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Jan Fernback
Department of Broadcasting, Telecommunications and Mass Media; School of Communications and Theater, Temple University, fernback@temple.edu

Gwen Shaffer
Donald Bren School of Information and Computer Sciences, University of California, Irvine

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Urban Planning Unplugged: How Wireless Mobile Technology Is Influencing Design Elements in Seven Major U.S. Cities

Jan Fernback

Department of Broadcasting, Telecommunications and Mass Media, School of Communications and Theater, Temple University

fernback@temple.edu

Gwen Shaffer

Donald Bren School of Information and Computer Sciences, University of California, Irvine

Abstract:

As wireless mobile technologies become central to contemporary living in urban areas, private service providers are undertaking directives to expand their broadband designs. Using critical policy analysis, this research examines city planning documents in cities with wireless broadband technology initiatives. It finds a disconnection between urban planning efforts and wireless technology policy that must be remedied to ensure democratic communication technology policies for the future.

Keywords: wireless broadband, ICTs, urban planning, broadband policy

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I. INTRODUCTION

The Internet has become fundamental to daily life in the United States, as citizens increasingly use mobile devices to access websites and e-mail. Until recently, approximately one in ten Americans used cell phones to access the Internet at least once a month [Semuels, 2008]. But advanced devices such as T-Mobile's Android phone and Apple's iPhone are, in large part, intensifying the demand for ubiquitous connectivity. According to a report commissioned by CTIA-The Wireless Association, by 2016 nearly 90 million Americans will use a mobile device, and most will rely on wireless broadband [Entner, 2008]. In November 2008, the Federal Communications Commission (FCC) voted to allow unlicensed devices to operate in spectrum bands previously dedicated for television broadcasting. Because mobile devices can transmit signals farther and faster in these "white spaces," they will bring the United States closer to the day when wireless Internet signals blanket the nation [Greene, 2008].

Public spaces will accommodate myriad digital activities as people become more comfortable with the mobile Web and handheld devices. However, as the lines blur between physical and virtual spheres, policymakers, urban planners, engineers, educators and other professionals will face unknown challenges. Considering how cell phone technology has altered the ways in which people can communicate, this study analyzes the future design plans articulated by seven large municipalities where Clearwire, a high-speed Internet service provider, plans to build citywide WiMAX (wireless broadband) networks. Clearwire has received investment funds from Comcast, Time-Warner, and Intel Corp. for this technology that uses licensed spectrum to connect cell phones, computers, and other devices over a single core network from any location [Motorola, 2008]. It can provide broadband wireless access up to thirty miles [WiMAX.com, 2008]. By comparison, a standard WiFi signal is typically limited to less than 300 feet. WiMAX is competing for future market share with LTE, or Long Term Evolution, a similar mobile system using different technical standards than WiMAX.

II. URBAN PLANNING AND COMMUNICATION TECHNOLOGY

At the turn of the twentieth century developed countries began the practice of deliberately managing growth to bolster quality of life "by creating more convenient, equitable, healthful, efficient, and attractive places" [American Planning Association, 2008]. Traditionally urban planners have been concerned with designing the physical infrastructure of communities, such as transportation systems, business districts, parks, and housing developments. While telecommunications have created layers of complications for these elements of city life, urban planners often neglect to consider ways in which information systems fundamentally influence development in the United States [Moss and Townsend, 2000]. Urban planners must recognize telecommunications as a powerful force in cities, even though the infrastructure is often invisible and subtle, according to Aurigi [2006]. With no cables or transmitters in sight, mobile technology is overlooked in the urban planning realm—perceived as "something digital as opposed to the spatial things planners deal with" [Aurigi, 2006, p. 25].

Urban planning may be transformed, however. In order to grasp the meaning of contemporary cities, one must be cognizant of mobile technologies, claims Rheingold [2004]: "Ten years from now, understanding the way people use mobile media will be as fundamental to urban planning as understanding the buildings they inhabit and vehicles they use." The cell phone is already characterized as an extension of our own human bodies [McLuhan, 1964; Schroeder, 2007]; it has altered how people interact with their surroundings and with one another [Mitchell, 2003]. As traditional boundaries between work and leisure time fade, they are being replaced by ubiquitous connectivity. This shift requires us to envision our environment differently and to reassess the ethical foundations of urban planning, architecture, and engineering, posits Mitchell [2003]. Mitchell's [1995] term for this environment, the *bitsphere,* is a "hyperextended habitat" (p. 167) characterized by hybridized spaces of architectural forms transformed by constantly evolving arrangements of telecommunications technologies. Castells [2001] sees those hybridized spaces in new configurations of land use, personal mobility, and communication in the networked spaces common in contemporary urban hubs. However, Graham and Marvin [2001] warn that political economic realities that favor specific policies of development tend to divide telecommunications, transportation, and energy infrastructures into "splintering networks" that privilege politically powerful sectors of industrialized societies. Thus, planning policies that account for information and communication technologies (ICTs) become the crux of the global economy.

Mobile communications complicate issues already facing planners who practice New Urbanism "by undermining the existing technological space–time regimes that have both driven the trends and framed the debate" [Townsend,

2000, p. 89]. The mobile phone intensifies temporal and spatial considerations as people become always-accessible. “The use of the mobile phone is certainly reinforcing these trends and driving the reality of the city away from the rational, modernist reality that drives most land use planning,” Townsend [2000] writes. The immediacy of mobile communication enables people to micromanage time and space in ways that previous technologies did not permit. The impact felt by urban planners is that city life may shift quickly, hindering planning strategies. And because telecommunications have decentralized the city, gathering data crucial for planning and designing becomes challenging [Townsend, 2000]. But Sevstuk [2005] counters these assertions and concludes that cell phone use has not altered cities. What has changed is that these telecommunication tools provide “more flexible use patterns” [Sevstuk, 2005, p. 7] in public spaces. For example, friends can find one another at a crowded concert or impulsively meet for dinner. The space has not changed, but cell phones allow for new means to exploit it. The technology has transformed cities into socially networked spaces “criss-crossed with the flow of messages” [Ito and Okabe, 2005, p. 272].

Some planners are uncomfortable with the idea of the cell phone altering one’s sense of place and erasing the distinctive identity of that environment. People strolling on the sidewalk, cell phones pressed to their ears, relinquish the communal experience of urban life by soaking in neither the architecture nor the people [Goldberger, 2003]. Not only do users disconnect from the physical environment, they begin to experience urban life differently. “Saturation of the city with mobile phones and other personal mobile ICT technologies heralds a reconstruction of the way city spaces are used, appropriated and mediated. This changes public choreography of physical movement of the city,” points out Graham [2004, p. 133]. In the future, mixed-use planning regulations—which currently accommodate activities such as retail and residential spaces within the confines of a single building—will assume “new meaning” [Gumpert and Drucker, 2007, p. 18] as urban environments adapt to the convergence of electronic and physical presence, as well as to the convergence of public and private spheres. It is inevitable that mobile media will continue to co-opt spaces that formerly facilitated human interaction. Therefore, the challenge for urban planners is determining how to support individual media uses without limiting interaction.

Existing zoning regulations typically attempt to steer economic development and land use by portioning cities and classifying each area for a specific type of activity. As a result of mobile communications devices, however, these boundaries have been erased. Company reports are edited on the train or the theater lobby; business phone calls are conducted on the bus or in the supermarket. “Telecommunications systems are blurring the separation between the home and the workplace, radically changing office design and function, transforming the automobile into an extension of the workplace, and moving street crime into the shadows of cyberspace,” assert Moss and Townsend [2000, p. 34]. Preserving the vital functions that cities play now requires integration among planning, architecture, and urban design.

Moss [1996] argues that the Internet will strengthen the role of communities as information production and transmission hubs. This is because Internet hosts tend to be large cities, and the technology is key to creating a knowledge society where scientific, academic, and political information is exchanged [Moss, 1996]. The servers supporting these Internet hosts must be positioned somewhere—and the underground locations of cables, which allow this vast telecommunications network to exist, influence how our cities evolve [Graham, 2004]. For instance, when MCI-WorldCom built transatlantic and transcontinental networks in 1998, the company linked New York to European telecommunications systems in Paris, London, and other major cities. This act guaranteed that corporations with intense telecommunications needs would maintain their headquarters in these cities; this situation has created a demand for “telecom hotels” [Graham, 2004, p. 140], also known as co-location facilities. These secure buildings are common in cities where multiple customers place network, server, and storage equipment which interconnects to a slew of telecommunications service providers. In addition to enabling the virtual life of a city, telecom hotels impact the physical aspects of city life.

In myriad ways, ICTs are leading to reduced need for mobility within cities. Prior to fax machines, for example, couriers routinely ferried documents within city limits. As a result, transportation systems dominated city design as a means for people to efficiently access information and destinations [Ohana Plaut, 2004]. But, the contemporary marketplace “is more concerned with the flows of information, rather than the flows of things or people” [Ohana Plaut, 2004, p. 163]. Pollalis [2006] outlines three elements for planning professionals to consider when adding information technology to the urban grid: wired infrastructure, public information spaces, and social information institutions. Siembab’s [2004] “cyber strategy for livable communities” incorporates these components in an effort to make standard urban functions more accessible. Rather than working alone from home or on a mobile device, people could congregate at a public, mixed-use “Network Station” [Siembab, 2004, p. 368] located in a public space. In an effort to encourage people to walk, cycle or travel in low-emission vehicles, Siembab [2004] proposes that planners create designated transportation zones around Network Stations. The ultimate goal is to reclaim paved parking lots and roads now dedicated to automobiles and transform them into community gardens and infill

developments. Siembab [2004] acknowledges the challenges of executing such a transformation but stresses these broad policy goals are necessary to avoid "instability" and "make metropolitan regions more livable" (p. 370).

Castells [2004] articulates similar goals for urban planners, who he believes must discourage spatial separation by implementing inclusive zoning policies. Characterizing public space as "the key connector of experience" (p. 91), Castells urges urban planners to incorporate plazas and squares into their designs—in an effort to create vibrant spaces for socializing, art exhibits, outdoor concerts, or media use. Regardless of whether a public space resembles a garden or a hardscaped boulevard, it should draw people in search of self-expression and diversity.

III. CRITICAL THEORY, COMMUNICATION POLICY, AND URBAN PLANNING.

In the following section of this article, the researchers use critical policy analysis to examine seven local plans for urban development. Critical theory attends to social meanings and the political/historical context of social policy, and research from a critical vector is dedicated to revealing "aspects of domination, both material and cultural, that are regarded as grounded in history" [Agger, 1998, p. 169]. In general, critical theory aspires to a social justice agenda by promoting an anti-positivistic critique of the structures of social domination and oppression borne out of historical circumstance and legitimation [Agger, 1998; Tar, 1977]. According to Mosco and Herman [1981], critical theory "concentrates on the vital functions of accumulation, legitimation, and repression that the capitalist state needs to satisfy in order to maintain the system on which the state depends for its survival" (pp. 877–878). A critical theoretical orientation is useful in social policy analysis for its assertion that the expanded role of the state in late capitalism calls for class/gender/race struggles to be considered in the arena of politics rather than the economy [Habermas, 1975]. Thus, critical policy analysis queries the dominant notions of social issues and concomitant policies. It critiques assumptions supporting policy problematics, clarifies the shortcomings of those policy problematics, and recommends corrections to the assumptions, and ultimately it considers socio-structural changes that might remedy social injustices [Agger, 1998].

These steps are useful in the examination of the role of information technology in urban planning. For example, how can the goals and challenges of telecommunications policy as it relates to urban planning be categorized? How can they be understood within the context of decades of deregulatory philosophy in the United States? Much telecommunications policy has been written by powerful industry lobbies at the federal level, while banks and other financial and informational institutions provide resource input into policy development. Simultaneously, local and state governments create and advance city planning policies in concert with urban planning experts. In the telecommunication sector, the Federal Communications Commission (FCC) and the U.S. military have control over electromagnetic spectrum allocation, while service providers, equipment manufacturers, and governmental regulators set larger industry policy [Mosco and Herman, 1981]. How might these various policy actors define and interpret current information and communication technology issues in order to account for them in city planning efforts? As an example, Clearwire began selling WiMAX wireless data service in Baltimore under the brand name *Clear* in October 2008. In an attempt to attract customers weary of long-term plans, no contract is necessary to use Clear. Nationally, WiMAX subscriptions could grow to 37 million worldwide by the end of 2011, according to the Telecommunications Industry Association [TIA, 2008]. This growth prediction is dramatic—as of October 2008, just 11,000 WiMAX subscribers existed in the United States [TIA, 2008]. These developments indicate that industry participants (ISPs, telephone companies, cable outlets) acknowledge consumer demand for ubiquitous connectivity, but that they use preexisting, routinized methods and practices of contracting and delivery of services that are now endemic to the way policy makers conceptualize telecommunications policy. What values, assumptions, and institutional practices underlie these conceptualizations?

IV. METHOD

To discover the rationale for broadband digital technology initiatives in urban planning efforts, this study used an interpretive discourse analysis of a sample of city planning documents. Discourse analysis is used to illuminate the logical connections between texts, discursive strategies, and socio-cultural realities [Fairclough, 1995]. Discourse is about meaning and form, but also about complex social and political structures, hierarchies of interaction, deliberative processes, and social practices and their functions [van Dijk, 1997]. This type of analysis is useful in dissecting any disparity between policy and practice [Yanow, 2000], and it provides insights into the political, economic, historical, and social contexts in which the documents were written. Because the language of policy documents often contains the tensions inherent in satisfying multiple constituencies, a critical discourse analysis of documents investigates how and why certain practices become premier in specific contexts. Thus, a primary aim of methods of critical policy analysis is to detect the provenance of policy specifics and the legitimations that direct and constrain them.

For the purposes of this analysis, discourse refers to the language and narratives employed to create meaningful practice in urban planning efforts. Given the historical realities of telecommunications policy in urban areas, the goal

of this analysis is to illuminate the logic of city broadband planning efforts and their possibilities for creating ubiquitous connectivity for urban populations. Using an interpretive scope to examine these planning documents is a means toward identifying the meaning of broadband planning for residents, as well as for cities as a whole. Simultaneously, this method suits a critical framework by positioning the city planning policies into political and historical contexts which value the role of technology in urban development. A critical approach to policy analysis stresses the values and principles inherent in the discourse of policy [Considine, 1994].

The research question guiding this study is: How is the demand for ubiquitous connectivity and the concomitant changing business models of incumbent ISPs impacting urban planning policy in the U.S.?

Urban infrastructure plays a critical role in the new paradigm of ubiquitous connectivity. This study looked at master plans, design documents, and zoning codes for seven cities. Baltimore and Portland, Oregon, were chosen because Clearwire is selling WiMAX subscriptions in these two cities. This study also examined urban planning strategies in Chicago, Washington, D.C., Philadelphia, and Dallas-Fort Worth because the company planned to roll out its WiMAX in these areas during 2009—placing them in the first round of U.S. cities to face the challenges and opportunities that accompany ubiquitous connectivity capabilities.

Mission statements were obtained and read multiple times in order to systematize the analysis. Overall themes in the plans were identified and coded according to their relevance to the study's premise. These themes are then mapped out to correspond to consistencies across the various data sets (the city plans) as a means to understand and interpret the meaning of these documents. This process is methodical, and it yields logical and reliable thematic constructs; it maps the architecture of the various positions on WiMAX, LTE, and information technology planning in general. How do the various city plans characterize information technology planning issues? How are terms associated with community, or progress, or the economy discursively linked with terms associated with ICTs? How do different aspects of urban planning in the text function in relation to issues of information technology?

V. FINDINGS AND DISCUSSION

A significant finding of this research is that, despite plans to implement WiMAX, Clearwire, or other wireless connectivity initiatives, these city documents lack comprehensive strategies for realizing urban environments enabling ubiquitous connectivity for residents. Narratives of progress through information technology development were not developed in the planning documents from the cities in this sample. The most common elemental themes found in the planning documents include those of *economic opportunity, quality of life,* and *design of place*. The discourses of these documents are exceedingly similar, defined by language that seems historically sanctioned and traditionally bound. Each of these themes is articulated below, contextualized in terms of critical discourse analysis. Table 1 summarizes key findings.

Economic Opportunity

The mission statements for all seven U.S. cities examined in this study used language of economic opportunity to construct a planning rationale. This discourse stresses the interplay of relationships among local constituencies that hold the power to create economic possibilities for the city. Language from the Fort Worth plan [2009, p. 3] typifies this discourse of economic opportunity:

> A community's economic health generally depends on its ability to attract and hold business establishments and industrial plants. The principal local economic factors that affect business location decisions include proximity to markets, availability of a suitable labor force, land prices, prevailing wage scales, cost of living, transportation costs, utility rates, and tax levels. … There has been a shift over the years in policy and philosophy regarding the relationship between local government and the economy. Increasingly, cities are looking for ways to stimulate their local economy to generate more jobs for their urban residents, as well as to increase the tax base and per capita income. However, increasing the tax base and per capita income is most challenging in central city areas, where cities are faced with issues such as high unemployment and disinvestment.

Like most of the city plans, the language of the Fort Worth document frames economic development in terms of traditional centers of power (market proximity, strong labor force) and in terms of traditional problematics (unemployment, low tax base). Asserted as facts upon which consensus has been achieved, these statements neglect to position information and communication technologies as either an asset or a problem. The document continues, however (pp. 92–93), with an "incentives and programs" section, which contains a plan for "Tech Fort Worth" as a means for development of technology sectors:

Table 1: Analysis of Urban Planning Documents in Seven Major U.S. Cities			
	Economic Opportunity	**Quality of Life**	**Design of Place**
Dallas–Fort Worth	Frames economic development in terms of traditional corporate and labor markets, with minimal emphasis on the role of communication technologies	Stresses the importance of outdoor spaces such as sidewalk cafes and shopping corridors, but does not incorporate the role of mobile devices	Land-use suggestions focus on mixed-use development, noise reduction and urban centers—but does not connect initiatives to communication technologies
Baltimore	Identifies technology infrastructure as key to meeting economic goals, particularly through deploying wireless "hotspots"	Asserts that ubiquitous connectivity must be considered in the city's plans to promote mass transit, public safety, and open space	Does not address the role communication technologies can play in terms of design and planning
Chicago	Equates communication technology with economic power; asserts that an efficient telecommunications structure is vital to attracting businesses and creating jobs	Emphasizes the potential of telecommuting to alleviate traffic	Acknowledges that knowledge-based industries favor locating in urban centers, where they can obtain high-speed Internet connections
Portland, Oregon	Does not address the role communication technologies can play in terms of economic development	Does not address how communication technology can contribute to the goal of creating livable neighborhoods and a vibrant downtown	Stresses the need for urban design to consider "innovation and globalization," but neglects to equate these concepts with communication technologies
Washington, D.C.	Does not address the role communication technologies can play in terms of economic development	Promotes the use of wireless technology to help residents achieve education goals, improve public safety	Does not address the role communication technologies can play in terms of design and planning
Philadelphia	Considers communication technologies only in bureaucratic terms, such as creating an internal division of technology to manage the city's network infrastructure	Does not address the role communication technologies can play in terms of bolstering quality of life	Does not address the role communication technologies can play in terms of design and planning

> Tech Fort Worth—A nonprofit business incubator designed to nurture and provide specialized and industry-specific business assistance to technology start-up companies in three industry sectors: aerospace, biotech, and information technology. Tech Fort Worth invests time, money, and expertise in the critical first years of emerging companies which demonstrate the potential for economic and commercial success.

This is not a city initiative, but a privately funded means for entrepreneurs to gain access to extra funding for technology initiatives. A city-wide plan for communication technologies is not envisioned except under the aegis of private development, and ICTs are not identified as essential to the economic health of Fort Worth. The Philadelphia document [City of Philadelphia, 2008] considers ICTs only in bureaucratic terms, by establishing a "division of technology" with a goal to "Stabilize and enhance the network infrastructure that provides the computing foundation for the City's business operations" (p. 40). Mosco [1989] argues that ICTs serve as a primary economic engine in the U.S. economy, and the telecommunications sector has become deregulated in order to flourish in an unfettered marketplace: "From a class perspective, deregulation responds to the recognition that telecommunications, and its related informatics and communications sectors, have come to occupy a central place in the capital accumulation process" (p. 103). Mosco is writing prior to the passage of the Telecommunications Act of 1996, but indeed, deregulated telecommunications markets in the United States have amassed wealth, particularly in the cable and telephony industries. The future of these markets appears to be favorable to development of wireless ICTs, as "white spaces" in the electromagnetic spectrum have been allocated for unlicensed devices [Greene, 2008]. These realities are not acknowledged as part of the scope of economic possibilities in the planning documents of Dallas, Philadelphia, Portland, Fort Worth, and Washington, D.C.

The plans for Baltimore and Chicago do address ICTs as a means for economic empowerment in urban planning. The Chicago plan [Johnson, 1999] equates communication technology with economic power: "The new economic order is characterized by global markets, advanced information and communications technologies, and a strong service orientation. In this new order, metropolitan Chicago must go beyond its traditional roles in international trade, banking, tourism, and conventions" (p. 62). The document considers a healthy communication infrastructure to be central to attracting new enterprises and jobs in networks that function best "in a metropolitan area with vital, compact employment centers" (p. 62). While this plan recognizes the role of ICTs in a global economy, most of this planning document uses familiar discourses of policy planning to characterize the economic development of the city, referring to growth, economic prosperity, tax reform, and workforce development.

The Baltimore plan [2006] for economic opportunity identifies "technology infrastructure" (p. 7) as a key to transforming Baltimore into a "world-class" city. This transformation can be initiated through an "increase in amount of wireless infrastructure" to be appraised through "wireless hotspots" and "conduit infrastructure" (p 11). These goals are articulated in no more depth, but in context with other goals dealing with increasing the tax base, increasing cultural opportunities, improving regional transit to better link neighborhoods and constituencies, improving education for job creation, and better matching employers with qualified employees. An investment in ICTs appears to be a pivotal strategy among other basic strategies to improve the city's image. However, the rhetoric of urban planning policy in the U.S. tends to emphasize civic, educational, infrastructural, and other types of improvements to achieve profit-oriented outcomes. It places value on these improvements. A similar regime of profit-oriented outcomes is advanced only in the Baltimore and Chicago documents which link ICTs to a global knowledge economy. The language of capitalism in all of these policy documents serves as a foundation for valuing the plans as a means of capital improvement; only the Baltimore and Chicago documents seek to include information technology as part of the rhetoric of policy that privileges dominant capitalist assumptions. Nevertheless, the logic of exchange and of capital accumulation is, in small ways, being extended into the sphere of information technologies. Rather than seeing access to ICTs or ubiquitous connectivity as an end unto itself, the Baltimore and Chicago documents rhetorically connect ICTs with economic growth. These plans do not foresee other uses for ubiquitous connectivity that may or may not be linked to prosperity and the logic of capitalism.

Quality of Life

The seven U.S. city plans examined in this study used language evoking general quality of life in the city to further construct a planning rationale. The quality of life discourses assume that some characteristics of city living impede most citizens' ability to enjoy "the good life" and that urban planning commissions possess the means to improve everyday living. Portland's plan [2006] is dedicated to "creating and promoting livable neighborhoods, thriving centers and corridors, and a vibrant and exciting central city" (p. 1). Fort Worth's plan [2009] states: "The influence of pedestrian environments and public spaces is far greater than simple aesthetic appeal. Eating at an outdoor table, browsing the windows of a bustling shopping street, and passing time watching crowds walk by are more than just pleasant diversions, they are components of urban social life that attract residents, businesses, and visitors" (p. 135). Following Considine [1994] and Habermas [1975], this language exemplifies a discourse that claims a universally accepted notion of what constitutes "livable neighborhoods." Eating outdoors and window shopping may be desirable components of urban social life to certain segments of the population but not to all. Baltimore's [2006] document notes that

> The amenities and services most valued by all groups of City residents include the following: quality affordable housing; quality of public education; quality and access to human services; public safety and crime; access to transit and transportation networks; parks and open space; historic and cultural amenities; aesthetic landscaping and streetscaping; and access to jobs, retail and recreation (p. 62).

While this language purports to understand quality of life issues for "all groups," amenities in this plan do not include ubiquitous connectivity or access to ICTs. The background consensus about what constitutes a high quality of life is, at any given time, articulated by established political, economic, and social institutions and the arrangements of power among them [Forester, 1993]. By excluding information technology needs as a quality of life issue, these documents frame ICTs as an inessential afterthought to policy planning. Elsewhere in the Baltimore document, however, language expresses the initiative to "provide wireless technology zones in public areas" (p. 108). While not developed into a discourse of a policy proposal, the document does assert that "the City should also capitalize on this initiative by marketing safe areas that can be used as wireless office spaces, cafés, parks, neighborhoods, schools, libraries, and commercial areas. Baltimore currently ranks twenty-fourth as the most-wired City. Development of wireless technology zones has great potential for significant public spaces at key locations" (p. 108).

The Chicago plan [Johnson, 1999] regards the need for ICTs in the context of mobility as a quality of life concern.

> We have only begun to recognize … the opportunities for moderating transportation needs through the application of computer and communications technologies. For example, while the productivity of people in the workplace will always require considerable face-to-face interaction, employers should look for creative ways in which to train employees to increase their effectiveness through telecommuting. … If only a small fraction of the nation's workforce were enabled to work from their homes for only one day each week, the social concerns of the motor vehicle would be greatly alleviated. Communications technologies could significantly moderate mobility needs in other arenas such as education, shopping, entertainment, and the common pursuit of hobbies" (p. 82).

Thus the plan acknowledges an information technological solution to a quality of life subject, but it neglects to consider that telecommuting is a solution for a small segment of citizens with mobility concerns. Larger segments of the population with mobility concerns likely comprise the disabled, the illiterate, and the economically disadvantaged. Moreover, quality of life matters are written into the Washington, D.C., plan [2006] in terms of regulatory agencies and structures. The plan discusses the role of the 1996 Telecommunications Act and the FCC in creating a high quality telecommunications infrastructure to elevate the quality of city living:

> *Policy IN-4.1.1: Development of Communications Infrastructures*
>
> Plan and oversee development and maintenance of communications infrastructure including cable networks, fiber optic networks, and wireless communications facilities to help support economic development, security, and education goals.
>
> *Policy IN-4.1.2: Digital Infrastructure Accessibility*
>
> Promote digital infrastructure that provides affordable broadband data communications anywhere, anytime to the residents of the District. Investigate the cost-effectiveness of providing municipally-owned wireless broadband connectivity to guarantee more affordable high speed-internet access for residents, businesses, schools, and community organizations (pp. 13–17).

While most of the language in these city plans does not address quality of life issues in terms of information technology needs, the plans that do consider these needs contextualize them in ways that speak to social class concerns. Power is reproduced and legitimated through normative assertions about amenities that appeal to all social groups. Ultimately, these assertions shape "belief *and* political consent, through the manipulation of the background consensuses that make any shared public understanding of a 'problem' possible in the first place" [Forester, 1993, p. 149, emphasis in original]. Ubiquitous connectivity is not seen as a true need for any segment of the population in these documents; it can, however, increase quality of life for economically advantaged segments of the citizenry.

Design of Place

Planning rationales for all seven cities were bolstered by discourse emphasizing the design of the urban environment. Most of this language is about walkable cities, mixed-use spaces, and urban villages; the language depicts design in traditional architectural terms rather than Mitchell's [1995] hybrid spaces of new architectural forms that encompass information technology. When the design of places is contextualized in terms of capitalism (e.g., as a means for industrial development), a hegemonic sensibility develops that valorizes profit, sometimes neglecting essential human needs for connection. Good urban planning must consider human needs [Castells, 2001]. The design of place is characterized in several ways in the city planning documents. The Chicago plan [Johnson, 1999] emphasizes spatial design as a means toward realizing greater profitability for the region. It connects innovation, knowledge, and spatial fluidity with competitiveness. It states: "Information technologies have made large metropolitan areas with vital regional centers the favored location for knowledge-based industries by reason of their heavy dependence on 'smart' buildings wired with high speed communications lines and other digital amenities and their need for ready access to skilled workers, suppliers, and research universities" (p. 7). The document provides no policy dictates for creating such a design, but it does exalt the rhetoric of progress with the spatial "proximity" of technologically sophisticated infrastructures.

Fort Worth's plan [2009] seeks more "high-tech manufacturing," particularly in relation to the existing Nokia and Motorola plants near the city. It characterizes spatial revitalization in capitalistic terms, citing the need to connect its commercial districts to contemporary sensibilities by "promoting their redevelopment as mixed-use growth centers and urban villages—districts which are more compact, contain a greater mix of land uses, and give greater emphasis to pedestrian and transit access" (p. 86). The document's strategies for urban revitalization include the creation of "pedestrian-oriented mixed-use growth centers" (p. 86) connected by public transit systems and having a

core of jobs, schools, housing, and public parks and facilities in a "unique sense of place" (p. 86). Sense of place is thematically common in the Fort Worth plan, yet that sense of place is not regarded as being fostered by wireless connectivity. The plan contains a list of land use suggestions focused on mixed use development, noise reduction, and urban centers, but without ICTs in consideration, the plan is hampered by traditional discourses of what urban planning should look like.

The Portland plan [2006] addresses information technologies broadly as a design issue. The document notes new planning directives, stating, "[T]he skills and specialties of the Bureau of Planning have expanded far beyond an exclusive land use and zoning focus to include areas like economics, demographics and urban design" (p. 2). These are key fixtures in urban planning that can be addressed through wireless communication technologies. The plan claims that "Residents and visitors to Portland will benefit from an improved sense of place" (p. 4), but the document contains no awareness that ICTs are crucial to that sense of place. The character of the Portland document is visionary rather than practical; it situates urban design in terms of "innovation and globalization" (p. 5) but is not more specific. Additionally, the Portland plan's themes emphasize the Willamette river (as part of the natural environment) as a vital component of urban strategic planning. Although the other plans do not contain an environmental theme, the Portland plan neglects to consider the electromagnetic spectrum part of its natural environment and part of resource planning. The document stresses "fresh" and "long term" planning, which might equate to wireless communication technologies as part of the planning process. The plan for space theme might also consider the ideals of Castells [2001] and Townsend [2000] about how a "sustainable economy" is inextricably linked to technological advances and the ubiquitous integration of ICTs into everyday life. Again, the rhetoric of spatial design in the city plans is typified by notions of space that are place based and dependent on natural and built environments. Yet much literature advances the notion that people engage with interactive technologies as part of place and space [Aurigi, 2006; Virilio, 2003]. The benefits deriving from the design of place are depicted in the interests of capital accumulation and to some extent public goods; but these plans are premised on historically derived notions of community that do not include communication technology as a part of both the natural and built environment.

Critical Policy Analysis and ICTs

Much information technology policy in the United States is based on either a political or an economic rationale, with the two realms rarely considered in concert. Moreover, some technology policy is based on a culturally determined rhetoric of progress and innovation that is usually divorced from political or economic considerations. Telecommunications has a central role in contemporary life [Castells, 2001], and these planning documents demonstrate little indication of this reality. The discourse of these planning documents reveals a traditional map of institutional arrangements for decision-making; the pivotal actors in creating urban planning include businesses, financial institutions, developers, utilities, local government, and to a lesser extent educational institutions, hospitals, law enforcement. Telecommunications policy in the U.S. has been dictated in recent years by a philosophy of free market deregulation [Mosco, 198], but city planning is generally dictated by political will [Moss and Townsend, 2000]. A critical analysis of urban planning documents in cities that have wireless communication initiatives suggests that structural relationships among institutions traditionally involved in city planning may ultimately benefit certain social groups. These leveraged social arrangements may bear out benefits for those pivotal actors who create urban plans while neglecting to consider economically and socially disadvantaged groups who are being bypassed by the ICT revolution but who need ICTs to function in everyday life. The values revealed in the planning documents indicate an attention toward traditionally conceived tenets for city planning.

There is little indication in these plans that human social arrangements will be impacted by ubiquitous connectivity, because these documents, with Baltimore somewhat excepted, use the language and institutional arrangements of plans from decades past. Thus, the planning policy agenda is set by dynamic power arrangements that have become hegemonic. Following Habermas's critical theoretical analyses of institutional structures in contemporary Western culture, Forester [1993] argues that "Public policy … alters the communicative infrastructure of society that interweaves social structure and social action" (p. 135). A critical analysis, then, examines the political-economic contextualization of social policy action as well as the logic of the discourse surrounding the policy (e.g., strategies, conflicts, agreements). What claims, then, do these documents make about current political realities when they include few specifics about ICTs? How are the claims made in these documents based on historically accepted "legitimate" claims? The normative institutional relationships between the contributors to city planning efforts have not traditionally included information and communication technology advocates. Companies involved in delivering communication technology, such as telephone and cable wires, are routinely consulted for technical specifications regarding placement and maintenance of these systems, but they have not been participants in most planning efforts. In a city like Philadelphia, headquarters to a major telecommunications industry entity, political realities would seemingly dictate a strong role in city planning for the cable industry, yet the city has no strategy to intersect ICTs with urban design. Dallas's planning documents are myopic, criticizing city streets that are cluttered with wires, poles, and traffic signals that are often "carelessly placed" and "creating visual chaos" [forwardDallas Urban Design,

2006, p. 2]. The city's desire to improve the aesthetic along major corridors might serve as an impetus to replace existing wired structures with wireless infrastructure. Similarly, Dallas' desire to ensure that the downtown and retail areas "pulsate with activity and encourage rich, exciting urban interrelations" [forwardDallas Urban Design, 2006, p. 2] points to the need for measures that ensure public spaces are not privatized through the use of personal electronics and mobile devices.

According to Forester [1993], policy proposals and measures influence the institutional participants to create or abrogate specific directions of public debate and action on issues. Forester illustrates using the example of court decisions which might influence state agencies mandated to promote public health information campaigns. The policies dictated by those state agencies may serve to shape, in particular ways, those information campaigns. As various institutions collaborate to affect policy debates, they ultimately craft policy, producing and reproducing power structures that enable the implementation or obstruction of public policy. Therefore, this critical analysis of these seven city planning documents demonstrates the lack of power ICT organizations have in the urban planning process. Some stakeholders, such as economically and socially disadvantaged residents, are excluded from the planning process except in recognition of their needs for affordable housing. These planning documents are not altering the communicative discourse of social production and reproduction by considering how disadvantaged populations might gain from city plans that include ICTs as a means for equalizing opportunities to access and use information.

Ubiquitous connectivity is certain to impact the ways in which urban residents utilize public space. Among the most powerful evidence of this trend is a move by incumbent ISPs to blanket public locations with WiFi hotspots. Optimum, the Internet service owned by Cablevision, is deploying wireless access points and promoting the hotspots as social networking and entertainment devices [Seals, 2009]. The cable company Comcast is now testing WiFi service at New Jersey Transit rail stations, targeting existing subscribers who commute [Rivera, 2009] and using Clearwire's new WiMAX network to provide wireless Internet access to customers in Portland, Oregon [Rogoway, 2009; Goldstein, 2009].

The proliferation of commercial wireless networks highlights the dominant role mobile devices play in daily life. As citizens engage in the most individualistic of tasks—text messaging, reading online, or listening to an MP3 player—they increasingly do so in public spaces. Mobile devices triumph over the historical constraints presented by location and geography. As this research reveals, and as Townsend [2000] has noted, urban planners and architects have addressed these new technologies only on a "cosmetic level." As a nascent field, technology planning tends to focus on building infrastructure, rather than how to take advantage of mobile communication devices in shared environments.

VI. CONCLUSION

A critical analysis of how the demand for ubiquitous connectivity and the response by service providers impacts urban planning policy shows that information technology planning is largely ignored in planning documents for major U.S. cities. Critical analysis is useful in examining planning policy since it aspires to illuminate complex social circumstances in ways that investigate and assess dominant ideas about social problems and ensuing social policies. Here, historical political and institutional arrangements likely account for the myopic stance taken in some of these plans with regard to information technology planning. Narratives of economic opportunity, quality of life, and spatial design epitomize the values and ideals of these plans in conjunction with input from traditional institutional constituencies involved in planning policy. Actual lived experiences and social interactions of citizens in these urban environments are virtually absent. As a result, planning policy disregards digital divide issues and larger concerns of social justice and equality. Conceptualizations of space as hybrid forms of information flows, people, and the built and natural environments are necessary for creative and democratic contemporary urban planning.

This research questions the normative foundations of urban planning policy in the United States. Those foundations are vulnerable to the dominance of institutional arrangements that exclude information technology and digital divide issues to the detriment of both current and future realities of urban life. City planners would do well to recognize those aspects of planning that do demonstrate an awareness of the impending reality of hybrid spaces. For example, General Motors and Segway have introduced the Personal Urban Mobility and Accessibility (PUMA) project, a two-wheeled electric car which uses a networked communication system to connect the vehicles with one another and regulate traffic flow. The system relies upon ubiquitous connectivity to avoid crashes, find parking, reduce congestion, and enhance personal networking capabilities [Fowler and Strumpf, 2009]. The technology connects the driver, the environment, and other people in ways envisioned by Mitchell and others.

Hand-held devices present urban planners with a range of new possibilities and solutions. For instance, GPS programs help planners determine movement patterns in a city, enabling them to design traffic corridors

accordingly. But the ubiquitous use of mobile phones, laptop computers and MP3 players also presents a range of challenges for urban planners—requiring them to "reassess" [Tuters, 2004] the concept of public spaces. Contemporary planning professionals are trained to design cities based on stationary zoning principles, where particular functions occur exclusively in designated areas; this strategy plays a role in making the city run as one ecosystem [Gencel and Velibeyoglu, 2006]. In reality, however, ubiquitous connectivity allows citizens to accomplish tasks and partake in activities from anywhere. While this creates flexibility and convenience, it may also rob individuals of privacy and personal boundaries. At the same time, these pursuits erect virtual fences in public spaces, which are meant for interaction and shared experience. As a result, the use of mobile technology is defying traditional planning approaches. Unlike traditional vehicles for interaction in public—a park bench or a promenade—personal devices are "so changeable and subject to so many external forces" [Gencel and Velibeyoglu, 2001]. Regardless, most cities have not articulated master plans to incorporate this new reality.

As this analysis demonstrates, the reasons for this are complex. Local governments, financial institutions, business enterprises, and other institutions legitimized by capitalistic entities are granted the authority to act in the planning and policy arena. As telecommunications infrastructure becomes a more visible entity in cities, this may change. The actions of ISPs in developing broadband technologies have not been capitalized on due to constraints with the privatization/competition model that create systems of private profit which can ultimately stifle innovation [Press, 2009]. The level of complexity and mere newness of mobile technologies have left city planners grappling with both a "knowledge gap" and a "communications gap" [Salomon, Cohen, and Nijkamp, 1999]. Because of these gaps, the precise spatial impact of emerging technologies is yet to be realized. Even when the effects are understood, planning professionals and city managers may lack the tools to effectively address them [Townsend, 2004]. Determining how to incorporate and capitalize on ubiquitous connectivity presents no less a challenge for urban planners than did the automobile during the twentieth century [Townsend, 2004].

Solving this challenge has implications that transcend traditional planning principles, such as aesthetics and utility. This is because urban spaces like the town square and the piazza symbolically represent democracy [Taipale, 2006]. They are spaces for civic engagement, where political protests, religious celebrations, and ethnic festivals all take place. Even random encounters in public spaces are essential for democracy [Lefebve, 1991; Jacobs, 1961]. As wireless networks and virtual interaction increasingly become the platforms for these same cultural events, it becomes difficult to define what qualifies as a public or a private domain. Perhaps parks, sidewalks and other areas open to anyone should be viewed as single public spaces "with multiple as well as private layers," as Taipale [2006] proposes. Regardless of how urban planners characterize the transformations spurred by mobile communication technologies, it is clear these devices are now an integral part of the built environment. Future planning policy must transcend traditional modes of institutional input into the planning process in order to ensure a more equal and democratic urban development strategy.

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ABOUT THE AUTHORS

Jan Fernback (Ph.D., University of Colorado) is an Associate Professor in the Department of Broadcasting, Telecommunications and Mass Media at Temple University. She works primarily on the cultural, philosophical and policy issues surrounding new communication technologies. Current work includes explorations of online privacy and surveillance issues; online community; information technology in distressed urban communities; and broadband policy in urban environments.

Gwen Shaffer is a postdoctoral research fellow at the University of California, Irvine. There, her research focuses on how to best incorporate telecommunications policy and economics into the Internet architecture. Shaffer received her Ph.D. from the Mass Media & Communication doctoral program at Temple University. Her dissertation examined the potential for peer-to-peer networking to help bridge the digital divide in the United States and Europe. Her previous studies examined the sustainability of municipal wireless networks; the need for a national broadband policy in the United States; and personal conduct in the blogosphere.

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