread presence of the personal vehicle also allowed residents to leave the urban core (Carmona 2003). Suburban models reduced the accessibility and advantages of the

Central Business District. The post-industrial city is therefore characterized by its decentralized form, reduced dependence on the Central Business District, and sprawling road infrastructure (2003).

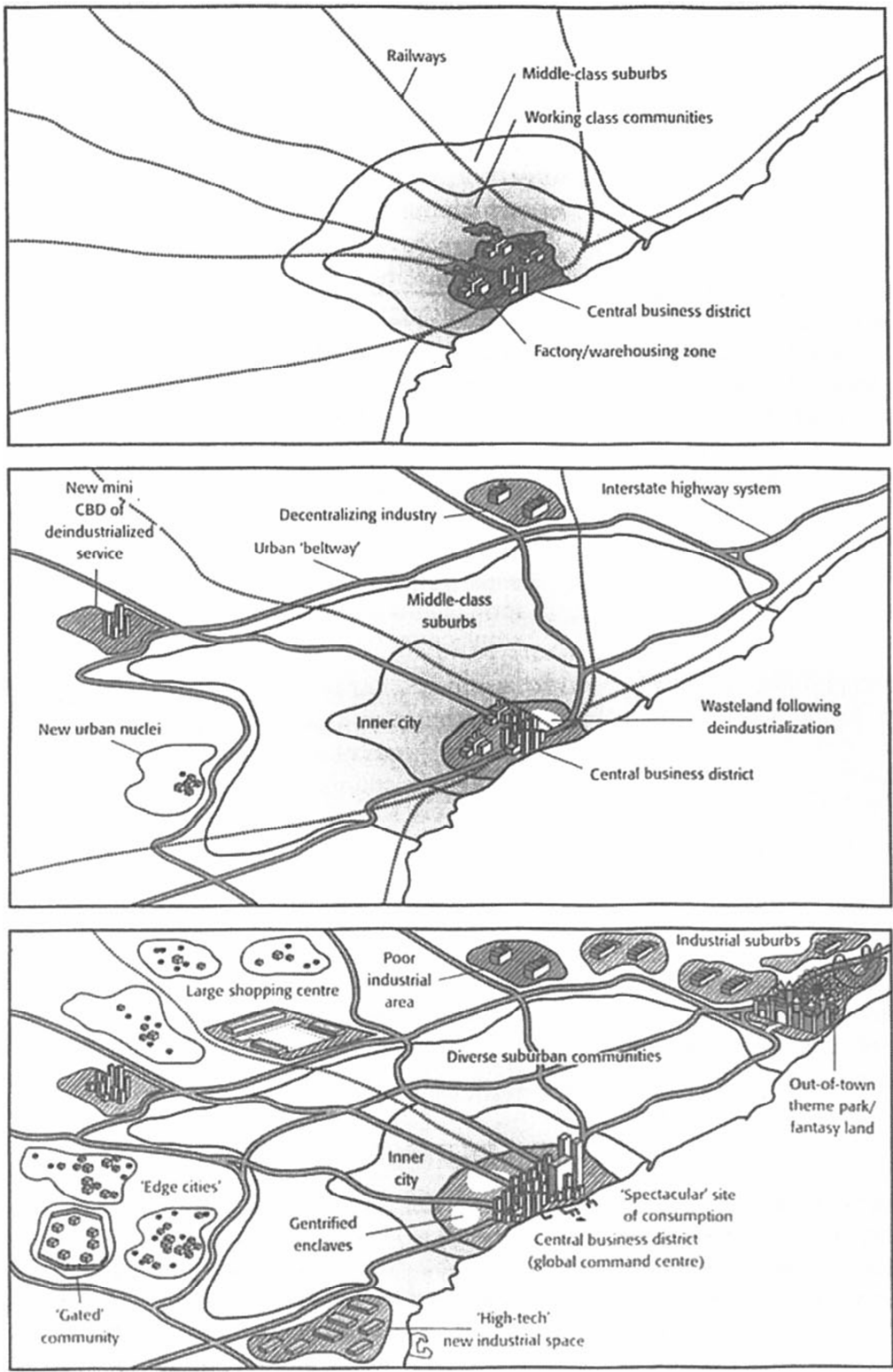


Figure 2.3: Changes in the Urban Form (Carmona 2003)

#### 2.2.2.4 The Information Age City

The most recent period of urban development is represented by the Information Age City (Carmona 2003). This era has changed the way urban places are conceived of as well. The significance of physical place has changed as communication technologies have evolved and the rate of globalization has increased (Glaeser 2011). Communication technologies offer alternatives to physical presence that used to be required for communication. For example, video chat programs have enabled business meetings to be conducted from home.

Electronic communications change the processes of a city by shifting economic, social, political, and cultural action into a virtual space (Carmona 2003). These changes in communications networks could alter the types of urban infrastructure needed and may “further loosen many of the spatial and temporal linkages that previously bound human activities together” (2003, p 24). Increased mobility enabled by electronic communications reduces the need for spatially concentrated activities. For instance, telecommuting enables employees to work from home which removes people from the already reduced Central Business District (2003). The result of these changes in lifestyle is a spatially decentralized urban fabric but an electronically connected community. This could appear as many urban cores as opposed to one.

Some urban planners have expressed concern over the Information Age city negating the significance of place (Carmona 2003; Carr 1992). Others suggest that the increase in mobility and connectivity will actually reinforce urban places. Communication technologies and face-to-face interactions complement one another. In addition, physical proximity reduces complexities in communications from afar. It also enables face-to-face contact which, studies show, increases trust, generosity, and cooperation (Glaeser 2011; Small 2011). This research is a response to the shifts in the use of the physical world as brought on by the Information Age.

#### 2.2.2.5 Urban Form Reveal Changes

The preceding city typologies show that urban form reflects societal values and interests. Studying the tangible outcomes of different periods in history is a method for studying societal values (Moudon 1997). In this study, it is observed that mobile devices usage causes change in the use of the city and therefore will inform future urban form (Hampton 2009). This is valuable to urban designers who respond to evolving needs.

#### 2.2.3 Public Places

Public spaces are defined by Carr as “open, publicly accessible places where people go for group or individual activities” (1992, p 50). They act as a physical and social interface between a variety of people, including consumers, suppliers, dwellers, and political leadership (Eriksson 2007). These types of spaces contribute to the understanding of publicness and privateness of life (Carr 1992). They include city streets, parks, and plazas and are a part of the larger public sphere (Hampton 2009). These spaces become places when given meaning by users (Eriksson 2007; Relph 1976). Public spaces are valuable to this research because they act as the setting for this study.

Public spaces mirror society's public and private values (Carr 1992). They “often come to symbolize the community and the larger society or culture in which [they] exist” (Carr 1992, p 23). While the private realm is dominated by homogenous social ties, the public realm hosts a variety of interests, behaviors, and beliefs (Hampton 2009). This allows users to access messages that they may not experience within closed social networks (2009).

##### 2.2.3.1 Components of Public Space

There are two components commonly identified within public space: Physical space and social activity (Carmona 2003). Physical space refers to those tangible settings that support public life and social interaction. Social activity describes events that occur within the physical space (2003).

The physical infrastructure for public space supports a variety of activities and functions (Carmona 2003; Carr 1992; Jacobs 1989). For example, streets are arteries which move objects, people, and information, but they also act as a social space. The market place is another valuable physical and social component of the public space. These places combine recreational and economic functions to bring users to a shared location (Carr 1992).

Public spaces can also act as a forum for political actions, such as protests or rallies, that contribute to the existence of a civil society (Carmona 2003; Carr 1992). In this sense, public spaces facilitate democratic actions.

Finally, public spaces serve the cultural needs of social learning, personal development, and information exchange (Carmona 2003; Carr 1992). As a shared gathering space, the public space provides a valuable service to society and individuals.

#### 2.2.3.2 Successful Public Places

Carr (1992) identifies three primary qualities of successful public places. The first is that the place is “designed and managed to serve the needs of their users” (Carr 1992, p 19). These needs include comfort, relaxation, active and passive engagement, and discovery. The second quality is that the space is democratic and protects the rights of users. Public spaces with this quality “are accessible to all groups and provide for freedom of action but also for temporary claim and ownership” (1992, p 20). Finally, successful public spaces are meaningful. This refers to the ability of the space to connect users, place, and the larger world. They respond to the physical and social context of the place. Meaningful spaces can contribute to a sense of identity in a rapidly changing world (1992).

Understanding the qualities of successful public places is valuable to this study because these features have evolved over time. New and future developments in public space, like the introduction of mobile devices, will either support these traditional values, negate them, or have no effect on them.

### 2.2.3.3 “The Social Life of Small Urban Places”

Whyte (1980, 1988) illuminated the relationship between the physical environment of urban plazas and the social behavior of users. His work was published as both a film and a book. Whyte “observed that usage of New York's downtown plazas varied wildly and bore little relation to existing theories of constructed space” (Paulos 2003). His research guided the methods set forth in this study.

Whyte's methods included providing a map for each of the studied spaces that recorded where people were, at what time they were there, and what the weather was like (1980, 1988). Time lapse cameras were used to record the daily patterns and uses of the plazas. Researchers on his team also interviewed users to find out their usage habits and their perception of the place. After the data was assembled, Whyte and his team reviewed the film using different speeds and frame-by-frame analysis to identify patterns (1980, 1988). The variables that Whyte examines in his studies include: Sitting space; environmental factors; food; proximity to the street; the undesirable users; effective capacity; indoor spaces; concourses and megastructures; smaller cities and places; and triangulation.

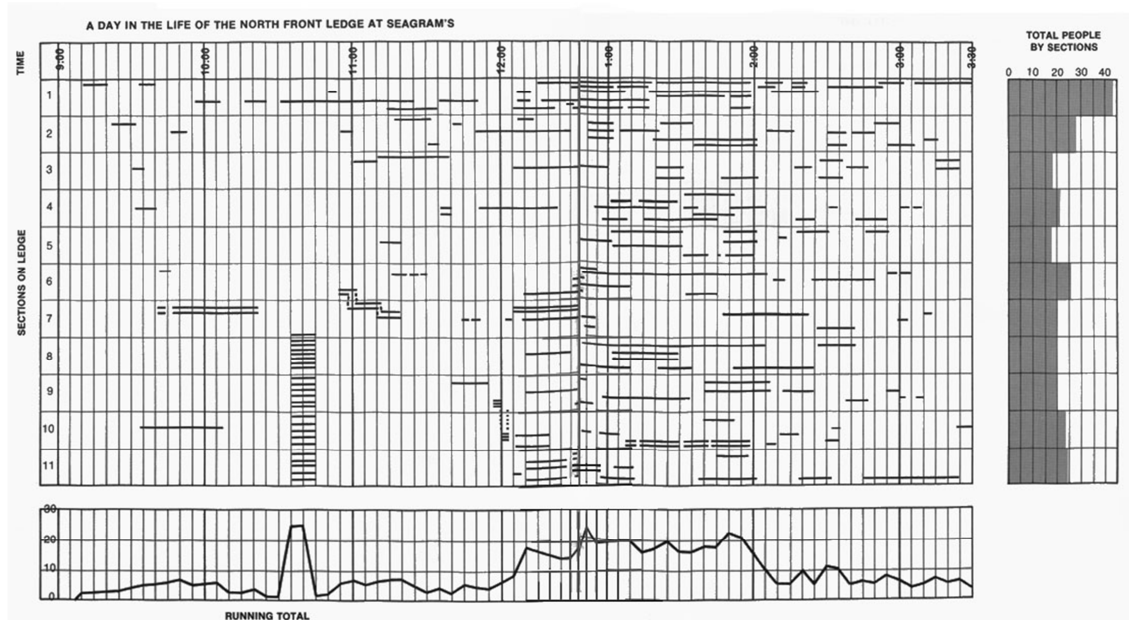


Figure 2.4: A Seating Graph Developed by Whyte (Whyte 1980, pp 70-71)



The research revealed that the highest indicator for popularity was simply the presence of other people (Whyte 1980,1988). The second indicator of success was variety of seating. Studies of rhythms revealed that the highest use was in the middle of the day. People showed preferences for self-congregation rather than retreating from the crowds. For example, people held conversations within pedestrian flow instead of finding places to the side. Silent language, especially reciprocal gestures, were often observed. Whyte concluded that these findings can be applied to other cities with the important variable being city size and scale (1980, 1988).

Suggestions made by Whyte include providing a variety of seating options (Whyte 1980, 1988). He emphasizes the importance of movable furniture in the process of place making. Whyte also suggests returning the city to the pedestrian. This includes addressing issues of scaling, windows, and sunken or raised plazas (1980, 1988). The ground-breaking categories identified by Whyte in his evaluation are crucial to this research because they guide the analysis of public space.

#### 2.2.3.4 Trends in the Public Realm

Trends in the public realm are used to predict the future of society's public places. A noticeable decline in the significance of the public realm has been noted by many observers (Carmona 2003). Carr suggests that “contemporary social and political systems, especially as they affect cities, tend to encourage privatization as people are drawn inward by their work, their personal lives, and their political activities” (1992, p 25). Many social functions that used to be only available in collective and public forms have moved into private realms through the technological introduction of television and internet as well (Carmona 2003; Putnam 2000). Increased mobility coupled by the digital revolution has contributed to the change in public space (Carmona 2003). Public and private lifestyles differ within each culture but will undoubtedly shift under the influences of cultural exchange, technology, political and economic systems, and the passage of time.

Still some insist that place will not become irrelevant because identifying with space is integral to the human experience (Seamon 2008; Wilson 1984). Scholars suggest that older spaces are merely being replaced by newer kinds public spaces (Carr 1992). For example, public life is taking place within small businesses like coffee shops, bookstores, and other third places. According to them, the value of social places is increasing regardless of whether it is actually publicly owned space or just publicly accessible (Carmona 2003).

### *2.2.5 Summary*

Place theory explores the human experience of space and the components that contribute to that understanding (Trancik 1986). It is valuable to understand this integral part of the human experience because it contributes to identity of self and society at large. Urban form has evolved over the years to respond to human needs and systems (Carmona 2003; Moudon 1997; Mumford1961). Far from random, it reflects the values and characteristics of the societies that developed them (Moudon 1997). Public places are shared spaces that contribute to the social, economic, and physical nature of a community (Carmona 2003; Carr 1992). They are a raw manifestation of the communities that host them. Understanding the different components, evolution, and examples of place are valuable to this study because this research looks to understand the relationship between place, people, and networks of communication.

## 2.3 Behavior

### *2.3.1 Social Capital*

Social networks are structures that consist of individuals and groups with a common interest or goal (Putnam 2000). Social capital is the currency that fuels social networks. It has both an individual and collective aspect and is valuable to any society because it generates honesty and trust between community members. It also is indispensable for social movements (2000). Understanding the evolution of social capital is valuable to this research because it reflects societal values, which are manifested in public spaces. Especially valuable is the shift

in social capital from public to private in recent years. This has an affect on the attitudes towards public space.

The evolution of social change involves both individual and generational processes (Putnam 2000). This is to say that it involves changes in individual habits and beliefs as well as the replacement of one generation's values with another over time. The use of technology, like the telephone or the internet, exemplifies a mixture of the two processes (2000). This means that the increased use of technology is the result of increased individual use and the replacement of older generations with younger generations who are more likely to use it.

Recent years have witnessed a change in the exchange of social capital within communities (Putnam 2000). Figure 2.5 shows American lifestyles are shifting from public to private life. Critics have also noticed that individual's "closest social ties increasingly consist of densely-knit networks that center on the home, with fewer strong ties to more loosely coupled networks. This trend toward privatism supports cohesion within tightly-knit personal networks but sacrifices interaction with more diverse social ties" (Hampton 2009 p 5).

Putnam (2000) credits technology for a reduction in the exchange of social capital. This is exemplified by news and entertainment, which have become increasingly individualized. Electronic technology allows individuals to consume entertainment in private or alone. As technology privatizes leisure time, it also privatizes civic activity by diminishing face-to-face interactions between individuals. This can weaken commitments to larger institutions of society. The introduction of electronic communication and entertainment changes the way in which people spend their leisure time (2000). Because traditionally leisure time was often spent in public spaces, this shift in social capital influences this research.

By contrast, some argue that the introduction of mobile technology into the public sphere merely changes the exchange of social capital and how physical space is used (Hampton 2009; Molnar 2010). For instance, flash mobs "demonstrate that the virtual and the physical are not parallel realms but continuously intersecting social realities" (Molnar 2010, p 4).

Flash mobs are sudden gatherings, organized using the Internet or mobile phones, of strangers in public spaces who participate in a planned activity before dispersing (2010). In this case, public space is still a large part of the exchange of social capital.

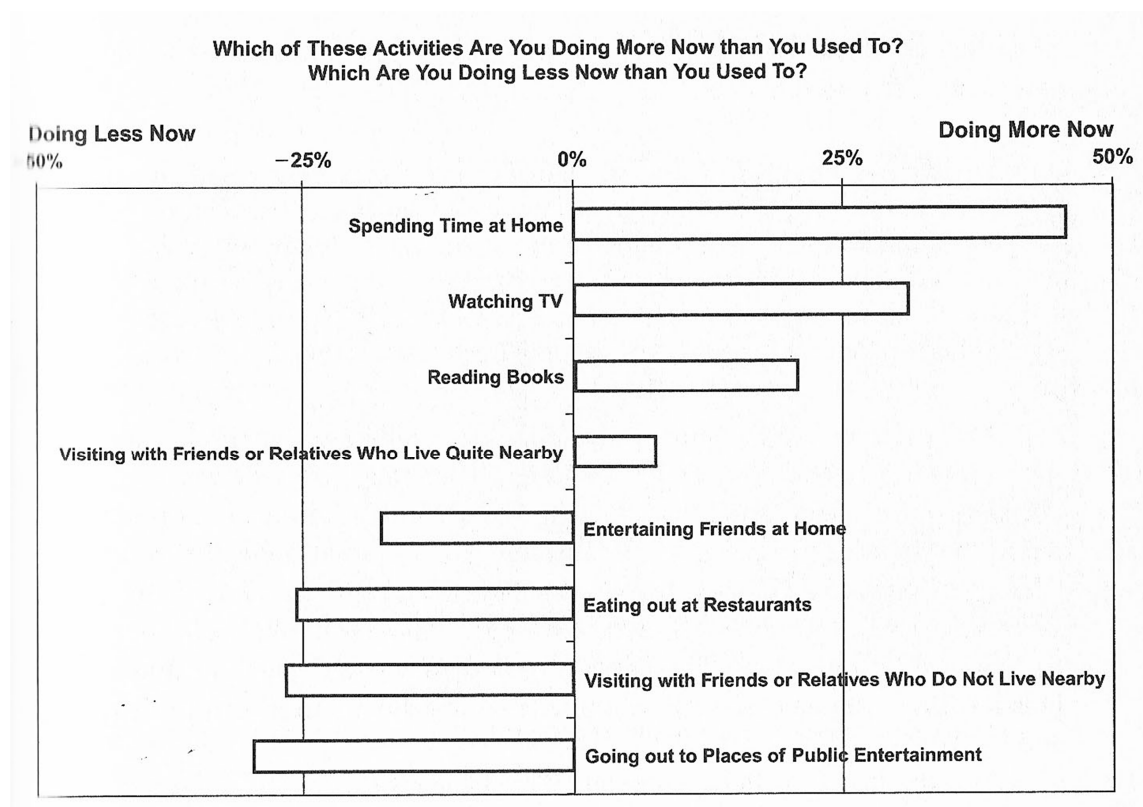


Figure 2.5: Shift from Public Life to Private Life (Putnam 2000, p239)

### 2.3.2 Behavior in Public Places

Behavior in public places has been examined by a variety of researchers with a multitude of backgrounds. In this literature review, Goffman's (1963) frameworks are reviewed to establish an awareness of typical behavior in public. His research relies on societal norms that provide distinction between acts that are approved and acts that are improper (Goffman 1963). Goffman's work provides a vocabulary and a framework for studying the behavior in public space in this research.

### 2.3.2.1 Goffman's Behavioral Terms

The conceptual model Goffman uses is that of 'social order' (Goffman 1963, p 8). In this approach, a person considers social norms to determine how to pursue objectives. Goffman uses only immediate environmental regulations to understand behavior. In particular, he examines public places which he defines as regions that are accessible to all members of the community (1963).

The exchange of information between individuals can occur through the written word, through spoken language, or through body idiom (Goffman 1963). In this way, a person can also give information expressively through events and activities associated with him. Embodied information is the focus of his research. It describes messages sent by present or at hand bodily action rather than messages sent through letters which hold information after someone has ceased informing.

Face-to-face interactions rely on combining sensory information and embodied exchanges (Goffman 1963). In this transaction, giving and receiving of information is done simultaneously by individuals present. Goffman identifies "richness of information flow and facilitation of feedback" as two distinctive features of face-to-face interaction (1963). His report uses these features to provide analytical rationale to study social norms of behaviors. Face-to-face interactions are one of the primary types of communications studied in this research because they can be recorded through passive observation and can offer a method for studying changes brought on by the introduction of mobile devices into conversation.

'Copresence' is an individual's sense that he or she is close enough to another to be perceived in whatever he or she is involved in (Goffman 1963, p 17). A 'gathering' is a set of two or more individuals who are in one another's immediate presence at a particular moment. A 'situation' is a space that hosts a gathering (1963, p 18). For example, person who enters a situation becomes a member of the gathering that is present.

Events that occur within the physical boundaries of a situation can be described as 'situated' (Goffman 1963, p 21). These situational activities cannot occur outside the situation because they are dependent on the existing conditions. 'Situational proprieties' are the rules that restrict communication within a situation (1963, p 24). This structure is the focus of Goffman's studies. Activities within this research will either be situated within the Maverick Activities Center plaza or the Central Library plaza.

A 'social occasion' describes the wider social event bound by place and time that provide the social context for situations and gatherings (Goffman 1963, p 18). Parties, workdays, and picnics are examples of social occasions. These occasions typically have a program that determines proper and improper conduct. More diffuse occasions rely on individual experience and a line of development within an individual's period of participation rather than of the occasion as a whole. Goffman identifies this as a 'behavior setting' (1963, p 19).

This research focuses on the two types of communicative behavior that people engage in when they are immediately present. The first is 'unfocused interaction,' which is communication that occurs when one gathers information about another through visual observations (Goffman 1963, p 24). The second is 'focused interaction,' which is a form of communication that occurs when people "gather together and openly cooperate to sustain a single focus of attention" (1963, p 24).

#### 2.3.2.2 Unfocused Interaction

Body language and behavior communicates information. In every society communication possibilities are established according to a common meaning. There tends to be an agreement about the meaning of behaviors as well as the behaviors that should be shown in public (Goffman 1963).

Involvement in an event requires that one maintains some kind of cognitive and affective engrossment in it (Goffman 1963). The involvement that an individual sustains is a

matter of internal study, but the assessment of involvement relies on outward expression. This is valuable to this research, which relies on passive observation instead of interviews to gather information about social expression in public places.

Passive observations do have some draw backs, though. For instance, outward expressions differ between cultures and societies (Goffman 1963). In addition, barriers to outside perception may be used to prevent negative reactions from outsiders. These are known as 'involvement shields' (1963, p 39).

Rules of allocation of involvement are also valuable in studying public space (Goffman 1963). Attention can be divided into main and side involvements. 'Main involvements' are those activities that absorb the majority of an individual's attention (1963, p 43). 'Side involvements' are those that an "individual can carry on in an abstracted fashion without threatening or confusing simultaneous maintenance of a main involvement" (1963, p 43). This sort of multitasking is often observed with people using digital media. Additionally, 'dominating involvements' are those that the social occasion requires the individual to recognize (1963, p 43). 'Subordinate involvements' are those that an individual may sustain only to the degree that it does not interfere with the dominating involvement (1963, p 44). An example of this is reading while waiting for the bus. When the bus arrives, others present will expect the reader to turn his attention to boarding the bus (1963).

Subordinate involvements are managed in common ways (Goffman 1963). For instance, individuals who wish to diminish the importance of these activities will present them as being small distractions. One may do this to assert that these involvements will not threaten the obligatory behavior of the public realm by absorbing more of the individual's attention than is commonly thought proper (1963). For instance, while waiting in line, an individual may interact with their mobile phone casually, careful not to pore over it in a way that would imply serious distraction from their duties to pay attention.

Main involvements may also be employed to avoid the appearance of being disengaged (Goffman 1963). This legitimizes an individual's purpose for being present. In this way, mobile devices may be used as a tool to prevent the uneasiness that comes with disengaged waiting. The problem of maintaining an appropriate main involvement is especially important in street behavior. Establishing a dominating objective, or a reason to be there, leaves the focus of attention free for other things. Idle activity is largely frowned upon and signals delinquent behavior to the larger gathering. The appearance of staying busy is therefore very valuable. Minimal recreational activities, smoking, can also be used as covers for disengagement (1963).

Goffman also explores rules about the "objects" or "directions" of involvement (Goffman 1963, p 64). For instance, auto-involvements include those that concern one's self. These include eating, dressing, and sleeping. Overall these are seen as subordinate side involvements that should not distract from dominating involvements. This is why individuals avoid looking at themselves in reflective windows while in the presence of others (1963).

Goffman describes an "away" as a shift in individual's attention away from the gathering to an independent activity that is inaccessible to those who are copresent (Goffman 1963, p 69). This is exemplified by daydreaming. Aways are usually accompanied by some physical sign of departure from the social situation, like humming, doodling, or hair twisting. Appropriateness of this activity is determined by one's willingness to return to the main involvement of the gathering (1963).

#### 2.3.2.3 Focused Interactions

Focused interactions are "concerned with clusters of individuals who extend one another a special communication license and sustain a special type of mutual activity that can exclude others who are present in the situation" (Goffman 1963, p 83). Face engagements dominate this type of behavior.

One of the most basic face engagements that occurs in public spaces is 'civil inattention' (Goffman 1963, p 84). Civil inattention is described as an interaction in which "one



gives another enough visual notice to demonstrate that one appreciates that the other is present while at the next moment withdrawing one's attention from him so as to express that he does not constitute a target of special curiosity or design" (Goffman 1963, p 84). Civil inattention is extended to an individual when he or she is deemed to be acting proper. This type of behavior is employed to avoid socially inappropriate interactions with strangers in public (Humphreys 2005). Urban overload from the number of daily social interactions provokes civil inattention. In other words, someone existing in the urban public space cannot be expected to greet everyone in passing. Civil inattention allows the acknowledgement of another human being without the verbal greeting (Paulos 2003). The concept of civil inattention has recently been examined by many including Humphreys (2005), Paulos (2003), and Hirshauer (2005).

In addition to civil inattention, individuals that are mutually present can engage in an 'encounter' (Goffman 1963, p 89). This is an engagement in which individuals share a mutual activity that gives them preferential communication rights, like small talk or gestures. Participation units are the groups that include both encounters and unengaged participants. A 'fully focused gathering' is one in which everyone present is participating while 'partly focused gatherings' do not engage everyone present (1963, p 91). 'Multi-focused gatherings' involve more than one encounter within the same situation (1963, p 91). This variety in gathering and encounter types are common in a public plaza, the focus of this research.

Users of public spaces are often obliged to remain accessible for potential face engagements (Goffman 1963). This is heightened in urban areas where there is a need for collective solidarity in a dense area. There remains a possibility that an individual can be exploited by this accessibility so he or she may place limits on that availability (1963). The introduction of mobile devices illuminates changes in this behavior. Headphones, for example, sever the audible availability of some public space users.

Engagements among the unacquainted are permissible and sometimes obligatory in social environments (Goffman 1963). Exposed positions put individuals in a situation in which

they may be approached by others. This includes people in costume who may be joked with. Individual actions, like bumping into another, can also create an exposed position as that person is obliged to apologize and or explain themselves. Opening positions are held by opening people, or individuals with a right to initiate conversation others. This is exemplified by police officers and other authority figures. Finally mutual openness exists between individuals that share common interests or belong to the same group. Mutual accessibility can also arise from open regions. These are physical places, like market places, where two people have a right to initiate face engagement for the purpose of greetings (1963).

#### 2.3.2.4 Goffman and Mobile Phone Use

Humphreys (2005) uses Goffman's framework to examine the effects of mobile phones on the behavior of users of public space. Goffman identifies two types of individual in public spaces. They include 'singles', those who are alone, and 'withs', those who are with other people (2005, p 813). Each of these is treated and observed differently by others that are present. Singles are more vulnerable to interaction and are judged more harshly than withs (Goffman 1963; Humphreys 2005). Humphreys looked particularly at the withs and how their partners reacted to their cell phone use (2005).

When two people are co-present, situational proprieties are crucial in the handling of side involvements (Goffman 1963). In Humphrey's research, people felt awkward when their former partner was engaging exclusively with the mobile media. They coped by engaging in side involvements until their partner was off the phone (Humphreys 2005). Goffman explains that this type of activity is a defense mechanism against social vulnerability (Goffman 1963; Humphreys 2005). Humphrey's study also illuminates that people adapt established methods of dealing with newly introduced technology (2005).

Humphreys' study is valuable to this thesis, which applies Goffman's frameworks to study mobile device use in the physical world (2005). Design implications will address the influx of side involvements in public spaces to cope with the introduction of mobile devices.

### 2.3.3 Summary

Physical space and society are interrelated (Whyte 1980, 1988). Place has a social component when meaning is invested in it. At the same time, social environments have a spatial component (Carmona 2003; Goffman 1963). The relationship is identified as a “continuous two-way process in which people (and societies) create and modify spaces while at the same time being influenced by them in various ways” (Carmona 2003, p 106).

Physical environment limits what people can and cannot do (Whyte 1980, 1988). In this way, behavior is situational because it is rooted in physical, social, cultural, and perceptual settings. A group of individuals that are present in a place determine the social rules of that space (Carmona 2003). Social context is therefore a very valuable concept to this research.

Understanding the evolution of the exchange of social capital illuminates trends towards privatization (Eriksson 2007; Hampton 2009). This is a result of technology, changes in the urban form, and a change in generational values. The future attitudes toward what constitutes a social network will determine how funds and time are spent on community.

Individual and group behavior in public spaces was also explored using Goffman's framework (1963). Goffman's analysis examined both unfocused and focused interactions through social norms that determine proper behavior. Humphrey applied these concepts to examine social structures with regards to technology (2005). Understanding user behavior is crucial in exploring the relationship between place and technology in this research.

## 2.4 Communication Technology

The evolution of technology has always had profound effects on society as well as the individual. It changes social atmospheres, economic approaches, and lifestyles (Caballero-Munoz 2006). Technology has wide reaching impacts on individual behavior (Gergen 2002; Small 2011). It also inspires social movements (Louv 2011).

### *2.4.1 Evolution*

One important fact to consider when reviewing the development of technology is that it is a product of society (Hess 2009; Humphreys 2005; Srivastava 2005). The greater social and cultural impacts can be misunderstood if just focusing on the effects of technology (Humphreys 2005). Technology expresses the characteristics and values of societies that produce them by reproducing and emphasizing values found in that society (Caballero-Munoz 2006). Mobile devices therefore “reproduce the personal and emotional problems of the society in which they were created, and perhaps lead to others, given the more or less intense culture shock they produce” (Caballero-Munoz 2006, p 70). Technology is often developed to solve communication issues relating to time and space. Social norms are altered in response to cope with the changes in communication due to technology (Humphreys 2005). Technology reflects the society it is created in but also affects those societies that make it (Srivastava 2005).

#### 2.4.1.1 Telephone

Modern communication technology is marked by the invention of the telephone (Putnam 2000). The telephone was patented to be used for commercial purposes but was quickly adapted to personal use (2000). It is credited with liberating social networks from physical space and creating psychological neighborhoods. This means that it was used socially to maintain relationships that had been split by space. Effects of the telephone include reductions in loneliness as well as face-to-face communication (2000). Unlike later technological inventions, the “telephone seems to have had the effect of reinforcing, not transforming or replacing, existing personal networks” (2000, p 168).

#### 2.4.1.1 Mobile Phones

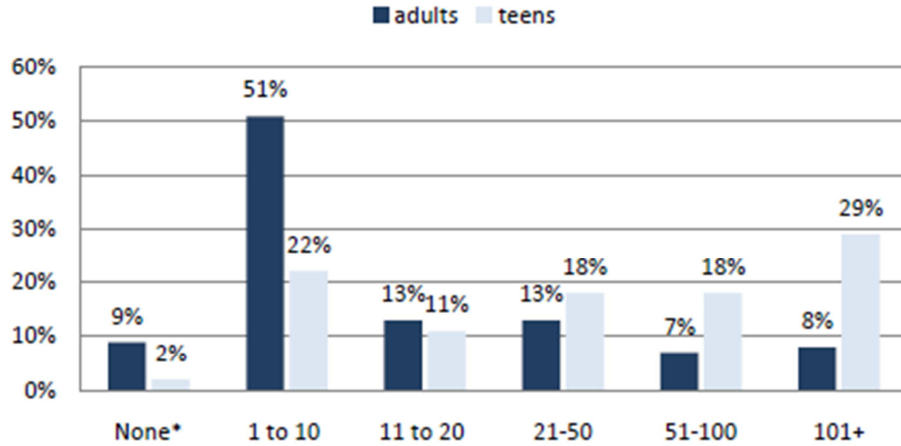
Mobile phones were introduced as two-way radio systems in the 1940's after World War II (Farley 2005). It was not until decades later, in 1969, that the commercial cellular radio was made operational using public pay phones in trains (2005). In the 1980's portable but bulky cellular phones were introduced. A fundamental change in mobile phones came in the 1990's

when the technology of the phone was combined with capabilities of a handheld computer. This included limited internet use (2005). In the year 2000 the mobile phone added a camera feature which became wildly popular. The number of mobile phones in the world surpassed that of fixed-line telephones by 2002 (Srivastava 2005). Recent Pew Institute surveys reveal that 82 percent of American adults own a mobile phone (Lenhart 2011). In recent years distinction between computers and mobile phones is diminishing. Computers offer the ability to video conference while mobile phones offer internet access (Baron 2009).

Trends reveal that texting, a form of short messaging system that uses a keyboard on the mobile phone, is growing in popularity (Ashbrook 2010; Lenhart 2011; Srivastava 2005). More text messages are sent than voice calls placed (Ashbrook 2010; Baron 2009; Srivastava 2005). Implementing the use of text messaging to communicate varies with age with a much higher rate of use among teenagers (Baron 2009; Lenhart 2011; Srivastava 2005). This is a result of the psychological benefits that arise from use. For instance, mobile phone use increases social inclusion and connectedness among friends (Walsh 2008). This is valuable in this research, which samples a younger segment of the population by studying a campus.

## Adults vs. Teens: Number of texts on a typical day

Based on cell phone users who text



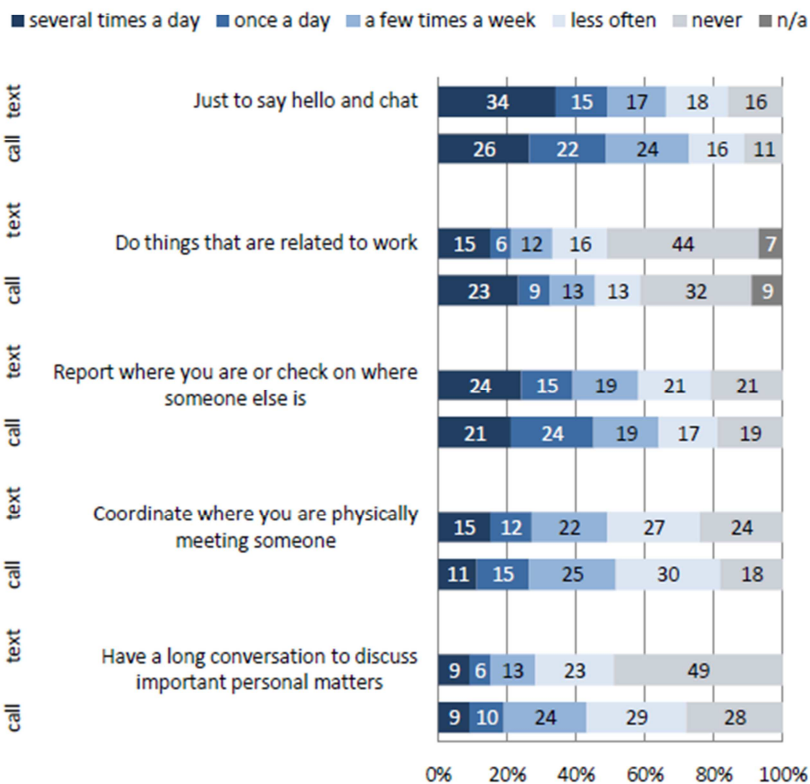
Source: Pew Research Center's Internet & American Life Project, April 29 - May 30, 2010 Tracking Survey. N=2,252 adults 18 and older; n=1,917 based on cell phone users. The teen results are based on data from June 26 - September 24, 2009 telephone survey, including cell phones, with n=800 teens ages 12-17 and a parent or guardian; n=625 for teen cell phone users.

Figure 2.6: Texts on a Typical Day (Lenhart 2011)

Users also report that texting is used to satisfy communication needs where phone calls are deemed inappropriate (Ashbrook 2010). Others report that texting is an easier method of communication for those who experience shyness (Srivastava 2005). Manners are still evolving to adjust to the prevalence of text messaging (Ashbrook 2010). As these behaviors evolve, so too will the physical infrastructure supporting them evolve.

## Why adults text message vs. voice calling

A side-by-side comparison of the reasons why adults text vs. why they call



Source: Pew Research Center's Internet & American Life Project, April 29 - May 30, 2010 Tracking Survey. N=2,252 adults 18 and older; n=1,917 based on cell phone users.

Note: Texting data is based on text message users and calling data is based on cell phone owners.

Figure 2.7: Reasons for Texting (Lenhart 2011)

### 2.4.1.1 Internet Use

The internet is a powerful tool for the exchange of information over distance (Putnam 2000). Social networks established through computer-mediated communication do not rely on physical place but instead can be organized through common interests. Critics question whether these groups will foster social capital and genuine community (2000).

Computers have also experienced a surge in mobility ability with the widespread existence of wireless internet (Hampton 2009). Traditional internet use was confined to the private realm of the home and the office. Today's wireless connectivity allows people to explore the internet within the public realm (2009). This trend toward private activity within a public place is intensified by other users within the same place. As a result, the activity of using the internet in public reduces public sociability among co-present users.

#### *2.4.2 Effects*

The technology revolution is redefining communication patterns as well as social, economic, and political systems (Small 2011). Mobile phones and other communication technologies are so widespread that they are said to affect every aspect of personal and professional lives (Humphreys 2005). This technology is used for entertainment, political engagement, communication, and social reform (Small 2011). A Kaiser Foundation study found that individuals experienced 8.5 hours of digital and video sensory stimulation (2011). This is important because environmental responses to stimulation create a particular chemical and electrical sequence within the brain that influences how individuals approach the world (2011). Small suggests that extreme exposure to technology and digital media is causing the brain to evolve at an exceptional pace (2011). Still, there are certain positive effects of technology. These include a reflection of self-identity, feelings of safety, and a sense of reassurance (Walsh 2008)

##### *2.4.2.1 Digital Natives Versus Digital Immigrants*

A massive generational shift is occurring in the way people's brains evolve (Small 2011). This includes an ability to sift through large amounts of information quickly to determine what is relevant. As a result a younger generation is establishing new social and political networks, manners, language, and workplace ethics. Members of the older generation must adapt to the technology or face being left behind politically, socially, and economically. Small



describes the younger generations as 'digital natives' and the older generation as 'digital immigrants' (2011).

Digital natives are those individuals that grew up around contemporary communication technologies, including the mobile phone, the internet, and mp3 players (Small 2011). Each of these technologies has liberated activities that were traditionally fixed to a geographic location. This group is characterized by their ability to multitask with ease. Constant visual and auditory stimulation, however, has led to a desire for instant gratification and persistent connectedness (2011). These young users' behaviors are predictors of the form of the future mobile information society (Srivastava 2005). This is valuable because the population sampled in this study could be considered predictive of trends for future college students.

Digital immigrants are represented by an older generation whose brains developed before the boom of the Informational Age (Small 2011). These individuals were trained using different methods of socializing and learning. For instance, they approach problems systematically by addressing one task at a time. They typically learn more methodically and are more precise in their execution of tasks (2011).

#### 2.4.2.2 Effects on the Individual

Technology has a variety of impacts on the individual (Ashbrook 2010; Baron 2009; Caballero-Munoz 2006; Gergen 2002; Paulos 2003; Rettie 2005; Small 2011; Srivastava 2005). This section reviews: Identity conflicts; behavioral effects, including hyperactivity, inattention, addiction, and multitasking; physical effects; and concepts of safety.

##### *Identity Conflicts*

Hand-held and other technological devices have moved from technological objects to valuable social objects (Srivastava 2005). These devices become extensions of identity. This is exemplified in the feelings of pride, embarrassment, and envy associated with them (Small 2011). Users feel constantly connected to the outside world and as a result less alone. This creates both physical and emotional attachment. Mobile technologies are personalized to a

user in both form and use. These devices become important aspects of individual identity as a result (Srivastava 2005).

Caballero-Munoz identifies two conditions caused by technology that inform identity (2006). The first is the 'empty self' which is a need for a wide variety of information that guides behavior. The second is the 'saturated self' which is a "social saturation facilitated by the constant availability the cellphone permits" (2006, p 70). This is brought on by technology which causes the constant availability and dependence of society (Baron 2009). Individual availability encourages flexibility of appointments, causing individuals to pay attention to responsibilities in the short term as the long term is too unpredictable. This constant attention to the present reinforces the saturated self. The emergence of an identity of self-distancing from immediate situation describes a common identity problem (2006).

Mobile technologies, like the phone, simultaneously cause users to feel liberated by and chained to their devices (Baron 2009). Users are made constantly available in way that may cause problems of coordination between mobile device users (Caballero-Munoz 2006). In a study conducted by Baron about youth use of mobile phones, internal conflicts caused by technology use are illuminated. They include: reachability; freedom versus entrapment; effects on spoken and written communications; effects on personal interaction; and attitudes toward mobile phone functions (Baron 2009). Carrying a mobile phone makes the user feel free but still immediately available to anyone who calls (Caballero-Munoz 2006). Although this act may have positive responses concerning connectivity, it is often counterbalanced by a dislike for the negative by-products, like feelings of entrapment (Baron 2009).

The problematic relationship between technology and identity comes in contrast to the relationship between place and identity (Caballero-Munoz 2006). Place is often seen as reinforcing both individual and societal identity because it roots meaning to a place (Carmona 2003; Relph 1976). In this research, the contrast between the value of place and the effects of technology on an individual are illuminated by the observation of users in public spaces.

### *Behavioral Effects*

Exposure to digital media has caused changes in behavior. Constant availability has challenged conception of identity as well as the behavioral norms in society (Baron 2009). The practice and prevalence of face-to-face communication has diminished (Ashbrook 2010; Small 2011; Srivastava 2005). Hyperactivity, inattention, addiction, and multitasking are some of the behavioral effects of technology exposure (Small 2011). In addition, mobile devices are used as a safety blanket in uncomfortable situations (Caballero-Munoz 2006; Paulos 2003; Srivastava 2005)

One of the effects brought on by technology exposure is multitasking (Ashbrook 2010; Small 2011). This is the act of taking on multiple activities in rapid succession. Engaging in this activity may help an individual develop the ability to sift through large amounts of information rapidly. It also allows individuals to experience instant gratification while putting off long term goals (Small 2011). This changes the kind of attention that individuals pay to tasks as well as social interactions (Ashbrook 2010). Studies suggest that when one engages in multitasking understanding of the presented information suffers (Ashbrook 2010; Small 2011).

Digital natives surrounded with technology often employ multitasking rather than focusing on a single activity (Small 2011). Studies link this behavior with “fewer, weaker, and more fluid friendships” (Putnam 2000, p 226). Additional research suggests that multitasking can cause increased stress and attention deficits as well as a decrease in work efficiency (Small 2011). It impairs memory by preventing full attention on the topic at hand. Heavy users of technology “can become increasingly distractible and even hyperactive, multitasking from moment to moment” (Small 2011 p 137). Multitasking therefore has negative effects on productivity as well as social engagements. Because multitasking affects social behavior, it affects the types of activities and uses of public spaces.

Another behavioral effect linked to the use of technology is absent presence, which is the condition in which “one is physically present, but is absorbed by a technologically mediated

world of elsewhere” (Gergen 2002). Communication technologies, like the telephone, computer games, and the internet, have allowed people to interact with others through a private format in public places. Gergen suggests that in dialogical technologies, “the present is virtually eradicated by the dominating absence” (2002, p 4). In other words, modern communications technologies encourage the absent presence by allowing people to interact with distant things while ignoring their physical location. Within this research, the absent presence is observed by users of public spaces that attempt to negotiate their roles in their physical surroundings and in their virtual networks.

Gergen suggests that there are significant cultural changes caused by the absent presence (2002). Relationships with technology can challenge one's realities and place traditional values under threat (2002). Vital community bonds are stressed when immediate realities become less relevant, and this can lead to interruptions in broader social interactions (Ashbrook 2010). Therefore, as absent presence becomes more prevalent due to the spread of the use of technology, the value of face-to-face communication is likely to fade (Gergen 2002). Absent presence also challenges concepts of self-identity as communal sources of identity are diminished. This leads to a “cultural condition in which our identities are increasingly more situated, conditional, and optional” (2002, p 7). As all of these traditional values are negated by technology through the absent presence, the value of place is called into question.

The mobile phone is an example of a communication technology that causes absent presence in an individual (Gergen 2002). It requires that users separate a part of their attention from their physical surroundings. Mobile phones introduced the idea that communication over the phone did not need to happen at a particular geographic location. This causes the absent presence to become mobilized as well. Conversations over mobile phones can happen in a variety of social contexts and become semipublic depending on their proximity to others. This makes the mobile phone “virtually unique in its capacity to link otherwise absent worlds to the immediate circumstance” (2002, p 11).

People often simultaneously engage in virtual worlds while being physically present in a place (Kleinman 2004). This challenges concepts of public and private as “individuals are removing themselves from the present context of shared meanings to become involved in a virtual world that is not available to those around them” (2004, p 1). The theme of increasing public and private conflicts is common in the study public space and valuable to this research.

Electronic addiction is another negative effect being attributed to technology (Ashbrook 2010; Small 2011; Walsh 2008). Addiction is defined as being overly attached to an object or behavior despite negative outcomes (Walsh 2008). Research suggests that mobile technology users are displaying addictive behavior toward their devices (Ashbrook 2010; Small 2011; Walsh 2008). Qualifications for substance dependence include symptoms like salience, euphoria or relief, loss of control, withdrawal, and relapse (Walsh 2008). The brain physically responds to these actions using the neurotransmitter dopamine which is “a brain messenger that modulates all sorts of activities involving reward, punishment, and exploration” (Small 2011, p 48). Common behavior of addicted users includes compulsive checking and inappropriate use of a mobile device (Walsh 2008).

One of the reasons technology can cause addiction is that it offers a sense of control (Ashbrook 2010; Small 2011). A person's perception of control is linked to the subcortical dopamine neural networks in the brain. This can result in a sense of dependence on the devices that are meant to provide control (Small 2011). Another cause of technological addiction is that users rely on their devices to provide psychological benefits like a reduction in negative mood. The continued use of the devices can lead to addiction (Walsh 2008). Although dependence is identified through several reports, a study reported that “a strong theme was that the mobile phone was a tool which facilitated young people's connectedness to others” (Walsh 2008, p 89). Addictive behavior towards mobile devices indicates trends towards their increasing presence in all places, including public spaces. These trends indicate a value for conducting studies like these that measure the affects of mobile phone use on public space.

### *Physical Effects*

Physical side effects of technology addiction include muscle strain, eye discomfort, and headaches (Small 2011). Mental fatigue can also happen in response to the rapid flow of visual stimuli that comes from staring at a screen. Studies also link the presence of Attention Deficit Disorder to technology addiction (2011). Other research suggests that the continuous inundation of information provided by technology affects one's ability to absorb data and communicate (Srivastava 2005).

Although attachment to mobile devices is often seen as mental, these devices cause physical side effects. In this study, the physical effects of mobile devices are looked at through the understanding of the physical use of public space.

### *Concepts of Safety*

Feelings of safety are also altered by the presence of digital media (Caballero-Munoz 2006; Srivastava 2005). Mobile phones are often used as a shield against unwanted attention. This is especially prevalent in women. They can also be comforting to users who feel that they always have access to help from their immediate social network.

While this may provide positive feelings of security for users, it may also have negative effects (Caballero-Munoz 2006). It undermines people's confidence in themselves to resolve unforeseen problems during the course of the day (2006). Users who reach for their phones and other mobile devices in public situations also dramatically decrease the chance of interacting with individuals outside of their immediate social group (Paulos 2003).

#### 2.4.2.3 Effects on Society

Social capital is the connections and networks among individuals and groups that result in reciprocity and trustworthiness (Putnam 2000). Recent years have witnessed a decrease in the exchange of deep, place-based social capital. Putnam credits this in part to recent evolutions in technology. Technology emphasizes individualized entertainment and desires

rather than community engagement. This technology allows individuals to consume services privately (Putnam 2000; Srivastava 2005).

Technology also undermines the traditional social institutions (Srivastava 2005). In some ways the modern communication technology is more democratic. In theory it offers everyone access to anything at any time. This undoubtedly causes changes in the way society functions (2005). Place-based social capital is instead exchanged with function-based social capital. Still if entrance and exit into a social network is too accessible, commitment, trustworthiness, and reciprocity will not develop (Putnam 2000).

In addition, closed, or private, social networks are reinforced by communication technologies like the mobile phone (Hampton 2009). They largely connect individuals with existing social ties. This can lead to an intense participation within a closed network at the expense of the larger community (2009). This in turn can prevent the exchange of social capital. The huge focus on homogenous ties contrasts the concept of public spaces which can connect individuals with new experiences and messages (2009).

Appropriate behavior is determined by social norms and context (Goffman 1976). The introduction of new means of mobile communication has challenged existing structures of societal proprieties. For instance, when a mobile phone interaction interrupts a face-to-face interaction, social anxiety on the left out party is observed. Often these left out individuals engage in their own side activities to occupy time until they resume their face-to-face interaction (Humphreys 2005). Other social and institutional environments, like classrooms, are also impacted when the mobile phone is introduced (Walsh 2008).

Researchers suggest that individuals use existing social rules to negotiate their dilemmas with new technologies (Humphreys 2005). These rules are just now being re-established to address communication technologies (Baron 2009; Ashbrook 2010). The study of these trends is valuable to understanding the future demands on public places.

#### 2.4.2.4 Communication Technology and Place

The communication technology revolution challenges the concept of place (Seamon 2008). Technology is no longer linked to space and is instead linked to individuals. As a result it is the most powerful decentralizing force of this generation (Carmona 2003). Today's social media provide the ability to be co-present without sharing a location (Hampton 2009, 2005). Still some argue that place continues to be a significant part of the conceptual and physical world (Glaeser 2011; Seamon 2008).

One reoccurring theme in the effects of technology is the perception of time and space (Caballero-Munoz 2006; Paulos 2003; Rettie 2005). Mobile technologies create a collision in what an individual is physically engaging and demands from the digital reality (Caballero-Munoz 2006). Individuals are able to participate in multiple interactions at a time within multiple places (Rettie 2005). Changes in this perception of time and space will result in "new metaphors for visualizing, interacting and interpreting the real-time ebb and flow of urban spaces" (Paulos 2003, p 8).

Mobile technology affects perception of time (Rettie 2005). It both conserves and consumes time. Although they improve time management, they also increase a sense of constant availability. As a result, more time is used for communication. This impacts the sequencing of tasks, cycles of work, and leisure (2005). This complete overhaul of traditional time usage has social implications. In urban design, for example, programming may need to be addressed to ensure a successful park design (Hampton 2009).

Concepts of place are also affected by mobile technology as individuals are freed from geographical locations (Relph 1976; Rettie 2005). The sense of belonging to a place, a valuable concept in place theory, is transformed into a sense of belonging to a social network. For example, an interaction on a phone is seen as occurring in a shared, private space. This is separate from a geographic location or place. Sense of place can therefore be replaced by a feeling of co-presence. In other words, in phone conversations, individuals may experience a feeling of presence without place (Rettie 2005).



The need for going to a place is challenged by the ability to occupy a virtual space (Rettie 2005). This concept is relevant to the future of urban design and landscape architecture (Carmona 2003). These fields attempt to create places for experiences, but technology challenges that need.

These shifts in conceptions result in changes in behavior. Actions and behavior are seen as existing in a new conception of space and time (Caballero-Munoz 2006). For instance, in mobile phone communication, the mobility of the device often results in interruptions in co-located interactions (Rettie 2005). Typical social patterns are altered by the presence of the device and the threat of interruption. This study identifies these pattern changes within public places.

Mobile communication technologies have liberated users from place, allowing a variety people to occupy a variety of spaces (Carmona 2003). This freedom is accompanied by a shift in attitudes toward public and private behavior (Srivastava 2005). Users must negotiate the proprieties between public and private behavior (Paulos 2003).

Urban form presents a division in public and private spheres both physically and socially (Caballero-Munoz 2006). Mobile devices challenge these concepts because they demand people be always available. Public places are also changing from ungoverned places for interaction to more formalized and controlled places for fulfilling a purpose. Also, media devices create controllable, individual spaces within the public realm (Eriksson 2007). This challenges the interactive, social, democratic, and self-organizing nature of public spaces (Eriksson 2007). Public places can also become colonized by the private realms of mobile device users (Srivastava 2005).

Phone conversations used to be a private event but have since moved into public space (Srivastava 2005). Private conversations that are publicly broadcast can cause embarrassment. Texting restores that sense of privacy by offering personal communication in

public (Ashbrook 2010). Still, being engaged in private activities in public is looked down on because it offends the image of the collective (Eriksson 2007; Goffman 1963).

#### *2.4.3 Responses and movements*

There is an effort to battle the negative influences of technology using a variety of approaches (Louv 2011). In this section, place-based interventions are examined as a method for dealing with the effects of technology. Seeking a deeper relationship with nature and bonding through place is often seen as a method of combatting these effects.

Mobile communication technology challenges concepts of place (Rettie 2005). An environment that encourages understanding and provides opportunities for exploration is basic to human well-being (Kaplan 1998). Connecting with natural environments creates new opportunities for health, creativity, and wonder (Louv 2011).

Biophilia is an individual's natural affinity to relate to other living things (Wilson 1984). There is a tendency for species to prefer the environment in which the brain evolved. For instance, Wilson suggests that the human race works to create a savanna-like environment which is seen in gardens and other cultural landscapes. These landscapes are characterized by open spaces, a small amount of vegetation, and less than geometric perfection. Proximity to water is also important. This is informed by human's origins in hunter-gatherer lifestyles (Wilson 1984).

Places expose the brain to sensations like smell, taste, touch, pain and fatigue (Small 2011). Each of these activates a part of the brain known as the insula. These senses are transformed into more complex human experiences as a result (2011). Technology has had a difficult replicating these deeper human experiences.

Because they stimulate the brain differently, experiences in the natural world help relieve mental stresses brought on by technology (Kaplan 1998). Kaplan refers to the wearing down of the mind from focused attention as 'mental fatigue' (1998). Effects of mental fatigue include irritability, impatience, and distractibility (Kaplan 1998; Louv 2011). In addition, studies

show that people with less access to natural environments have poor attention spaces, decreased cognitive function, reduced ability to handle life issues, and problems with impulse control (Louv 2011).

Natural environments lend themselves to restoration from mental fatigue (Kaplan 1998). Restorative environments have a variety of qualities that combat mental fatigue. Quiet fascination allows individual reflection. Wandering, even in small spaces, creates the sense that the environment is deeper than what meets the eye. This quality encourages the mind to wander. Separation from distraction creates an environment free of interruptions and distractions (1998). Natural environments “provide a psychologically safe haven from the man-made pressures of society” (Louv 2011, p 112).

Exposure to nature also impacts social networks (Louv 2011). Studies show that it leads people to nurture close relationships, to place a high value on community, and to be more generous with money. This reverses the trends in the exchange of social capital within communities. This is important because encourages an authentic sense of personal and community identity (2011).

The evolution of technology has caused massive shifts in existing social, economic, and physical structures (Small 2011). Louv suggests that the best equipped mind will be a hybrid model, one that incorporates a combination of natural and virtual experiences (2011). Responses to growing technology will likely involve place-based interventions. Landscape architects can play a role in developing these elements in public space.

### 2.5 Summary

This chapter examined the relationship between place, behavior, and technology. Place is separated from simple physical space by the meaning that is invested by individuals (Relph 1976). An individual's behavior is also influenced by his or her environment (Whyte 1980, 1988; Goffman 1963). The introduction of mobile social media to place and social systems brings new questions about the effects on and the future of each.

One common theme is the introduction of private media into public places and the way in which individuals use common coping mechanisms. Another theme is the individual's perception of space and time. Landscape architecture may have a role in the understanding of the relationship between place, behavior, and technology. This field, like others, will undoubtedly change to address evolving perceptions of place and behavior.

## CHAPTER 3

### RESEARCH METHODS

#### 3.1 Introduction

Social norms have evolved with the introduction of communications technologies (Gergen 2002; Humphreys 2005; Louv 2011; Small 2008). This study examines behavior in campus spaces to understand the implications of mobile device usage on the design of spaces (Relph 1976; Steele 1981). In this research, field observations are used to document behavior in order to understand ways in which mobile devices have affected the use of campus space.

This research uses data from the literature review, from empirical evidence generated by field observations, and from qualitative analysis through theoretical sampling and open coding (Corbin 1990). Similar investigations have been carried out by Goffman (1963) and Whyte (1980, 1988) who focused on social norms in public places. Field observations are used to better understand behaviors of people using mobile devices as well as the behaviors of those around them.

#### 3.2 Site Selection

The site used in this study is the campus of The University of Texas at Arlington (see Figure 3.1). Data were gathered from the plaza to the west of the Central Library and the plaza to the east of the Maverick Activity Center (see Figure 3.2). Both of these outdoor campus places offer a variety of different contexts and uses.

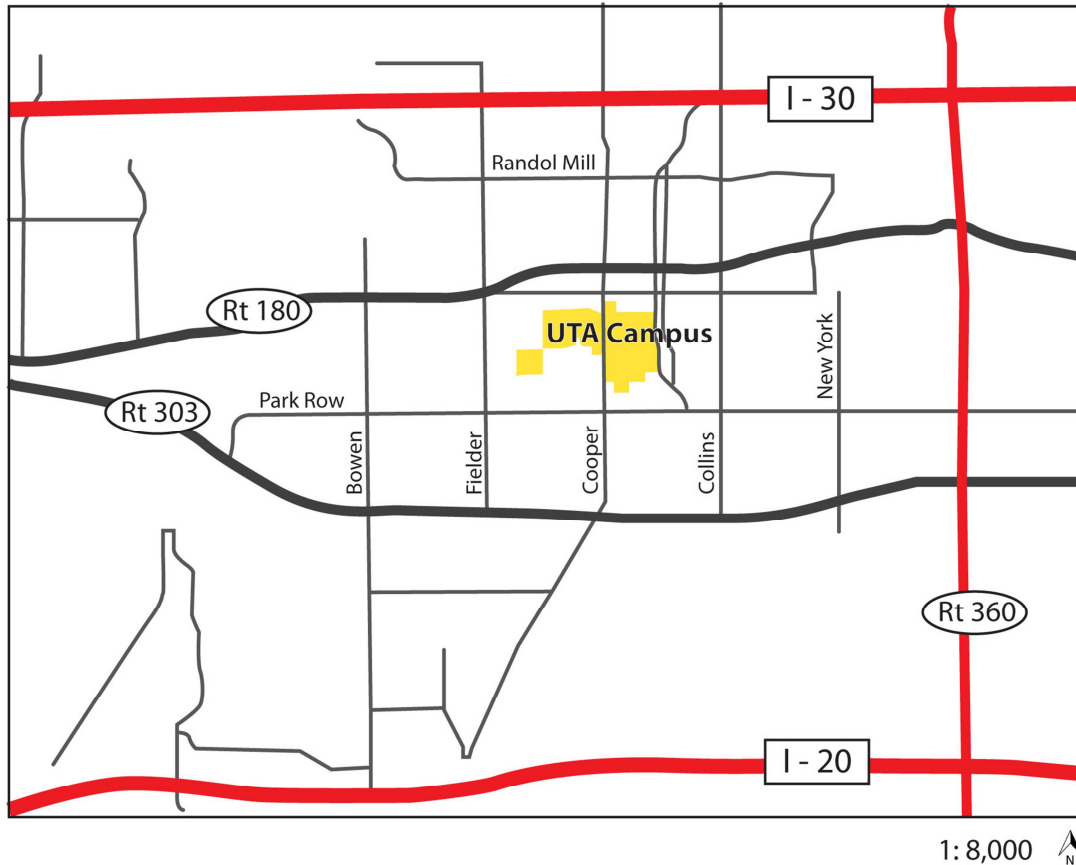
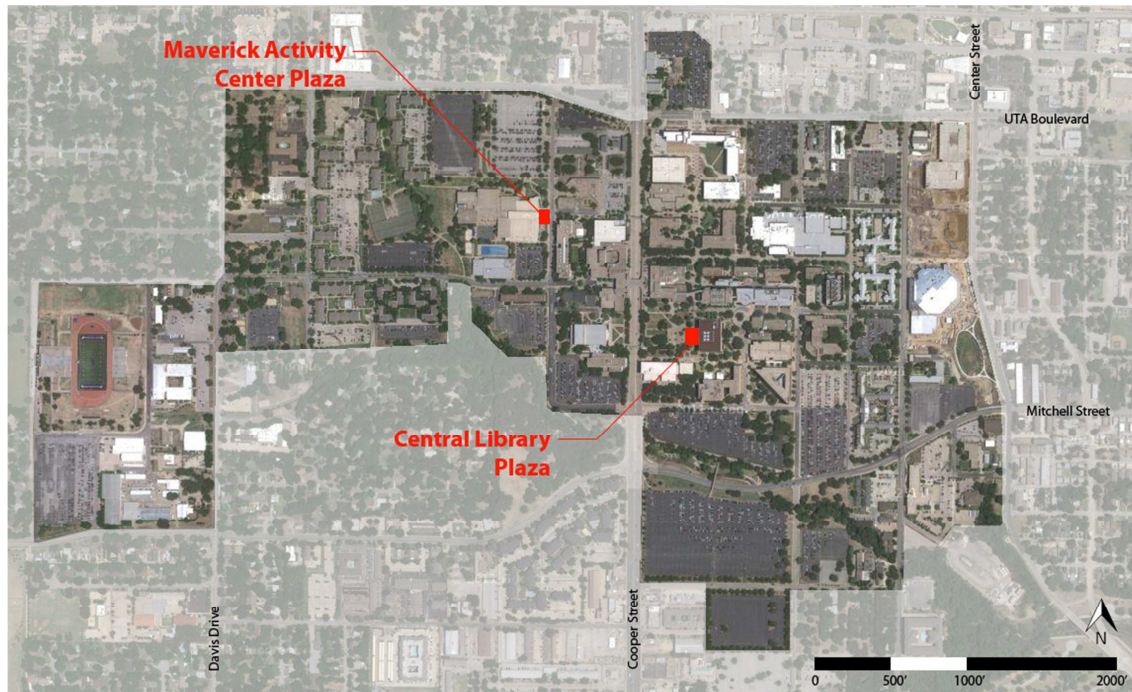


Figure 3.1: The University of Texas at Arlington Campus Context (NCTCog 2011)

The Central Library’s plaza was chosen as a site for research because of its heavy use and variety of physical and social elements. The site is located on the eastern side of Cooper Street, a main vehicular thoroughfare that punctuates the campus, below grade. The plaza is surrounded by the Science Hall to the north, the Central Library to the east, University Hall to the south, and to the west a larger green mall contained by a wall along Cooper Street. The site is largely used by students visiting the Central Library and those passing through the area. It also hosts many activities put on by various student groups. The observations focus on an approximately a 5,700 square foot section of the plaza.

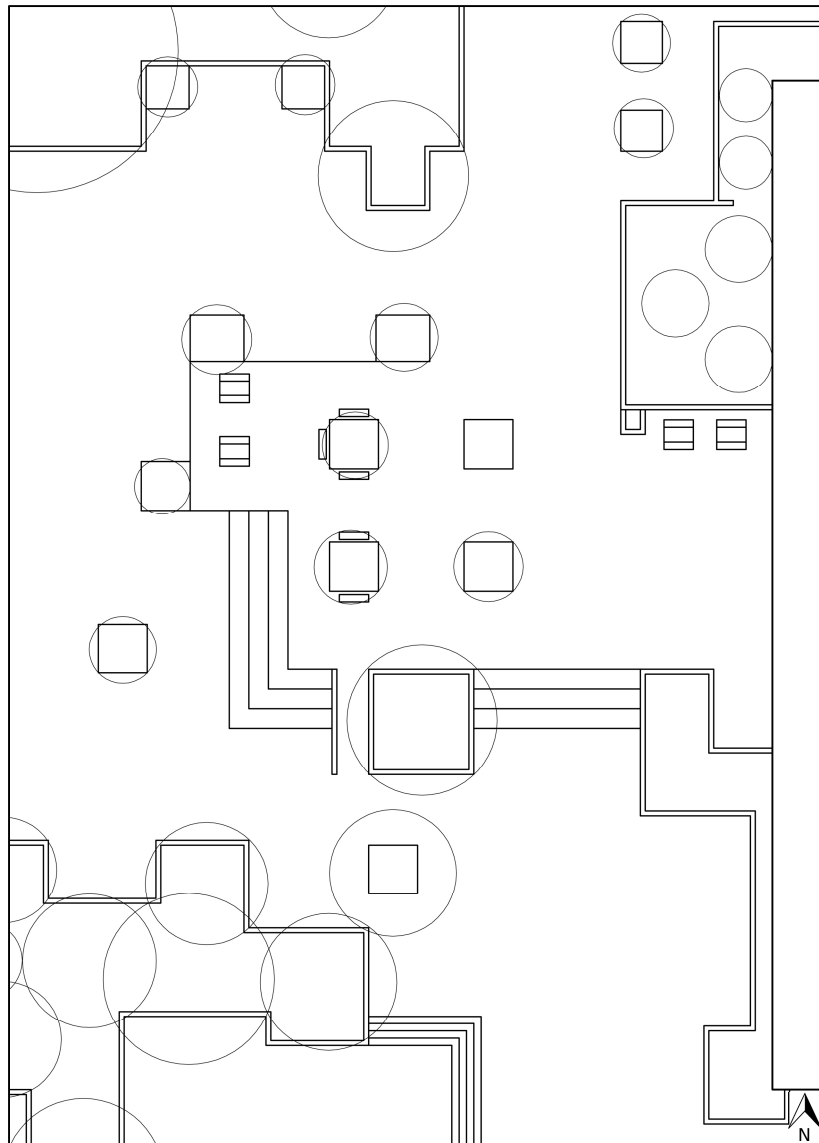
Users of this site typically were students, faculty, or staff visiting the Central Library. Other users passing through the plaza were likely in transit between other academic buildings,

the parking lot to the south, and surrounding on campus housing. This site also serves as a social space for many on campus as it is centrally located and hosts a variety of events.



*Figure 3.2: The University of Texas at Arlington Campus 2011*

Design elements create a variety of spaces within the plaza (see Figure 3.3). For example, the space includes an active pathway that moves north and south and a passive seating area to the west. There are also a variety of seating options, including benches, picnic tables, and ledges. In addition, there are multiple planters that house several matured trees. These trees provide dappled shade to visitors to the site. The Central Library casts a significant amount of shade on the site in the morning hours as well. In addition, the plaza features a boxy paving pattern that responds to the geometric design of the site.



*Figure 3.3: The Central Library Plaza in Plan View*

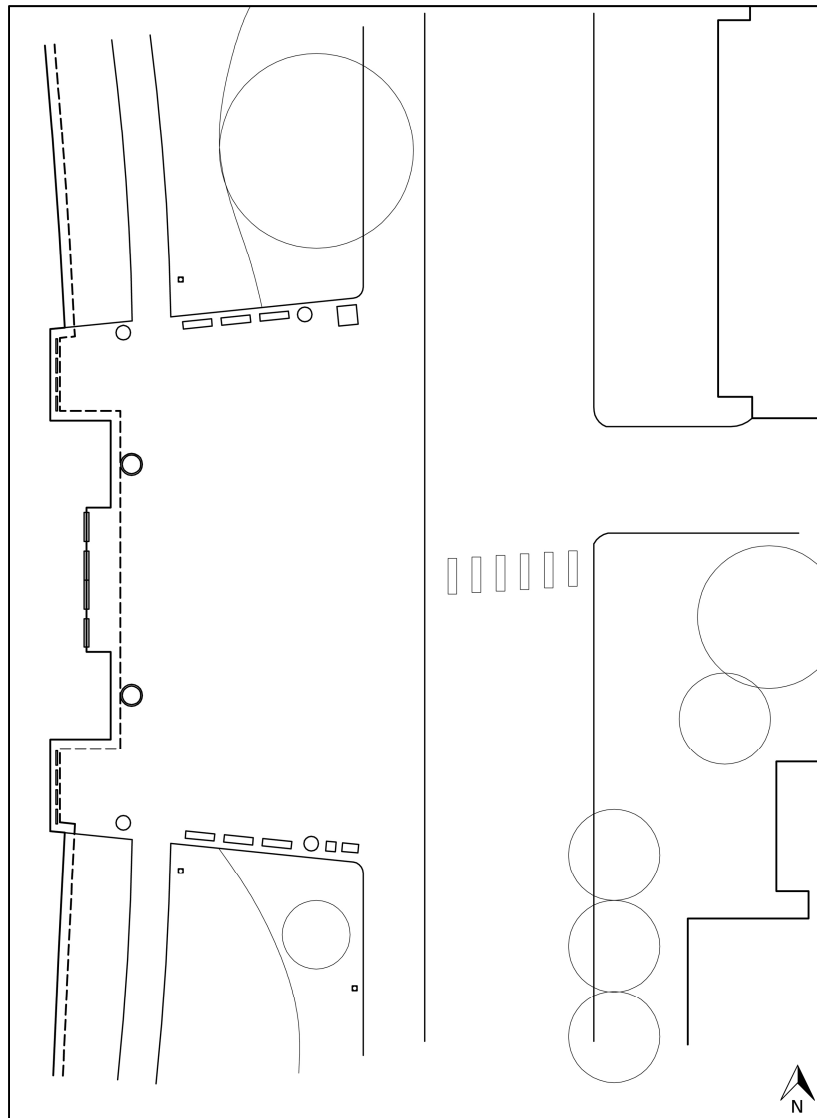
The Maverick Activity Center (MAC) plaza was also chosen for this research for a different set of qualities that contrast those found at the Central Library. This space is also heavily used by campus users. Located a block west of Cooper Street, this plaza is surrounded by parking lots to the north, street access and the School of Architecture to the east, faculty parking lots to the south, and the Maverick Activity Center to the west. The Maverick Activity



Center houses the campus gym, a small market, recreation rooms, and classrooms. The study area represents approximate 6,800 square foot section of the plaza.

Users to this site are frequently in transit to or from the parking lots. Other users are passing in and out of the Maverick Activities Center, which houses a noisy gym. These contextual uses had an effect on the types of uses within the site.

The design of the plaza includes plantings to the north and south of the plaza (see Figure 3.4). There are three benches on the north side and three benches on the south side of the plaza. Shade is cast over the plaza in the early mornings from the School of Architecture building and the late afternoons from the Maverick Activity Center. The plaza itself is very wide and open.



*Figure 3.4: The Maverick Activities Center Plaza in Plan View*

The variety in context, use, seating, and shade enabled the observation of a variety of behaviors. Both the Maverick Activity Center plaza and the Central Library plaza were chosen for the types of features they represented according to Whyte's categories (1980, 1988).

### 3.3 Research Design

This research used methods from Davis (1975), Whyte (1980, 1988), and Humphreys (2005) to develop a procedure. Each examined the relationship between the physical world and behavior.

Photography and film allowed behavior to be recorded and analyzed with a smaller margin of error due to observer error, limitations of observer skill, or speed in recording (Davis 1975). Video recordings can also allow for greater accuracy concerning complex or brief events than field observations recorded through written notes. In addition, imagery allows for the comparison of similar events that may have occurred at different times in different places. This allows for more complete testing of themes (1975). Imagery also helps to illustrate the behavior described in the research. This is useful for studies in landscape architecture, as the field is represented by individuals who tend to be more visually oriented (1975).

This research also sought to record place centered observations. This included recording the location of mobile device users in order to understand if users have a preference in location compared to those who are not engaged in mobile device use. A predefined list of behaviors is developed using the literature review. The presence of these behaviors are then recorded (Hampton 2009).

Whyte's method provides a basic framework for this research. His method includes approaches for selecting equipment, camera placement, clock placement, lens setting, interval, film stock, viewers and projectors, night work, slow motion, street filming, safety, and evaluation (1980). These considerations were adapted to modern technology by the researcher and used to design a procedure to collect data.

### 3.4 Research Subjects

The study was conducted on The University of Texas at Arlington campus and therefore primarily involved students, faculty, and staff of the school. The research participants in this study were those using the public spaces. Users engaging with mobile devices were studied

and compared to those without devices. It was expected that the study would feature a young representation of the population. Young people tend to be the most exposed to digital technologies (Small 2011). This group provides “telling cues as to the shape and form the mobile information society will take in the future” (Srivastava 2005). In other words, the younger population observed on the campus could illuminate trends toward the future use of public space.

Consent was not obtained from the subjects due to inability to the sheer volume of users observed and the need for unobtrusive data collection methods; however, the privacy of the subjects was maintained. Any images used in the report were distorted to protect identities.

### 3.5 Research Procedure

As the first step in this research procedure, permissions were obtained from authorities that monitor those spaces. Then a filming schedule was developed. Then video recordings of each of the plazas were taken, during which, observations were recorded on a predetermined form. Open coding was used to begin to understand the data. Then the recordings were imported into a computer and observed at different speeds in order to further explore and abstract patterns in plaza usage. At the same time, detailed notes were taken as a means of explaining the activities of the users in the space. Special attention was given to those interacting with mobile devices. Selective coding using frameworks from Goffman (1963) and Whyte (1980, 1988) was used to identify categories for analysis. Finally maps were created to further document the use of the space. Further coding of the notes and maps led to design implications.

#### *3.5.1 Filming*

Before the recordings began, permission was received from the following groups: The Institutional Review Board; the University of Texas at Arlington Campus Police; the Central Library; and the Student Government Association.

The schedule for recording video and observations was determined in order to study a random sampling of events (see Table 3.1). Each plaza was observed during different times between 8:30 AM until 6 PM in order to obtain observations on a variety of users and events in daylight. These observations were carried out over approximately two weeks.

*Table 3.1: Scheduling*

	Monday 9/26	Tuesday 9/27	Monday 10/3	Tuesday 10/4	Wednesday 10/5	Thursday 10/6	Friday 10/7	Monday 10/10
8:00 AM								LIBRARY
9:00 AM	MAC					LIBRARY		8:30 - 9:45
10:00 AM	8:30 - 12:30					9:30 - 11:00		
11:00 AM							LIBRARY	
12:00 PM				LIBRARY			11:00 - 12:30	
1:00 PM		MAC		12:00 - 1:30				LIBRARY
2:00 PM		11:30 - 3:15						1:30 - 3:00
3:00 PM					LIBRARY	MAC		
4:00 PM					3:00 - 4:30	3:00 - 4:30		
5:00 PM			LIBRARY				MAC	
6:00 PM			4:30 - 6:00				4:45 - 6:15	

The equipment used included a Canon Vixia HFR10 camcorder. This camera was chosen for its hi-def quality imagery and its zoom capability. A tripod was also used to steady the image.

Recordings of the Central Library plaza were taken from a third floor window of the library. The recordings of the Maverick Activity Center plaza were taken from the fourth floor of the School of Architecture. The elevated position was chosen in order to obtain bird's eye views, allowing the camera to record the larger composition as well as circulation patterns within the space.

### 3.5.2 Observation Forms

Observation forms were derived from Davis' (1975) photography journals (see Figure 3.5 and Table 3.2). They contained information such as date, collective activity, weather conditions, location, time, and description. In addition, several columns were reserved for coding. These codes were based off literature review. They included descriptions for device

usage, behavior, and place usage. These notes were later referenced when developing the descriptive notes.

<p>Lighting f.c./Acoustic envt. <b>STEP ON</b> 38 deg.k. 3400</p> <p>Population</p> <p>Activity Mostly arrivals from United #521 Eugene, Oregon &amp; Medford</p> <p>Temperature indoor outside Exterior weather</p>	<p>Description of location <b>SAN FRANCISCO INTL. AIRPORT</b></p> <p>Site #2 end of moving sidewalk towards B gates</p> <p>Environmental dimensions</p> <p>Site diagram and viewpoints</p>
--	--

Location #	Sheet #	Bunch #	Slide #	Camera	Time	Descriptive comments	Photo. tech. variables
				NIZO	8	17:20 VA @ VIEWPOINT #1, GD ON MOVING SIDEWALK APPROACHING VPT #1	
				BLACK	20	non-modular	
				CHROME	21	BUNCH #	
7	1,2	20				NUMBER IN BUNCH	
7	1,2	21				MOV. WALK	
7	18	22				abreast	
7	18	23				same man	
7	9,22	24				use trash basket	
						18 19 20 21 22 23	
						2 2 1 1 1 1 50 TOTAL	
						↑ ↓ ↓ ↓ ↑	
						PILOT	
				NIZO	9	17:20 GD @ VPT #2 & #1 VA @ VPT #2 w. NIZO	
8	6,7,8	25				4 modules	
8	9,11	26				1 2 3 4 5 6 7 8 9 10 11 12 13	
8	13,13*	27				1 1 2 2 1 2 1 3 2 2 5 2 2 26 TOTAL	
8	12,13*	28				↓ ↓ ↓ ↓ ↓ ↑ ↑ ↑ ↑ ↑	
						loses balance	
© Copyright 1972				Film roll no.	Viewpoint(s)	Project no.	
TEAG PHOTOLOG				Movie modules circled are 30 sec.		Project name	ESCALATORS
				Slide nos. circled, taken @ 30 sec.		Date	24 DEC 72
						Page no.	12

Figure 3.5: Model Observation Forms (Davis 1975, p 252)



### 3.6 Analysis

The collected data were then compared to secondary data on behavior in public spaces extracted from the literature review on Goffman (1963) and Whyte (1980, 1988). Analysis through open coding (see Table 3.3) was used to expand on how the introduction of mobile devices in public spaces impacts behavior of users and those in close proximity (Taylor and Bogden 1998). The coding system was used to separate data into understandable pieces in order to identify themes (Davis 1975). Codes represented device usage (see Table 3.3), Whyte's (1980) categories of use (see Table 3.4), and Goffman's (1963) behavioral traits (see Table 3.5). Open coding allowed the researcher to study the notes in smaller, more understandable pieces.

*Table 3.3: Open Coding Used During Observations: Device Usage*

Category	Code
<b>NOT ENNGAGED</b>	
Free of device	□
<b>ENGAGED</b>	
<b>Device not in hand</b>	
Headphones in	HI
<b>Device in hand</b>	
Texting/ surfing while sitting	TR
Texting/ surfing while standing	TS
Texting/ surfing while moving	TM
Headphones in while sitting	HR
Headphones in while standing	HS
Headphones in while moving	HM
<b>Device to ear</b>	
Device to ear while sitting	ER
Device to ear while standing	ES
Device to ear while moving	EM



Table 3.4: Open Coding Used During Observations: Place

Category	Code
<b>SEATING</b>	<b>WC</b>
Benches	1
Movable Chairs	2
Amount of Seating	3
Physical comfort	4
Social comfort	5
Location (Ped flow, corners, sun)	6
<b>SUN</b>	<b>WS</b>
In	1
Out	2
<b>WIND</b>	<b>WW</b>
Protection	1
Promotion	2
<b>TREES</b>	<b>WT</b>
<b>FOOD</b>	<b>WF</b>
<b>STREET</b>	<b>WR</b>
Variety	1
Impulse Use	2
Sight Lines	3
<b>MOVEMENT</b>	<b>WM</b>

Table 3.5: Open Coding Used During Observations: Social Interactions

Category	Code
<b>UNFOCUSED INTERACTION</b>	
<b>Involvement</b>	
Main Involvement	MI
Side Involvement	SI
Involvement Shields	IS
Auto-Involvements	AI
"Away"	AY
Occult Involvements	OI
<b>FOCUSED INTERACTION</b>	
<b>Face Engagements</b>	
Civil Inattention	CI
Fully Focused Gathering	FF
Partly Focused Gathering	PF
Multi Focused Gathering	MF
Exposed Position	EP
Opening Position	OP
Mutual Openness	MO

### *3.6.1 Selective Coding*

This section reviews selective coding techniques, which were used to further develop theory based on field notes. It also describes the requirements for core and supporting concepts that developed within this research.

Selective coding is the process of integrating and refining a theory (Corbin 1990). It is the interaction between the analyst and the data. In this process, categories are derived by comparing data from a variety of cases (1990). Findings are then presented as a series of interrelated concepts rather than a list of themes (1990). This is typically done through a written narrative.

The central or core category has the ability to pull other supporting categories together. It can be developed through writing a storyline or through the use of diagrams that note patterns, processes, and relationships (1990). Within this research, the storyline is combined with diagrams to identify patterns of use within the spaces.

Integration organizes categories around a central explanatory concept. The refining process involves the trimming of excess information and the further expansion of poorly developed categories. This is accomplished through theoretical sampling (1990).

### *3.6.2 Mapping*

The observations from field notes were then recorded on a map of the space (Corbin1990) in fifteen-minute intervals. The maps divided use into three categories represented by three different colors. Yellow icons represented users of the space that were not engaging with a mobile device. Red represented those users that had a device that they interacted with in their hand, for instance through texting. Green icons represented users that had the mobile devices to their ear while, for example, talking on the phone. Within each of these groups, icons represented whether the users were sitting, standing, or moving. These icons were located spatially on a map to explore the use of space. In total, seventy-eight maps were developed and examined.

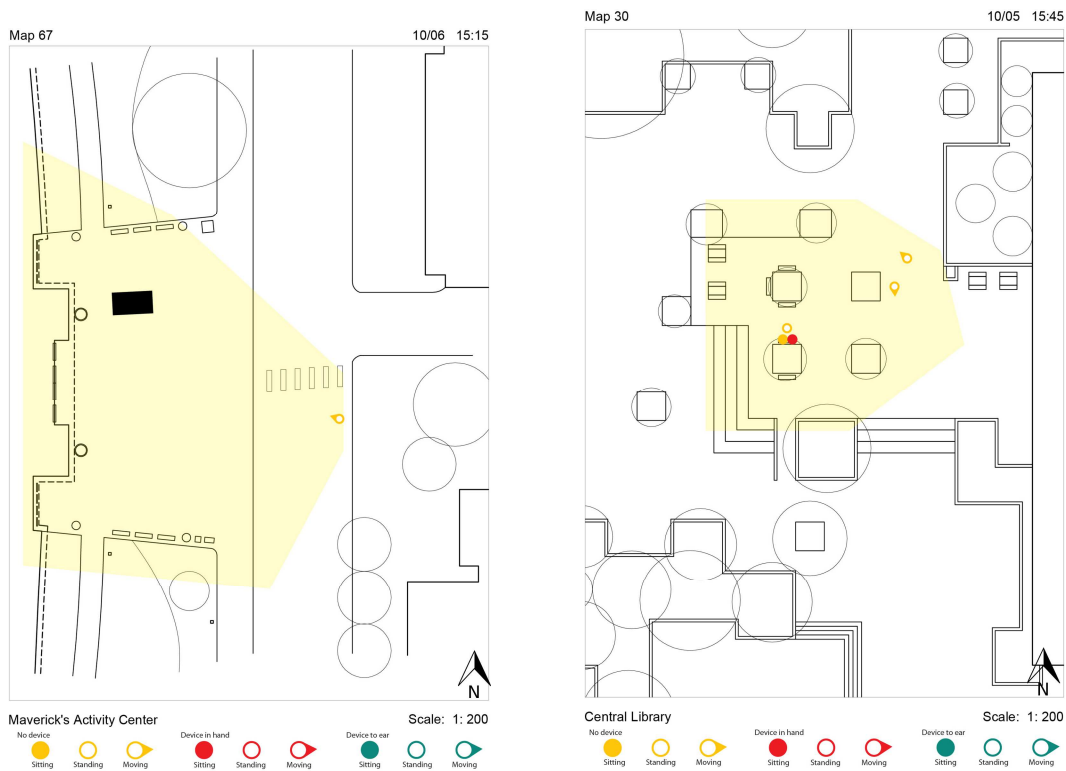


Figure 3.7: Mapping to Understand Notes

### 3.6.3 Statistical Analysis

After the mapping was concluded, statistical analysis began. This study used descriptive statistic frequencies to illustrate the occurrence of device usage under different conditions. Using the categories that emerged in the selective coding, the maps were analyzed. Tables were developed to further document how those observed were using the space (see Table 3.6). These data were analyzed using a program called BusinessObjectives OnDemand by SAP. This program was used to create charts to further understand the usage of mobile devices within campus spaces.

Table 3.6: Metadata for Analysis

DEVICE		BEHAVIOR		Physical Infrastructure		OTHER	
Mobility		Interactions		Zone		Location	
Sitting	1	Focused	1	Passive	1	Library	1
Standing	2	Unfocused	2	Active	2	MAC	2
Moving	3	Organized Event		Threshold	3	Time	
Usage		Participant	1	Peripheral paths	4	Early Morning (8 - 9:45)	1
Not engaged	1	Non Participant	2	Street (MAC)	5	Late Morning (10 - 11:45)	2
In Hand	2	None	0	Seating		Mid Day (12 - 1:45)	3
To Ear	3			Benches	1	Early Afternoon (2 - 3:45)	4
				Picnic Tables	2	Late Afternoon (4 - 6)	5
				Hardscape	3	Gender	
				Temp Objects	4	Male	1
				Sun		Female	2
				In	1		
				Out	2		
				Temporary Objects			
				Interact	1		
				Ignore	2		
				None	0		

### 3.7 Summary

This research examines how users interact with the physical features of public space while interacting with mobile technology. Social relations can be both facilitated by space and constrained by space (Carmona 2003). It is in this way that urban designers and social life influence one another.

Technology challenges concepts of place. Users constantly negotiate their responsibilities to the physical world and the digital networks (Humphreys 2005). Technology therefore has profound implications on the use of public space (Kleinman 2004).

This research methodically identified the effects on public space through literature review, observations, and analysis. The literature review identified frameworks that can be used to examine this movement. Observations were documented using digital recordings and open coding. Analysis was carried out using selective coding and theoretical sampling. The result is a series of observations about the implications of mobile phone use on the design of public spaces.

## CHAPTER 4

### ANALYSIS AND FINDINGS

#### 4.1 Introduction

This research sought to discover the design implications from the introduction of the mobile device into public spaces, specifically on campuses. Passive observations, or observations conducted quietly so as to limit interference with the subjects, were used to collect data. The data were first analyzed using open coding which referenced work from Goffman (1963) and Whyte (1980, 1988). After themes began to emerge, selective coding was used to develop a core concept and supporting themes. This was done using written field notes that described a storyline and diagrams. Pie charts and other tables were used to understand the proportion of mobile device users within certain situations. These categories are described in this chapter.

#### 4.2 Analysis

Selective coding was used to understand the collected data. A single core concept emerged by repeatedly examining the data in the notes and maps. Categories that support this core concept were also defined through this research. This section reviews the core concept and the supporting categories.

##### *4.2.1 General Device Usage*

The purpose of this research was to identify how users interact with the physical features of public space while interacting with mobile technology using Whyte's model (1980). Passive observation techniques were applied to observe users interacting with spaces and mobile devices simultaneously. This section reviews some of the general usage patterns.

Device usage measures whether visitors to the site were engaged with a device in their hand, holding their device to their ear, or not engaged with a device at all. As a whole, about

eighty-three percent of the users of the site were not engaging with a device (see Figure 4.1). Among users who were engaging with devices, texting was more popular. Device usage was higher at the Maverick Activity Center at nearly twenty-five percent than at the Central Library at almost fourteen percent.

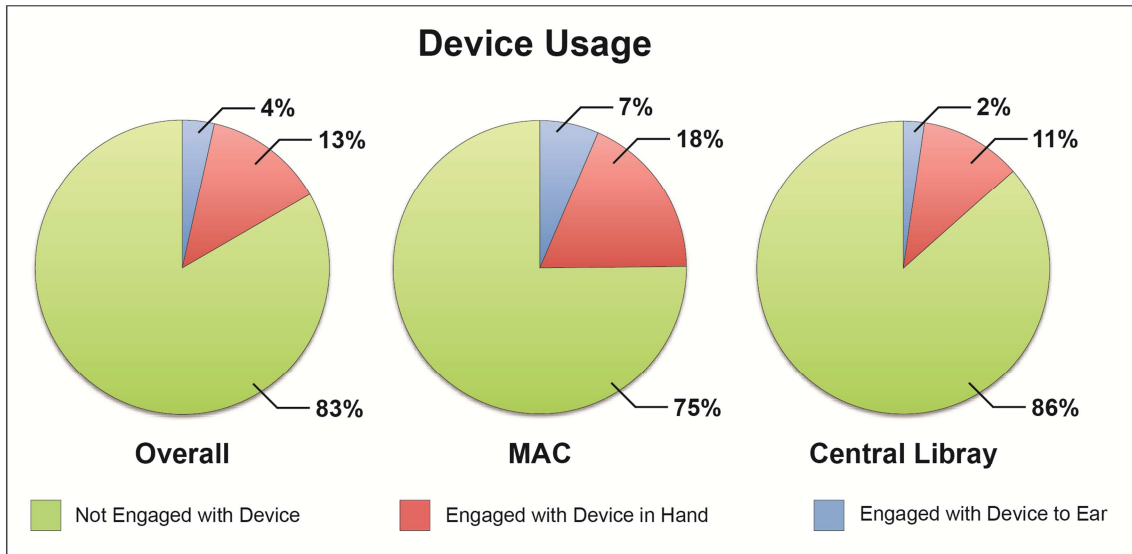


Figure 4.1: Device Usage at Observed Sites

This difference in use could be a result of a variety of things. First, the Maverick Activity Center has fewer physical obstacles, like tree wells, allowing for more fluid movement while using a device. This is key for users of devices in their hand because many employ a scanning technique in order to walk and text simultaneously. It was observed that users walked with their heads down, focused on their devices, until they came within ten feet of another moving person. Then users would suddenly look up to regain their position within their physical environment.

#### 4.2.2 Core Concept

Through both open coding and selective coding, it was found that mobile device usage reduced when environments were more complex. This is a reflection of the qualities of the sites that were observed. It was found that device usage in the Maverick Activities Center was

higher which was linked to the simplified environment. This reduced complications for users that were attempting to multitask.

#### *4.2.3 Categories*

Supporting categories are observations that support the core concept. The supporting categories in this research include several elements that affect use. These include:

- Organized events;
- Social interaction;
- Level of mobility;
- Seating context;
- Presence of Sun;
- Interaction with temporary objects;
- Time of day;
- Zones of use.

##### 4.2.3.1 Organized Events

If there was an organized event present on the site, involvement was measured by whether or not an individual was participating in the event. During the observations, organized events only occurred at the Central Library plaza.

When an event was organized, most of the people present, fifty-nine percent, participated in some fashion or another (see Figure 4.2). The majority of participants in organized events did not simultaneously engage with a device (see Figure 4.3). None of the observed participants talked on the phone while participating in an event. Non-participants, however, continued to use their devices, though slightly less than the percentage of device usage overall. In these observations, an organized event led to the reduction in the amount of device usage in the public space (see Figure 4.4).



Figure 4.2: Participation Levels at an Organized Event

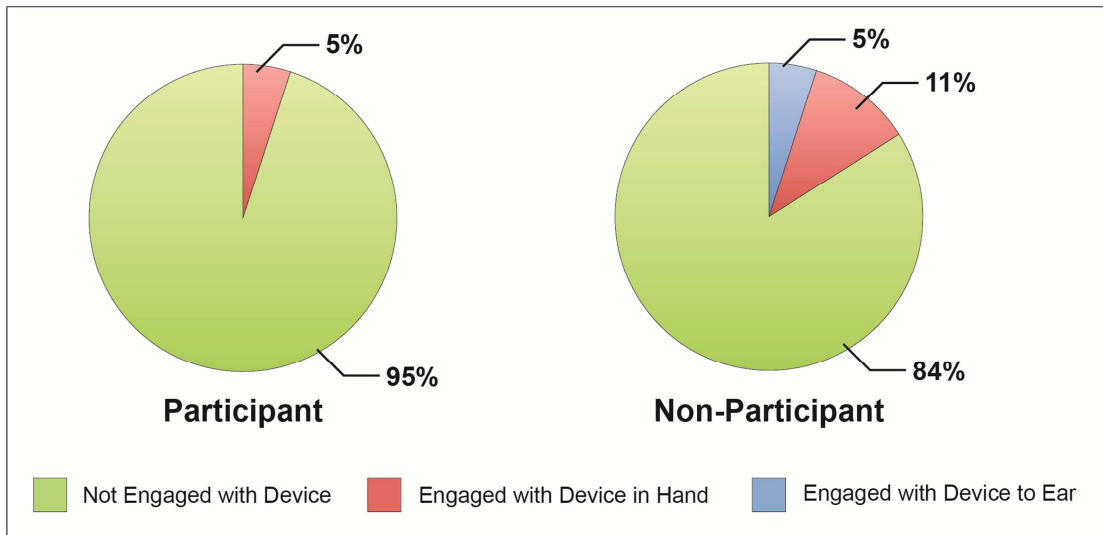
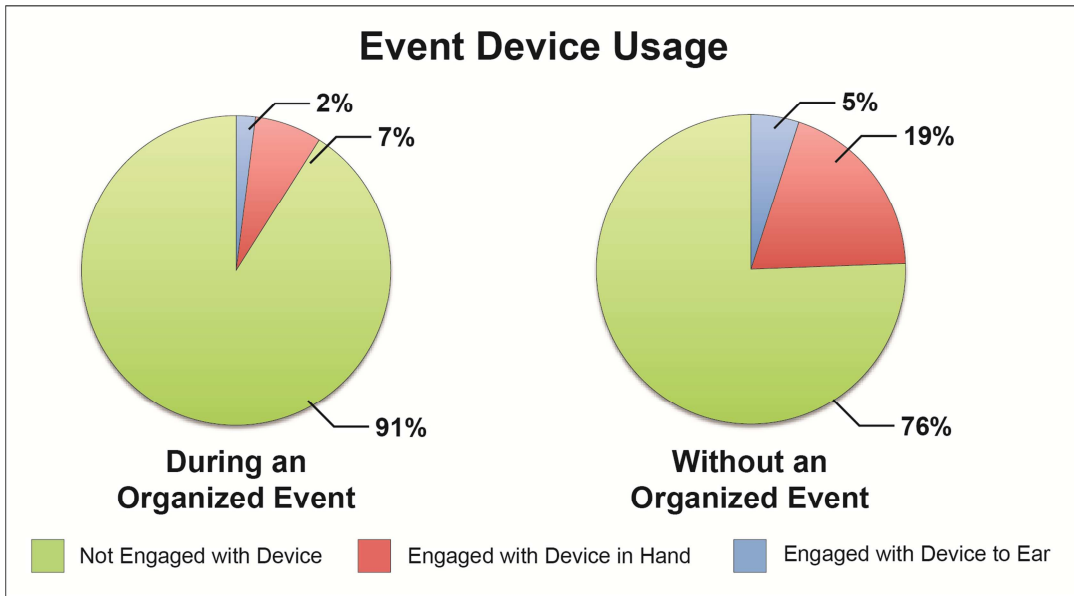


Figure 4.3: Participation Levels with Device Usage





*Figure 4.4: Device Usage With or Without Organized Events*

It is suggested that an organized event reduced the amount of device usage in the public space. Within those events, participation level varied depending on device usage. No one in the random sampling participated in an event while talking on the phone, although several were observed during the passive observations. Those who were not using a device were more likely to be participants in an event than those who were using a device in their hands (see Figure 4.5).

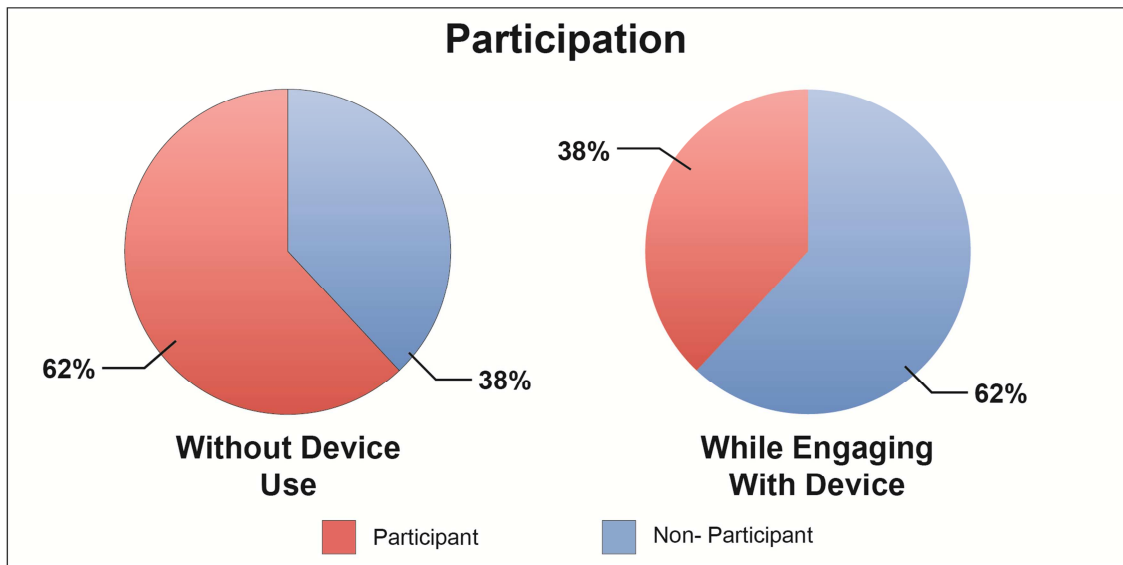


Figure 4.5: Participation Levels With or Without Device Usage

#### 4.2.3.2 Social Interactions

Interactions measured whether a user was engaged in a focused or unfocused interaction. This metric was developed according to Goffman's (1963) frameworks. Focused involvements are dominated by face engagements. Unfocused involvements are those activities that are represented through body idiom.

Approximately sixty-seven percent of the involvements observed at the Maverick Activities Center were unfocused as opposed to forty-three percent at the Central Library. This means that people using the MAC were more likely to be in an unfocused involvement while people using the library plaza were more likely to be in a focused involvement. It could be interpreted that the Central Library therefore creates more opportunities for or nurtures face engagements.

It was also found that the majority of people engaging in a focused interaction do not use a device (see Figure 4.7). The percentage of people using devices while engaging in focused interactions was slightly higher at the Maverick Activities Center. If users did engage in a face engagement while using a device, they were far more likely to be using their device in

their hand rather than talking with it to their ear (see Figure 4.6). The MAC had a slightly higher percentage of engagement with a device during a focused interaction.



*Figure 4.6: People Engaging in Device Usage and Focused Interactions Simultaneously in Frame 69 at the MAC*

In addition, it was found that a higher percentage of people interact with their mobile devices during an unfocused involvement (see Figures 4.7 and 4.8). This behavior was observed frequently in the observations. Users tended to their devices while sitting or while waiting for others to join them. This usage could be considered main or side involvements by Goffman (1963) and related directly to the core concept.

Devices could be used to justify one's place in the public space so that one does not appear to be completely alone or inappropriately present for no reason. They could also be used to cope with the boredom of waiting. This study can only speculate on the reason for using devices during an unfocused involvement. Further research could look to uncover perspectives of device users.

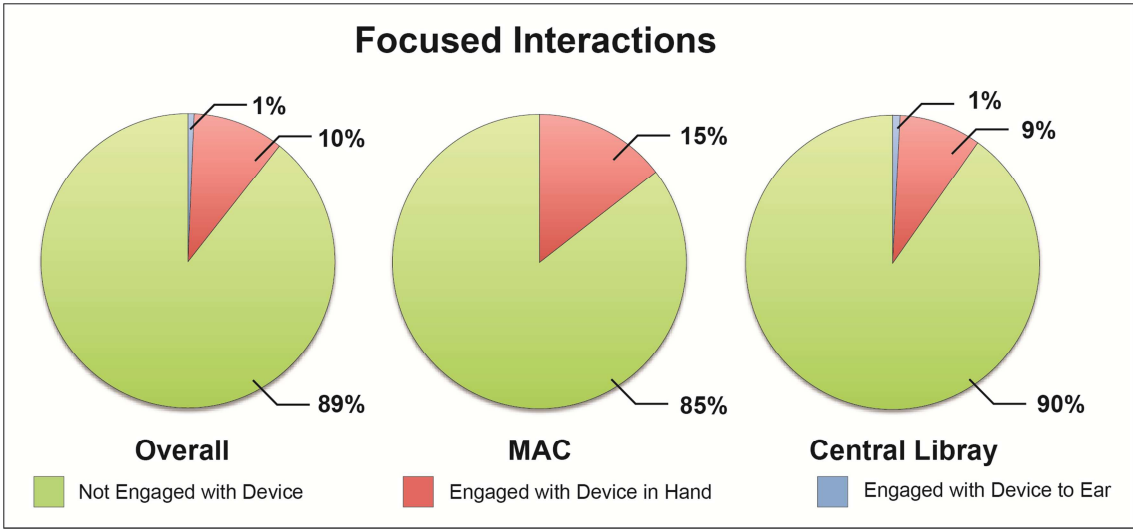


Figure 4.7: Device Usage While Engaging in Focused Interactions

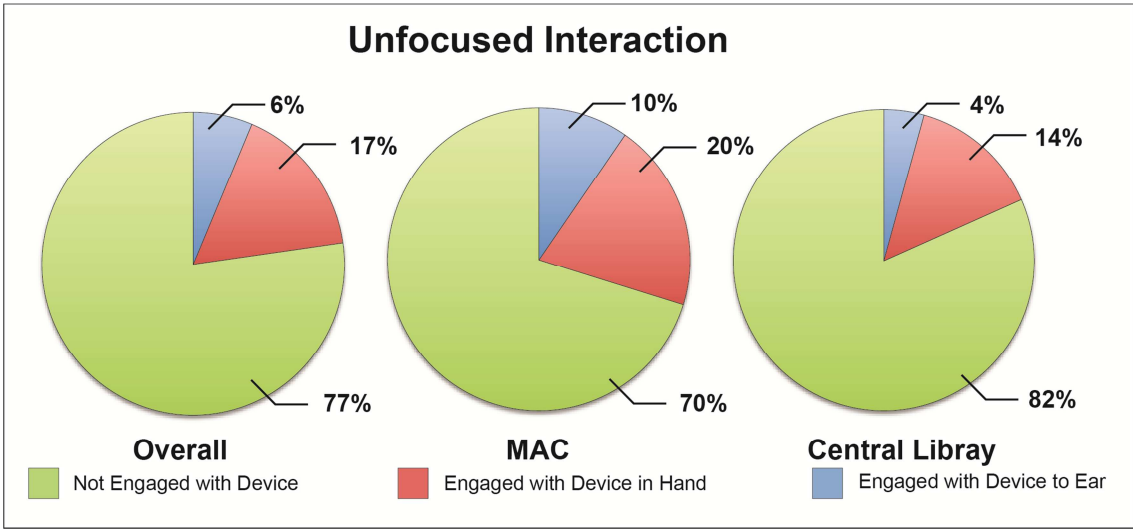


Figure 4.8: Device Usage While Engaging in Unfocused Interactions

Device usage during unfocused involvements in the Maverick Activities Center is again higher, reflecting general trends of higher device usage in that plaza as well as higher levels (see Figure 4.8). This plaza has a higher level of unfocused interaction than the library as well as higher levels of device usage during these unfocused interactions.

#### 4.2.3.3 Level of Mobility

Mobility in this study measured the intensity of movement based on three categories: Sitting; standing; and moving. Of people using devices, most were observed in motion. Sitting was the second most popular level of mobility.

When talking on the phone, people tended to be in motion. This was observed frequently in the passive observations. This population of moving talkers could be divided into two groups. The first group is those that seemed to have a destination in mind. They were often found in active zones, or pathways, en route to somewhere that seemed predetermined. The second group is those that wandered while talking on the phone. Their movement patterns were characterized by looping around physical infrastructure and pacing.

People engaging with devices in their hand were more likely to be in motion than sitting or standing as well; however, they were also more likely to be sitting or standing than those who were talking on the phone (see Figure 4.9). This could be attributed to the amount of visual attention necessary to engage with a device in one's hand. For instance, it was observed that people in motion would sometimes pause to finish texting before continuing on their path. In addition, it could be suggested that those sitting often might use their devices periodically as a side or main involvement to supplement their inactivity.

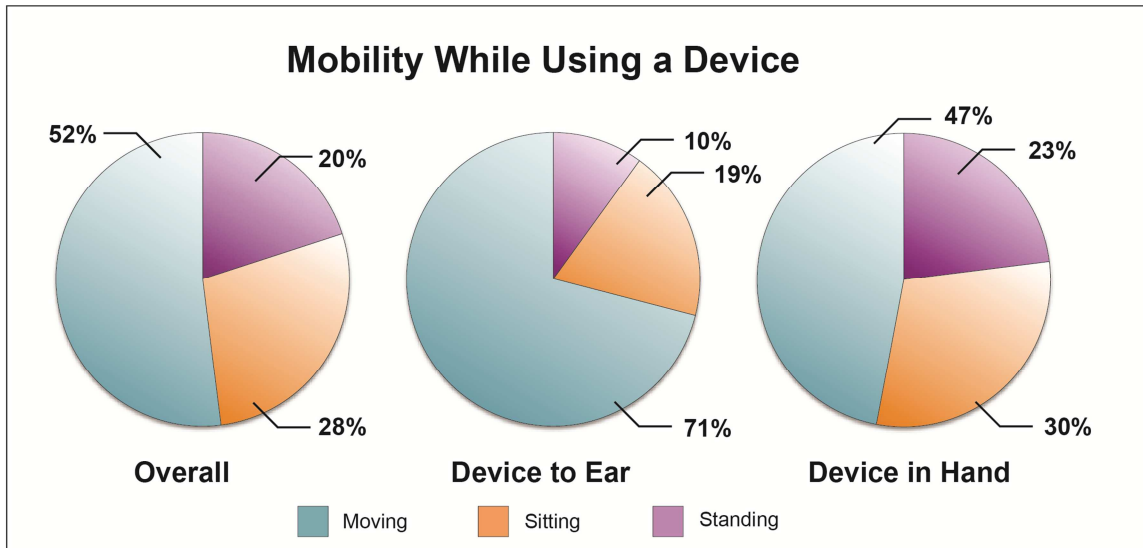


Figure 4.9: Level Of Mobility While Using Devices

At the Maverick Activities Center, patterns of use were very similar to the overall average. Among people talking on the phone, slightly more were likely to be in motion. The same holds true for those engaging with devices in their hands, although people were slightly more likely to be in motion in this plaza than in the overall (see Figure 4.10). These patterns of higher mobility while using a device could be contributed to the lack of seating options as well as the large, unobstructed plaza area.

At the Central Library, users talking on the phone were similar to those at the Maverick Activities Center in that they were largely in transit. Users with devices in their hands, however, were far more evenly distributed between moving, sitting, and standing (see Figure 4.10). Still, they were more likely to be in motion while simultaneously interacting with a device in their hand. This could be attributed to the amount and variety of seating as well as the tree wells that punctuate the site, causing conflict for those walking and texting.

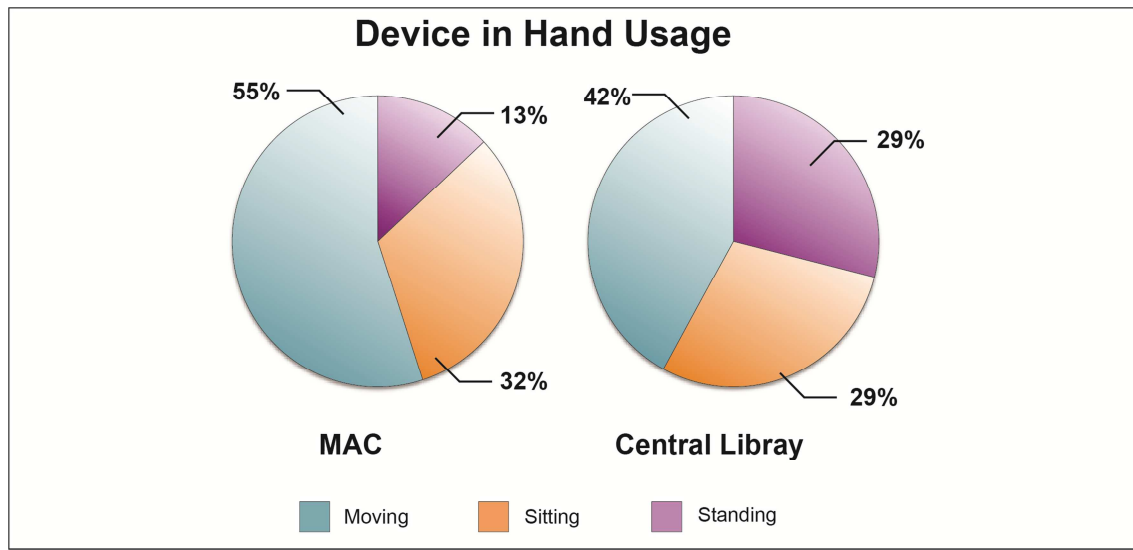


Figure 4.10: Level Of Mobility With a Device in Hand at Each Site

#### 4.2.3.4 Seating Context

Whyte suggested that seating was a determining factor in the use of public spaces (1980, 1988). According to him, more and greater variety of seating was indicative of a more popular space. In this research, the Central Library plaza and the Maverick Activity Center plaza were chosen because of their different seating conditions. The library has picnic tables, benches without backs, ledges, and events that typically bring temporary seating in a variety of lighting conditions and within different zones of activity. The MAC is limited to six benches that face the wide plaza.

People observed sitting at the Central Library were most likely to be found on benches (see Figure 4.11). Users of mobile devices in the library plaza were only observed using benches and picnic tables. Of the two options, users sat on benches while texting more often (see Figure 4.12).

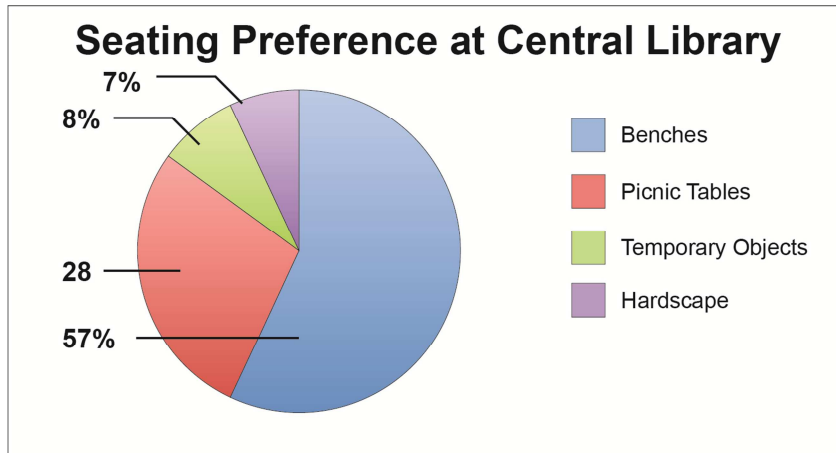


Figure 4.11: General Seating Preferences at Library

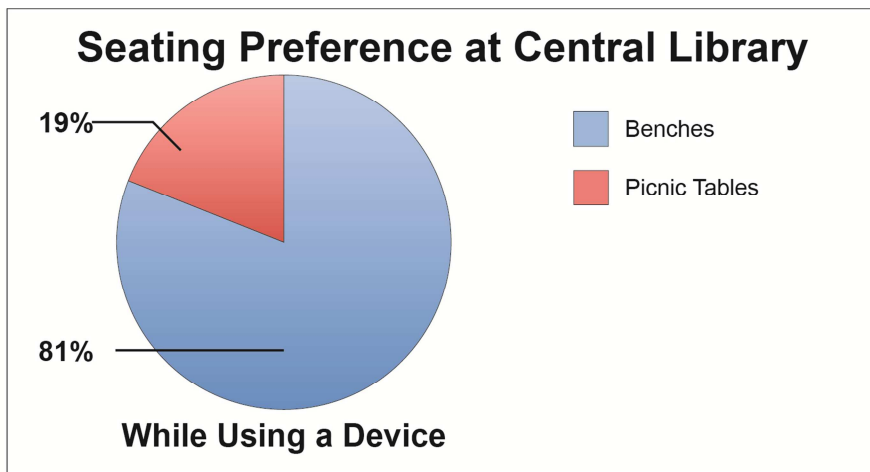


Figure 4.12: Seating Preferences at Library While Using a Mobile Device

Mobile devices and seating were also examined by looking at the device usage on different types of seating at different places. At the Mavericks Activity Center plaza, most of the people observed sitting on the benches were using a device in some way (see Figure 4.16). Of the device users, texting was the most popular. It could be suggested that benches in the Maverick Activity Center are therefore more conducive to mobile device usage.



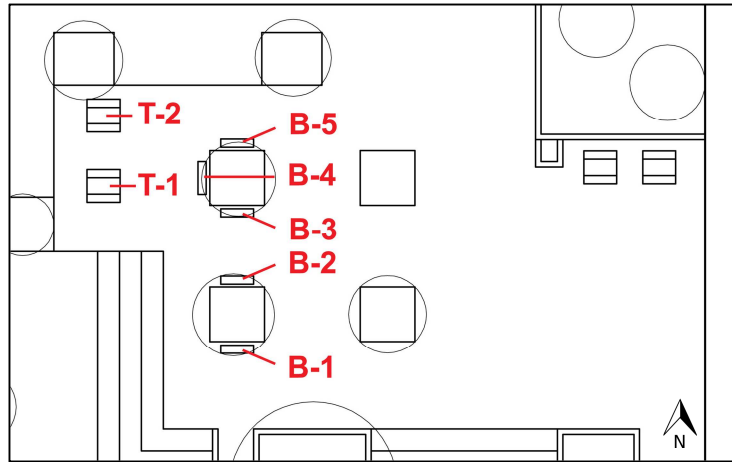


Figure 4.13: Seating Labeled at Central Library

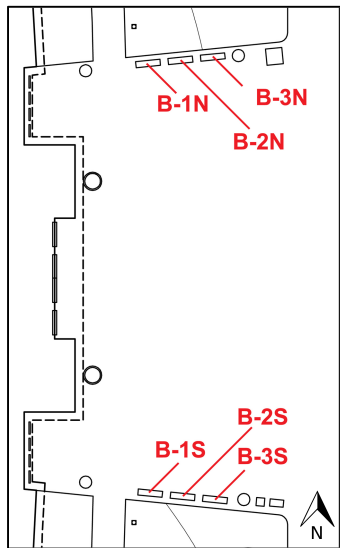


Figure 4.14: Seating Labeled at the MAC



#### 4.2.3.5 Presence of Sun

During observations, the sun was thought to play a role in device usage. Some users were seen shading their screens while trying to adjust to lighting changes. This was especially noticed under the trees in the Central Library plaza where the lighting is dappled. Sun measurements recorded whether a person was in or out of the sun while using a device. Device usage depending on whether a user was in the sun or out of the sun was found to be essentially equal.

It was also found that while using a device to talk with it to one's ear, users were almost equally in and out of the sun. Users were also more likely to be in the shade while engaging with a device in their hand (see Figure 4.17). This could be indicative of difficulty that individuals have while using a digital screen in the bright sun.

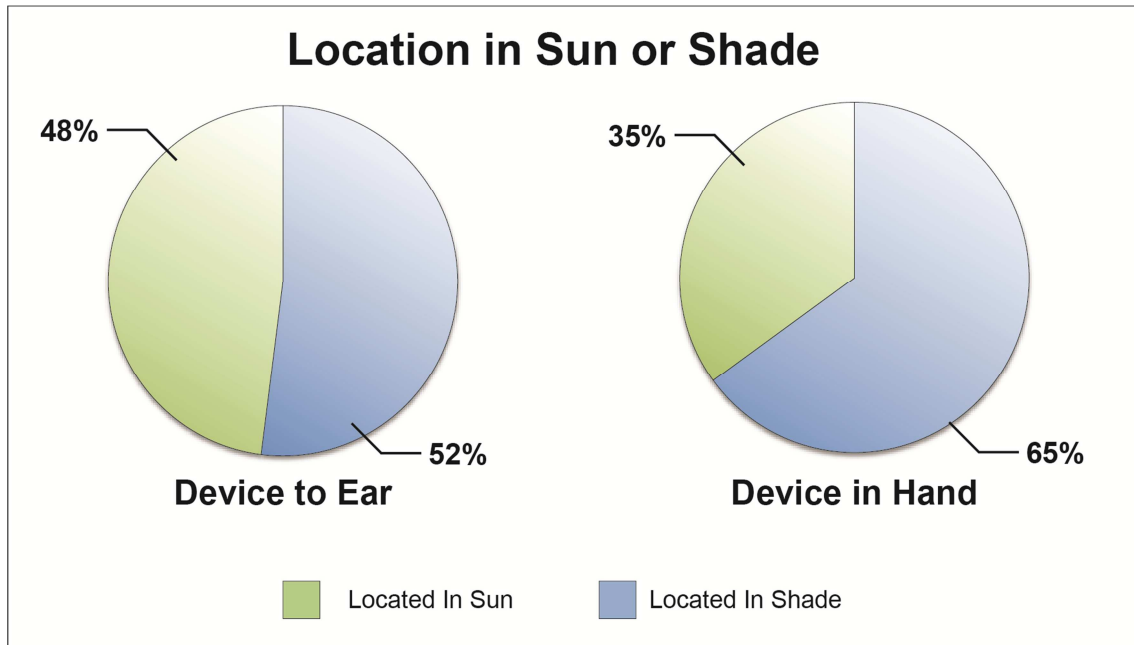


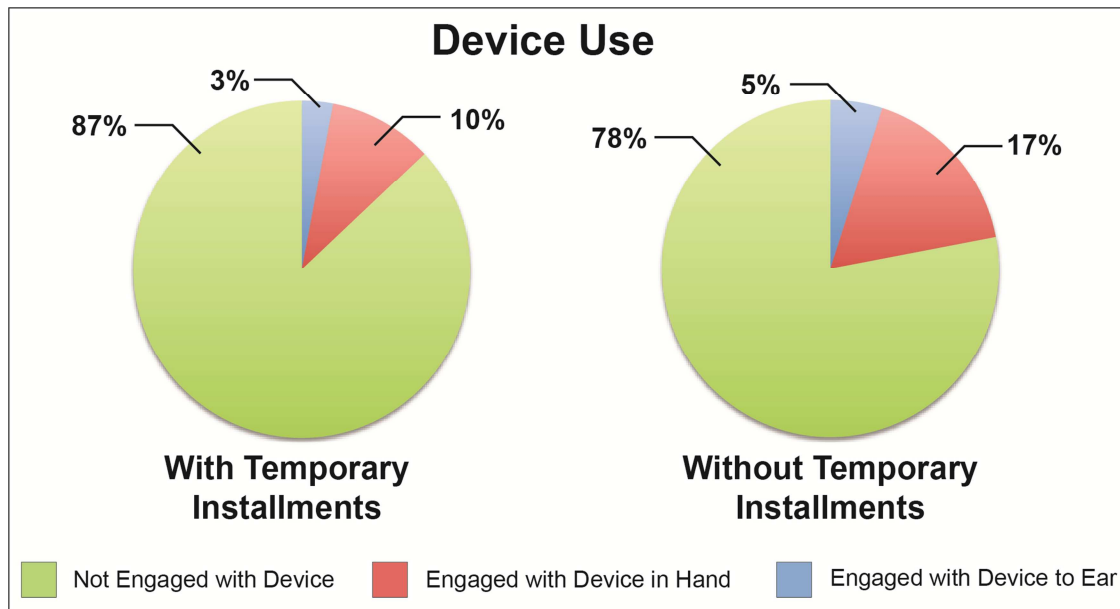
Figure 4.17: Location of Device Usage Depending on Sun

#### 4.2.3.6 Temporary Objects

Temporary objects, like tables and chairs, were typically introduced into a space by an organized event, but they also included maintenance vehicles that may have occupied the space at some point. Interaction with these objects compared with phone usage was valuable in the exploration of the absent presence. It was suspected that people would largely ignore these items if they were using devices.

It was found that people using devices were more likely to ignore the temporary objects, especially if they were talking on the phone. This could suggest that the absent presence is more likely in public spaces if they are using a device. This could also indicate that users of devices were not involved in the organized events that introduced the temporary objects.

It was also found that device usage was lessened in the presence of temporary objects. Eighty-seven percent of people did not engage with a device when there was a temporary installment. This is as opposed to seventy-eight percent of people who did not engage with a device when there was not a temporary installment present on site (see Figure 4.18). These findings could be used to suggest that mobile devices hurt sociability of public spaces. It also supported the core theme, that mobile device usage is higher in less complex environments.



*Figure 4.18: Device Usage In the Presence of Temporary Objects*

#### 4.2.3.7 Time of Day

Whyte suggested that time was a huge indicator of the amount of users a place had at any given point (1980, 1988). Specifically, he found that lunch hours were the most popular times for use. In this research, the amount of users was compared to the time of day as well. Time was broken up into five categories: Early morning, or 8:00 AM until 10:00 AM; Late morning, or 10:00 AM until 12 PM; Mid-day, or 12:00 PM until 2:00 PM; Early afternoon, or 2:00 PM until 4:00 PM; and Late afternoon, or 4:00PM until 6:00 PM.

It was found that people are most likely to use the plazas at mid-day, followed by late morning (see Figure 4.19). Users of devices were also most likely to be present during mid-day, but the distribution among late morning, early afternoon, and late afternoon was far more even. Early morning had the least amount of device usage.

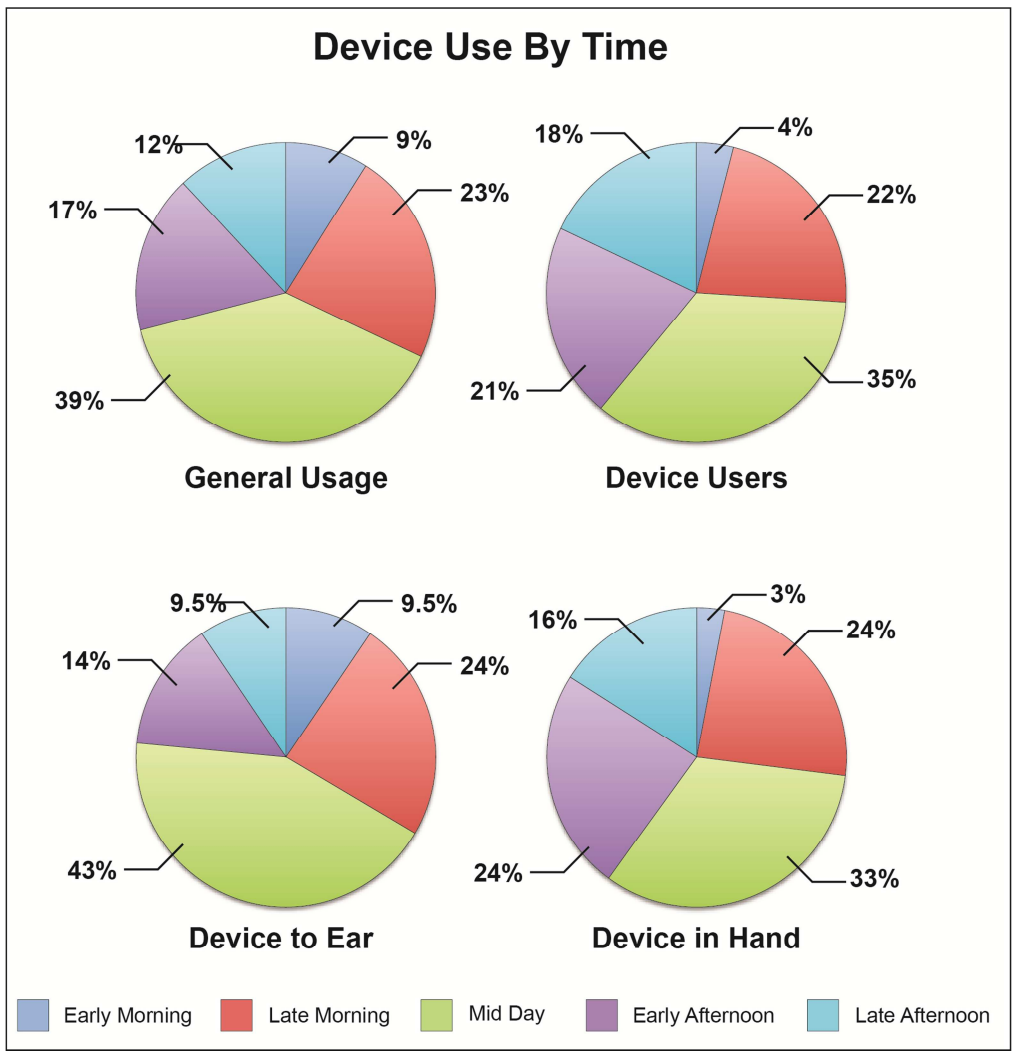


Figure 4.19: Device Usage By Time of Day

4.2.3.8 Zones of Use

During passive observations, zones of use were established (see Figure 4.20 and 4.21). These include active areas, passive areas, thresholds to buildings, peripheral paths, and the street. Street access was only observed at the Maverick Activity Center.

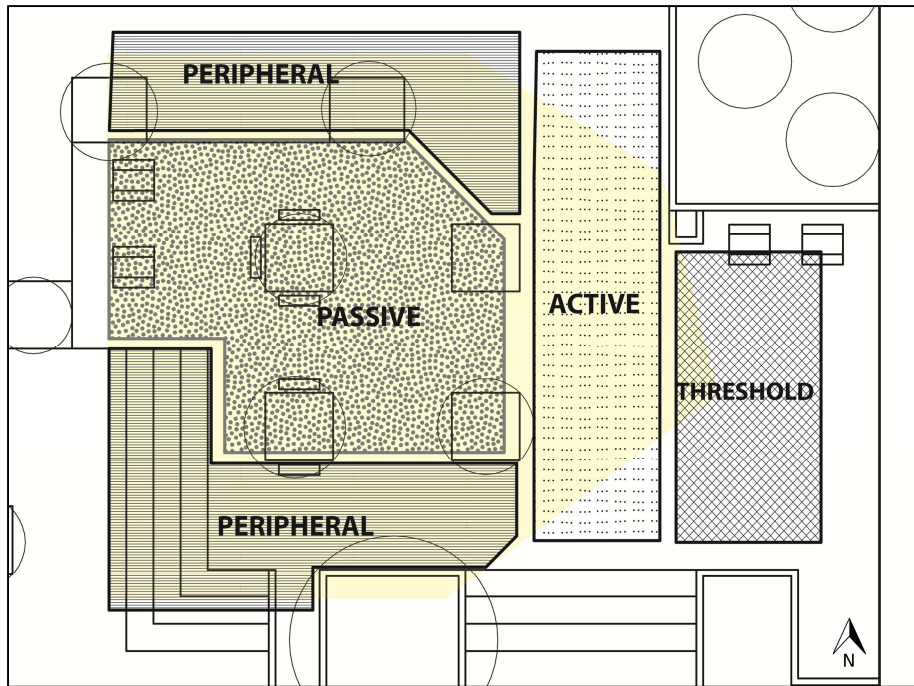
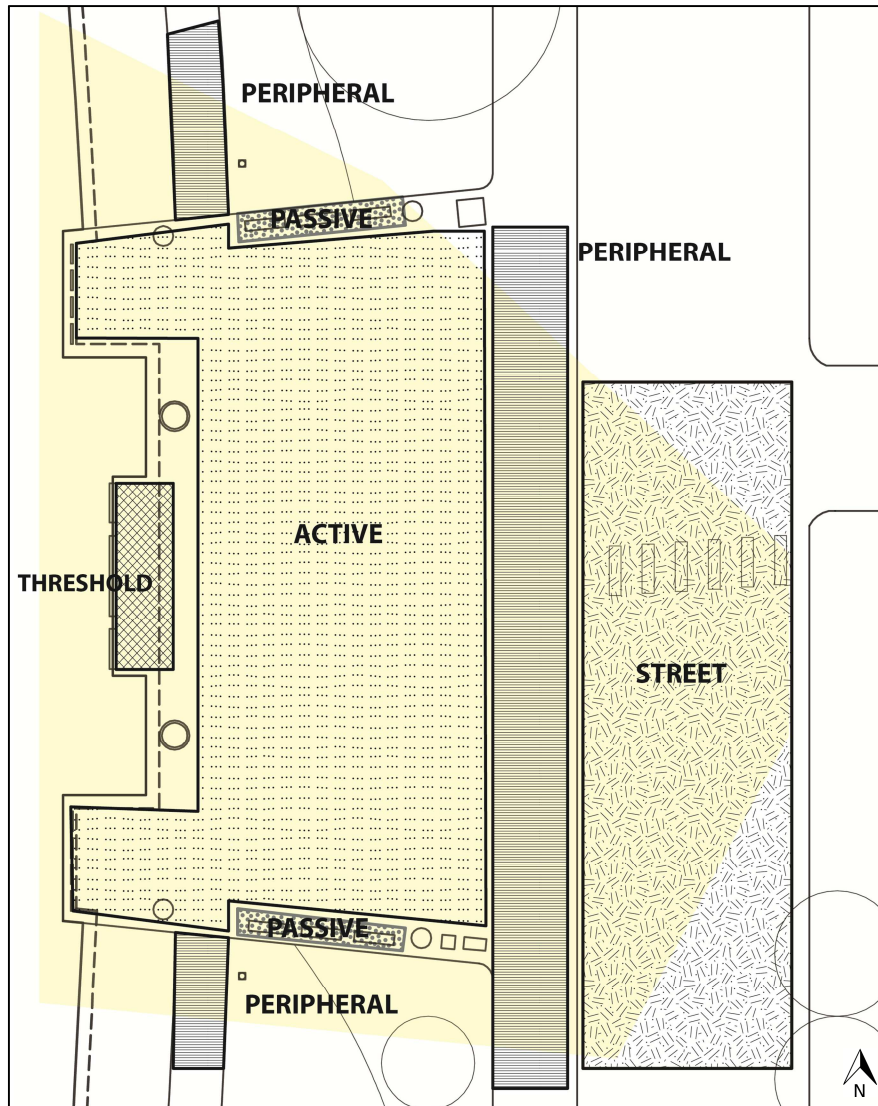


Figure 4.20: Central Library Plaza Zones



*Figure 4.21: Maverick Activities Center Plaza Zones*

It was found that in general, most people were observed within the active area, followed closely by the passive area. At the Maverick Activity Center, a majority of the users were observed within the active area (see Figure 4.23). Population usage in the other zones was far more evenly distributed than in the library plaza. In the Central Library, most people were observed in the passive area, followed by the active area (see Figure 4.24). The location of the camera contributed to the limited amount of data about building threshold occupancy.



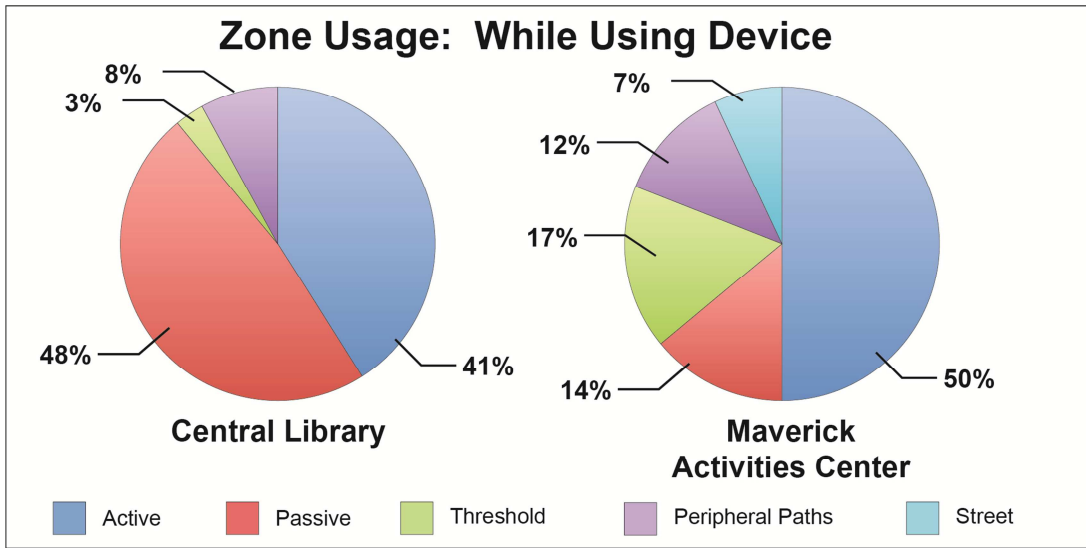


Figure 4.22: General Usage of Zones

Cumulative data of both locations shows that users talking on the phone are more likely than those texting to be using the active zones. This is also supported by earlier charts that show that people talking on the phone are usually in motion.

Users texting in the Maverick Activity Center plaza are almost equally found in the active and passive areas. Users talking on the phone, however, are again more likely to be in the active area.

Users texting in the Central Library plaza are slightly more likely to be using passive areas. Users talking on the phone, however, are much more likely to be in the active area than the passive area.

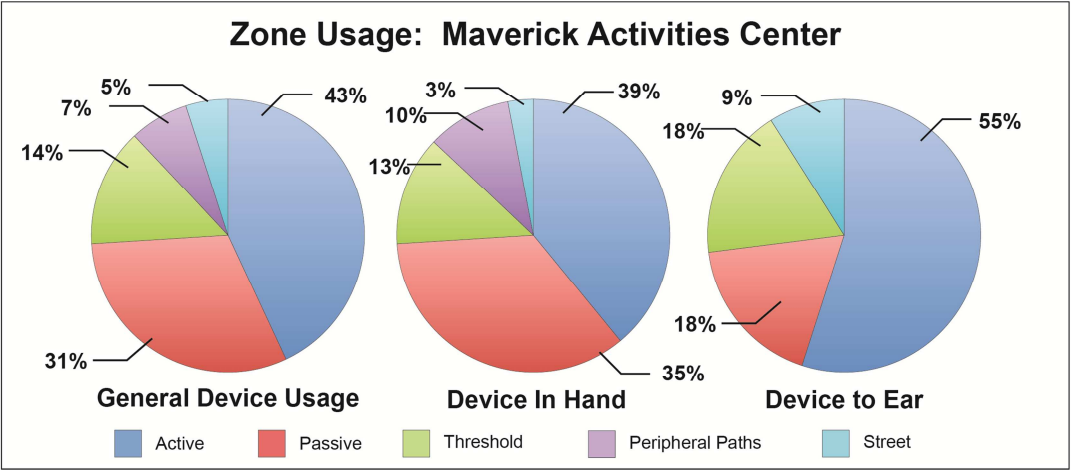


Figure 4.23: Zone Usage Based on Device Usage at MAC

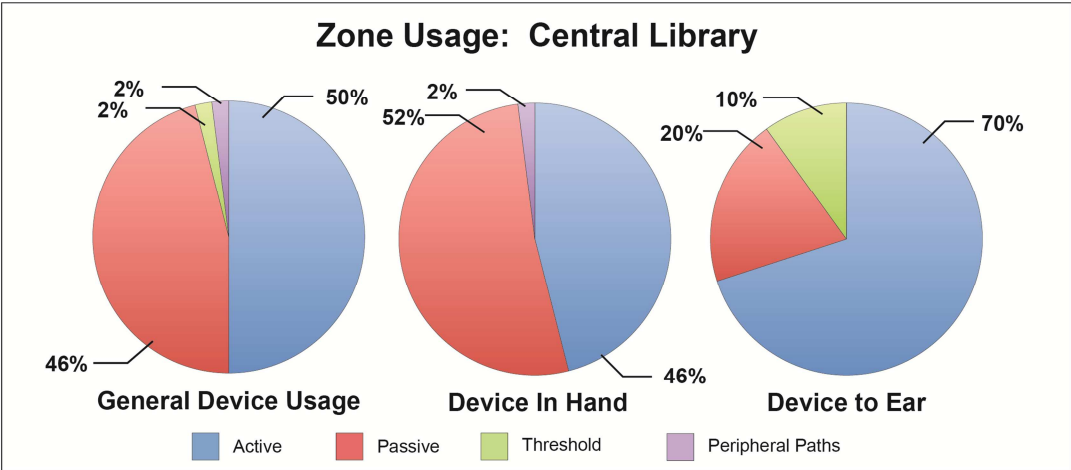


Figure 4.24: Zone Usage Based on Device Usage at Central Library

This data was further deconstructed based on location. At the Central Library within the active and passive zones, device usage through texting is more popular than talking on the phone (see Figure 4.25). Within the threshold, however, talking on the phone is more prevalent among device users than texting. This was observed by people who paused outside of the building to finish talking on the phone before walking inside. Texting is likely not seen in the

threshold because it is a high traffic area with limited boundaries; therefore, it is an area with a high risk for collision.

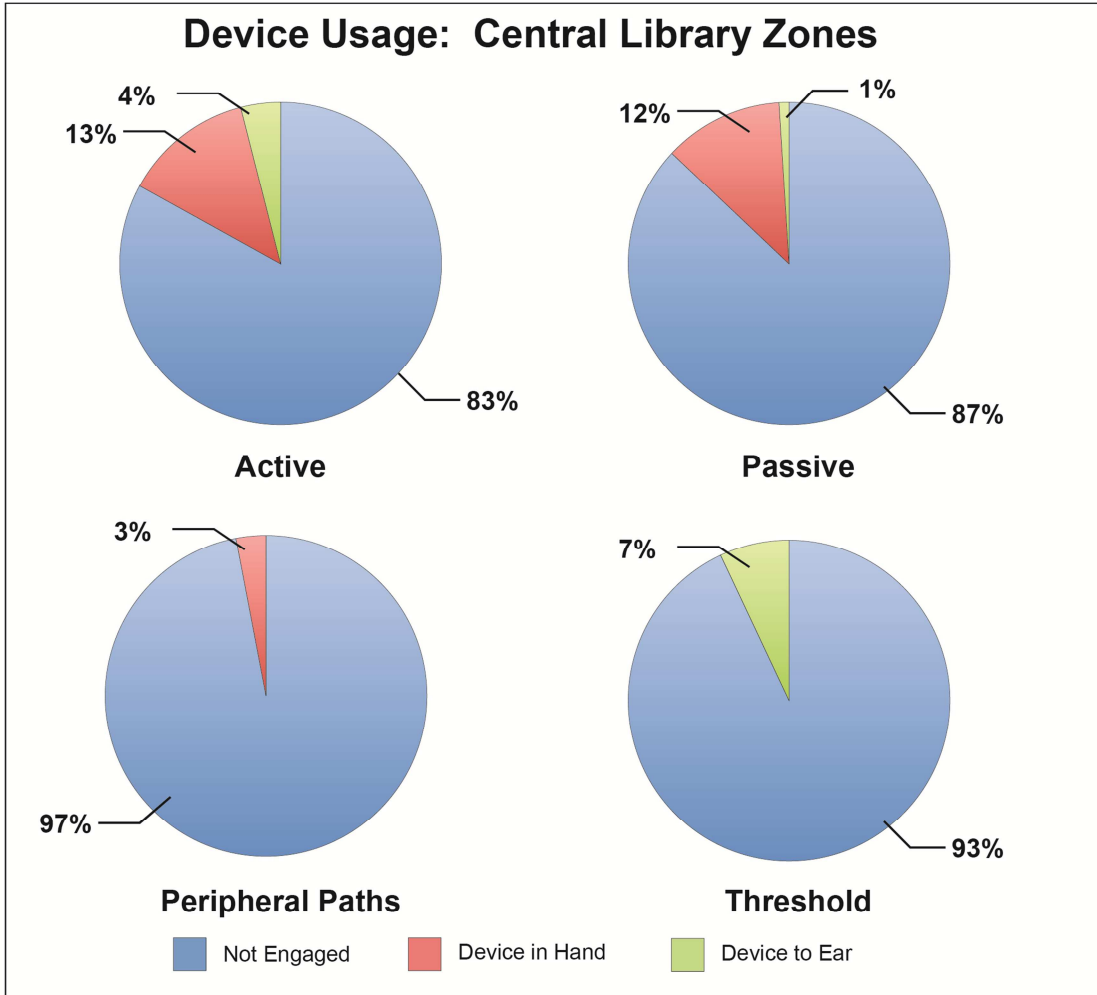


Figure 4.25: Device Usage Based on Zone in the Central Library Plaza

Within the Maverick Activities Center plaza, passive zones are much more likely to have texting than in the Central Library plaza (see Figure 4.26). This zone was represented by the area immediately surrounding benches, which explains the high level of texting.

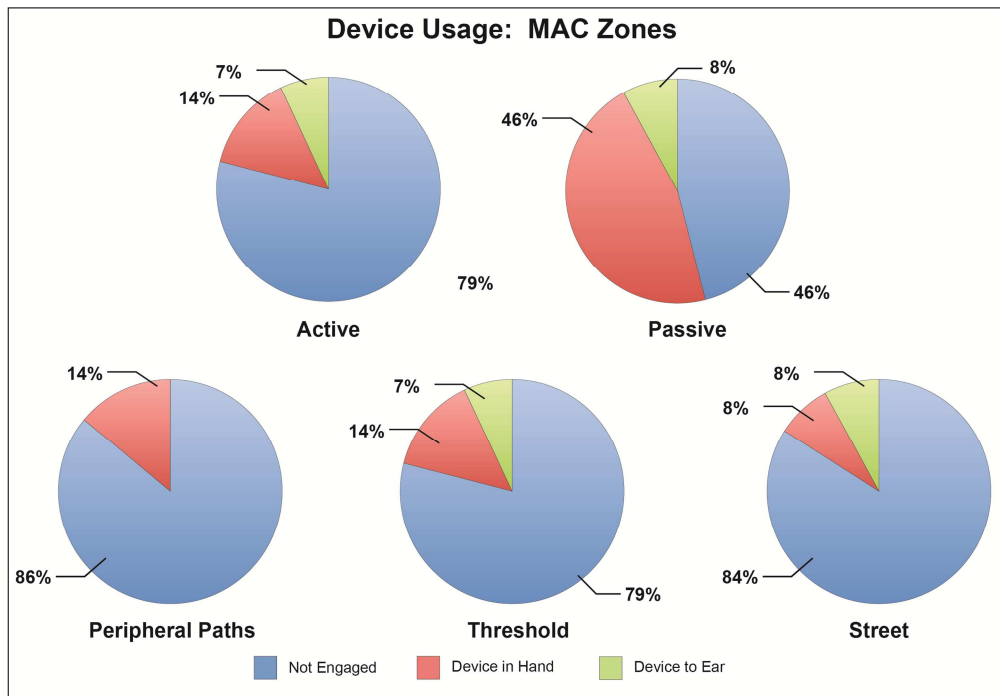


Figure 4.26: Device Usage Based on Zone in the MAC Plaza

#### 4.3 Summary

In this research, it was observed that mobile device usage was higher in less complex environments. Also, several categories were identified that support this core concept. First, organized events were found to be positively correlated with reduced device usage. Next, intensity of social interaction was found to influence device usage. Specifically, device usage was observed to be higher among people engaged in unfocused interactions. Mobility and device usage were also positively correlated. Most device users observed were often in motion. There was a higher rate of users engaging with a device in their hand while in motion at the Maverick Activities Center plaza. In addition, the seating context influenced the amount of people sitting and the retention rates in each site. Seating was found to be more popular in the Central Library plaza, but people sitting at the Maverick Activities Center were more likely to be using a device. The presence of the sun was also found to influence device users in the site. Shade was more popular for users with a device in their hand. Device usage was also lower

with the presence of temporary objects. Time of day influenced device usage in the plaza as well. Finally, the zones in the plaza were used at different rates depending on device usage. Active zones were found to more popular among device users. Each of these elements influenced device usage within the campus space and supported the concept that less complex environments are related to increased device usage.

## CHAPTER 5

### CONCLUSION

#### 5.1 Introduction

In the first chapter of this report, the problem of device usage in public spaces was identified. Communication technology introduces a new social element into an inherently social place. This creates changes in the way that people use space.

The literature review examined the relationship and qualities of place, behavior, and technology. Works by Goffman (1963) and Whyte (1980, 1988) were identified in order to establish normative behaviors in public spaces. Passive observations were used to gather data for this study. Both open coding and selective coding was used to develop theory.

It was found that mobile device usage causes conflict for users because people have to balance their physical and virtual worlds. More complex environments were observed to reduce the device usage in the campus places. Supporting themes were also identified. They were influenced by the following elements: Organized events; social interaction; level of mobility; seating context; presence of sun; interaction with temporary objects; time of day; and zones of use.

This section concludes the study by first evaluating and summarizing concepts. It then discusses some of the design implications that arose from the supporting categories identified through the research. It also reveals the importance of this report for the field of landscape architecture. It closes with some ideas for future research.

#### 5.2 Evaluations and Summary of Concepts

This study compared and contrasted the tendencies of mobile device users with the general population of users. It was found that the introduction of mobile devices causes conflicts for users who must negotiate both their virtual and physical worlds simultaneously.

It also identified how users interacted with the physical features of public space while using mobile technology by employing Whyte's model (1980). This was seen in the study the following elements: Organized events; social interaction; level of mobility; seating context; presence of sun; interaction with temporary objects; time of day; and zones of use. Each of these influenced the way in which mobile device users interacted with the campus spaces.

Although this study found that device usage decreased in more complex environments, future research could test that finding by observing spaces that include interactive features for device users. It is likely that the presence of design elements made to address device users would impact the use of space.

### 5.3 Design Implications

This section describes the design implications from the supporting concepts. Implications fall into the following categories: Fostering or Suppressing Interactions; Infrastructure for a Variety of Mobility; Participation in Events; Seating Options; Shaded Areas; Temporary Installations; Scheduling; and Zones of Activity.

In general, device usage at the Maverick Activity Center was found to be higher than within the Central Library plaza. This could be contributed to the obstacles and pinch points could deter use within the Central Library plaza. Designers could create more comfortable spaces for device usage through wide open spaces or deter use through a space with features that would enhance circulation conflicts for device users.

#### *5.3.1 Fostering or Suppressing Interactions*

The analysis of the effects of focused and unfocused interactions on mobile device usage in public spaces revealed that people used devices less if they were involved in face engagements. More meeting spaces for face-to-face communication could deter use of devices.

On the other hand, people engaged in unfocused interactions were more likely to be using a device. In order to cater to higher levels of unfocused interactions and more

comfortable device user experience, spaces could offer infrastructure for single users. These spaces could provide a higher level of privacy and could also be equipped with basic infrastructure for device usage. For instance, the spaces could be semi-secluded and equipped with charge ports.

### *5.3.2 Infrastructure for a Variety of Mobility*

People talking on the phone have a tendency to be in motion. Destination driven people do not seem to need any special infrastructure, as they typically employed main pathways. Wandering device users, however, could use spaces that include those areas for pacing while engaging in private conversations. Wandering paths with small outdoor rooms could support this activity.

People texting have a variety of mobility ranges as opposed to those who are talking on the phone. Movement while texting has a potential for causing collision, though. For instance, during the observations, people changing direction suddenly caused confusion in paths. This could be addressed using wide-open paths that allow people to balance both tasks simultaneously. Designers could also make circulation nodes clear to approaching users in order to reduce collisions.

Texting is also associated with higher levels of standing or sitting. Charging ports near seating could respond to the higher levels of low mobility.

### *5.3.3 Participation in Events*

In these observations, it was suggested that an organized event reduced the amount of device usage in public space. Those who were not using a device were more likely to be participants in an event than those who were using a device in their hands; therefore texting doesn't prevent participation, but talking on the phone significantly reduces the likelihood of participation. A separate area from event spaces could be provided for users of devices, since they tend not to be involved in the events. These areas could be equipped with charging ports and personal spaces that support their needs.



If events deter use, they may be used to discourage the private use of mobile devices. Additional event friendly spaces and active event scheduling could be used to deter device usage. Sections for device users could be separated from main event areas in order to create more comfortable spaces for device users.

#### *5.3.4 Seating Options*

Among users of devices at the Central Library plaza, benches were the most popular form of seating. This could be a result of sheer quantity or it could be that people prefer to sit on benches while texting. In addition, location under trees or in passive areas could be a determining factor on the preference for the benches. Shaded areas are more well-used by people texting. Passive areas also have a larger amount of device in hand. As a result of these findings, it can be suggested that context has much more to do with choice of seating than the physical seat itself.

#### *5.3.5 Shaded Areas*

As explained earlier, users were also more likely to be in the shade while engaging with a device in their hand. This could be indicative of difficulty that individuals have while using a digital screen in the bright sun. Areas that require full attention for safe passage, like crosswalks, could incorporate a variety of lighting to grab user attention. In addition, device zones could be shaded to encourage use.

Time charts show that people texting tended to be in the shade. This data could also be overlaid with shading techniques to assure that users of devices have a shaded place to engage with their devices in the middle of the day.

#### *5.3.6 Temporary Installations*

It was found that people using devices were more likely to ignore temporary objects, especially if they were talking on the phone. Temporary objects could be used to bring people out of the absent presence by discouraging device usage. Scheduling events that include temporary objects, like temporary art displays, could create a space that has less device usage.

### *5.3.7 Scheduling*

Users of devices were also most likely to be present during mid-day, but the distribution among late morning, early afternoon, and late afternoon was far more even. Early morning had the least amount of device usage. Managers of space should consider this for scheduling events.

### *5.3.8 Zones*

Active areas are most popular for talking on the phone. Wider active areas with limited conflicts would allow people to safely use the space while talking on the phone. People texting were typically found in the active area in the Maverick Activities Center and in the passive area in the Central Library. In addition, texting decreased in the threshold, where there are pinch points and increased traffic. Zones can be thoughtfully arranged and developed to either support or discourage this device usage. These mobility issues were addressed earlier in the implications on mobility. Device usage could be encouraged through wide paths and visible circulation nodes. Usage could be discouraged through pinch points and other objects in paths to increase conflict.

## 5.4 Importance to the Field of Landscape Architecture

The study of the effects of mobile device usage on behavior in public is significant to the development of urban design (Hampton 2009). The built environment and human activity have a symbiotic relationship; both affect one another. Designers both contribute to and react to evolving trends in use (Carmona 2003; Moudon 1997). Communication technologies also contribute to developing tendencies of users within public spaces.

The design implications that emerged from this study are valuable to landscape architects because the concept of place is evolving past traditional meanings (Rettie 2005). The mobility of communication technologies gives users the ability to choose from a variety of locations. Places, as a result, must become more competitive in what they offer in order to attract users. Designers must understand the preferences of people to use certain spaces in

order to create successful places (Whyte 1980, 1988). This research reveals a technique that could be used to identify the needs of both users and non-users of mobile devices.

Mobile devices are a part of public space. As a result, the analysis of mobile technology use patterns will likely need to be incorporated into typical evaluations conducted by landscape architects. This will enable designers to provide comfortable and appropriate spaces for users.

### 5.5 Future Research

Future research could include the study of perception. Interviews were conspicuously absent from this study. In the future, they could be used as a method of understanding experience of a place depending on mobile device usage. Interviews could also be used to further study the existence of the absent presence in public spaces. Gergen (2002) speculates that the value of face-to-face communication is likely to fade with the spread of communication technologies. As these traditional values are challenged by technology through the absent presence, the value of place is called into question. This question is crucial to the future of urban design and worthy of further exploration.

In addition, sense of place could be explored through the lenses of the Information Age. It is suggested that this era in particular has placed less influence on the concept of place (Carmona 2003). Future studies could seek to find out if the trends of this decade positively or negatively influenced a person's sense of place.

The economic evolution of place is also a topic of future research. Because technology is evolving, events are evolving as well. Places are also changing to respond to the events; therefore, the economic value of place is likely changing as well. For instance, office spaces are abandoned for third places, like coffee shops, because of increase mobility (Hampton 2009). Future studies could track these shifts through economic analysis.

Finally, predictive modeling could be explored as a tool based research subject. A similar set of data could be used to predict the probability of users in a space depending on

different elements. This would be valuable to designers and managers of public space who might plan for events.

### 5.6 Summary

In this research it was found that mobile device usage causes conflict in public spaces because people must negotiate with their physical and virtual worlds. Individuals using mobile devices were constantly determining their level of commitment to their devices and their actions.

Conflicted behavior was noticed in users who were observed texting while walking. Goffman suggests that people constantly renegotiate their main, side, and subordinate involvements in public spaces (1963). This behavior was observed throughout the passive observations. Mobile device users engage constantly switch their main and side involvements to negotiate responsibilities within virtual and physical worlds.

It was found that the design of space could be used to either foster device usage or deter device usage. This is addressed by increasing or decreasing the level of complexity for device users.

In conclusion, it is found that places are not devolving with the introduction of media; they are evolving. Because of a person's ability to choose their location, places must become more competitive to attract users. In the future, universities will likely to reconsider their mission to create more comfortable and fulfilling places that respond to mobile device usage.

APPENDIX  
IRB APPROVAL LETTER



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September 09, 2011

Grace Herman  
 Dr. Pat Taylor  
 School of Architecture  
 Box 19108

**Protocol Title:** *Mobile Device Usage in Public Space: Implications on Design*  
**RE:** Exempt Approval Letter  
**IRB No.:** **2012-0018e**

The UT Arlington Institutional Review Board (UTA IRB) Chair (or designee) has reviewed the above-referenced study and found that it qualified as exempt from coverage under the federal guidelines for the protection of human subjects as referenced at Title 45 Part 46.101(b)(2). You are therefore authorized to begin the research as of September 09, 2011.

Please be advised that as the principal investigator, you are required to report local adverse (unanticipated) events to this office within 24 hours. In addition, pursuant to Title 45 CFR 46.103(b)(4)(iii), investigators are required to, “promptly report to the IRB any proposed changes in the research activity, and to ensure that such changes in approved research, during the period for which IRB approval has already been given, are **not initiated without IRB review and approval** except when necessary to eliminate apparent immediate hazards to the subject.”

All investigators and key personnel identified in the protocol must have documented Human Subject Protection (HSP) Training or *CITI Training* on file with this office. The UT Arlington Office of Research Administration Regulatory Services appreciates your continuing commitment to the protection of human research subjects. Should you have questions or require further assistance, please contact Robin Dickey at [robind@uta.edu](mailto:robind@uta.edu) or you may contact the Office of Regulatory Services at 817-272-3723.

Sincerely,

Patricia Turpin

Digitally signed by Patricia Turpin  
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## BIOGRAPHICAL INFORMATION

Grace Herman was born in Ann Arbor, Michigan and raised in Easton, Pennsylvania. She has always had an interest in the visual arts and the outdoors. The post industrial landscapes of her home region have been an enormous inspiration for her in her studies of people and place.

Miss Herman received her Bachelor of Landscape Architecture from Philadelphia University in 2010. After graduation, she immediately began working towards her Master of Landscape Architecture at the University of Texas at Arlington. She is the first to graduate from the program under the Enhanced Graduate Teaching Assistantship. She is excited to continue to explore the field of landscape architecture and place-making in the future.