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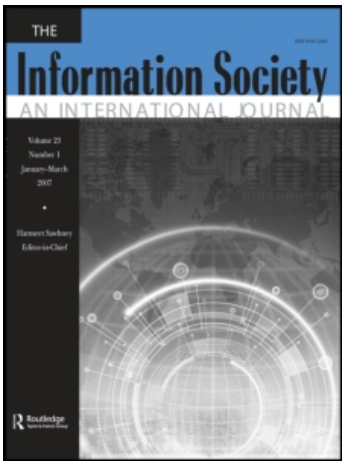

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WiFi Geographies: When Code Meets Place

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PERSPECTIVE

WiFi Geographies: When Code Meets Place

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This article argues that as our homes, offices, cities, and spaces get layered with digital information networks, it is vital that we develop new conceptual categories that integrate digital and physical spaces. With that objective in mind, it examines how WiFi networks interact with socioeconomic factors to reconfigure people, places, and information in physical spaces. Drawing on empirical research from ethnographic observations, a survey, and in-depth interviews, it shows how the availability of WiFi public hotspots has opened up new ways for freelancers to do their work, often using different locales for different phases of their work. Also, for freelancers in search of opportunities for co-working, WiFi hotspots are sites of informal interaction, social support, collaboration, and innovation. The article also illustrates how a WiFi network does not map onto existing physical or architectural boundaries. Instead, it reconfigures them in a number of ways by permeating walls, bleeding into public spaces, and breaking down some traditional notions of privacy and property while reinforcing others. Such reconfigurations of people, places and information require a new conceptual framing—codescapes—built on earlier notions of digital information and physical space.

Keywords code, hotspots, third places, WiFi, wireless Internet

Over the past decade, since the Internet's mainstream adoption in 1995, scholars have used a plethora of spatial metaphors to describe the spaces and places of digital information. However, in the current moment, a digital information layer is rapidly expanding throughout the physical spaces of our homes, offices, cities, and towns. This digital layer includes mobile and wireless technologies such as WiFi hotspots, municipal wireless networks, cellular networks, wireless sensors, and radiofrequency identification (RFID) tags. For example, electronic access cards are increasingly being used to allow entry to apartment buildings (especially in luxury condominiums) and offices, sensors are being deployed to measure pollution, and credit cards have been equipped with one-touch payment systems. Mobile phones are commonplace, and laptops are increasingly accessing the Internet wirelessly in cafés, parks, and public spaces. The nexus between physical space and digital space is both challenging and interesting, because while both shape and are shaped by human behavior, the ways in which they regulate behavior may be different and even conflicting at times. This further complicates the ways in which we understand the Internet and related technologies and their business and policy implications. Therefore, as I argue in this article, a new theoretical concept is needed to better understand the interaction between physical and digital space. In effect I answer the question: "What happens when code [software] meets place?"

Based on a yearlong empirical study of WiFi users, this article describes the way in which WiFi networks interact with broad socioeconomic trends to reorganize people, places, and information. The WiFi users studied include remote workers, self-employed workers, freelancers, independent contractors, and entrepreneurs who often work at cafés, parks, and public spaces where they are able to access WiFi. Synthesizing results of this study, I develop the concept of "codescapes" to describe a new analytic category that integrates both physical and digital spaces.

THEORETICAL FRAMEWORK

Scholars of media, communications, and technology have struggled to understand the ways in which particular media such as books, newspapers, telegraph, radio, television, and Internet interact with physical space and geography. In the post-World War II period, Canadian economic historian Harold Innis traced the history of Western civilization through the lens of the media and technology.

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Specifically, he chronicled the rise and fall of Western empires, arguing that empires—from ancient Egypt to Babylonia, Greece, Rome, and, finally, to the United States in the late 1940s—succeeded by balancing their need to extend themselves across space while simultaneously maintaining themselves throughout time. With respect to the printing press, Eisenstein's work highlights an increase in the differentiation between private and public worlds as the result of the ability to read the news from one's own home rather than congregating in a public place such as a church (Eisenstein, 1968). Similarly, Anderson illustrates how the introduction of the newspaper broadened people's ideas of what it meant to belong to a community and paralleled the rise of the nation-state (Anderson, 1983). With respect to the telegraph, Carey's well-known article on the telegraph shows that the telegraph had the direct consequence of allowing information to travel faster than transportation and the indirect consequence of the creation of a futures market in commodities trading (Carey, 1988). de Sola Pool shows that the telephone, like all technology, has multidirectional effects, which depend on its uses. For example, the telephone both increased centralization by making skyscrapers and dense business districts possible and decreased centralization by locating manufacturing and homes in the suburbs (de Sola Pool, 1977). Fischer's underscores the importance of conducting in-depth ethnographic studies of communication technologies as they are being developed, adopted, and used (Fischer, 1992).

More recently, scholars have turned to the social implications of the Internet. Much of this research has perhaps overly focused on virtual communities rather than on the intersection between the virtual and the real. However, Wellman and Hampton's "Netville" study is an example where the social implications of the Internet is considered with respect to a real-world community, a wired suburban neighborhood (Wellman & Haythornthwaite, 2002). Anthony Townsend has argued that while many scholars asserted that use of the Internet would result in the decline of cities, this has not happened (2005). Currently, there is a rapidly growing body of research on the way in which mobile phones are used (Ito et al., 2005; Katz & Aakhus, 2002; Pedersen & Ling, 2005). More recently, there have been several studies about the use of wireless networks in cafes and public parks (Gupta, 2004; Hampton & Gupta, 2008; Hampton et al., in press).

In addition to the preceding discussion of the ways in which scholars of media, communications, and technology have studied the relationship between media and physical space and geography, and, in particular, the ways in which media interacts with the socioeconomic structures of the time to shape behavior while at the same time being shaped by these structures, it is important to consider concepts from legal scholarship. Lessig's well-known book *Code* (1999) argued that software regulated behavior in ways similar to that of physical architecture, which got popularized in the mantra "code is law." While more recent legal scholarship has further clarified the ways in which software is similar to and different from architecture, these discussions do not account for the current convergence of physical and digital spaces. In this article, I build on Lessig's definition of code by attempting to understand what happens when code merges with physical space.

Scholars have introduced a number of concepts to attempt to describe the qualities of different types of physical spaces. For example, Oldenburg believes that third places—places that are neither home nor work—are necessary for the functioning of urban social life. At the same time, he fears that these third places are rapidly disappearing (Oldenburg, 1989). Castells has articulated the tension between the "space of flows"—global networks of technology flows—and the "space of places"—the urban spaces of everyday life (1996). The concept of innovation spaces captures the recent interest of firms in designing physical environments that foster innovation and creativity (Moultrie et al., 2007). I argue that a new concept is required that combines Lessig's understanding of code with relevant spatial categories. I call this *codescapes*. The following discussion of WiFi hotspots illustrates some of the unique qualities of codescapes in the ways in which they reconfigure people, places, and information.

METHODOLOGY

This project uses a mixed methodology (Axinn & Pearce, 2006; Creswell, 2003; Norman, 1990; Tashakkori & Teddlie, 1998) to combine ethnography, participant observation, comparative research, survey research, and in-depth qualitative interviews. It can be described as a network ethnography, an emerging transdisciplinary method that makes use of a wide variety of network data—using new media including e-mail, websites, log data, and social network analysis—in order to study communication in organizations (Howard, 2002).

I conducted a survey on the use of wireless networks in cafés, parks, and other public spaces. The 40-question online survey was conducted between October 2006 and April 2007, in New York, Montreal, and Budapest. It was conducted with a small grant from Microsoft Research in partnership with local community wireless organizations: NYCwireless (New York), Île Sans Fil (Montreal), and the Hungarian Wireless Community (Budapest). Île Sans Fil translated the survey into French and conducted it bilingually in Montreal, and the Hungarian Wireless Community (HuWiCo) translated the survey into Hungarian. These three cities were chosen to exploit the different architectures of their wireless networks, which have

been shaped by a number of factors including national telecommunications policy, economic incentives, climate, availability of public space, and local culture.

In New York, the surveys were publicized through fliers, on listservs, via e-mail announcements, and via the login or "splash" pages of the wireless networks of partner organizations. In New York, the Downtown Alliance, a Lower Manhattan business improvement district, placed a link to the survey on their website. The survey was included in New York City Council Member Gale Brewer's monthly e-mail announcement. In Montreal and Budapest, the survey was publicized only online. The survey was conducted using SurveyMonkey,[1] an online survey tool. The survey resulted in 1362 responses: New York (614), Montreal (370), and Budapest (378). The survey provided a useful way of identifying informants for in-depth interviews.

The survey asks three types of questions about the use of the wireless Internet: general questions, technology and Internet access-related questions, content and activity-related[2] questions, and standard demographic questions[3]. These questions were informed by a number of earlier surveys that have included questions about the use of mass media and the Internet, such as the Pew Internet & American Life project and the General Social Survey. More specifically, the survey asks about the location of use, purpose and reason for use, frequency and length of use, types of technologies owned and used, access to the Internet, problems using the network, type of information and websites accessed, and kinds of activities pursued.

Results from the survey provided descriptive statistics about how WiFi hotspots in public spaces are being used, by whom, where, and for what purposes. This will aid in the development of a typology of users of mobile and wireless technologies in public spaces. In addition, by comparing the survey results with earlier studies about the use of mass media and the Internet, it is possible to start understanding how the use of WiFi hotspots is different from and similar to the wired Internet and earlier communication technologies. Furthermore, by comparing the survey results from New York, Montreal, and Budapest, it is possible to make recommendations about content and applications for mobile and wireless use across diverse markets and civic cultures.

In addition, I conducted in-depth qualitative interviews centered around three case studies in New York, which were identified through insights from the ethnographic observations and survey results. Bryant Park, Starbucks, and the JetBlue Terminal at JFK Airport were selected for in-depth case studies. These three sites were chosen because they represent three different types of settings where WiFi hotspots are often deployed: cafés, parks and public spaces, and airport lounges.

Following is a short description of the three research sites. First, Bryant Park is a privately managed public park in midtown Manhattan and is located on Forty-Second Street between Fifth and Sixth Avenues, directly behind the New York Public Library. The Bryant Park wireless network was built by NYCwireless, a community wireless organization, in partnership with the Bryant Park Restoration Corporation in 2002. The wireless network at Bryant Park is free to use. Second, Starbucks, an international coffee retailer, has 153 locations in the New York area (within a 5-mile radius) where a T-Mobile HotSpot is available.[4] The T-Mobile HotSpot requires customers to pay daily, monthly, or annual membership fees in order to use the wireless network. Interviews were conducted in numerous Starbucks locations in Manhattan and Brooklyn. Third, JetBlue is a low-cost airline in the United States. While no interviews were conducted in the JetBlue Terminal at JFK Airport, I asked informants I interviewed in other locations about their experiences using the the JetBlue wireless network. In addition, on several occasions, I conducted observations at the JetBlue Terminal at JFK Airport. All three case studies were documented through a combination of ethnographic observation, in-depth interviews, photography, and spectrum analysis.

About 80 people—those who reported using the wireless network for 2 or more hours per day at a café, park, or other public space—were selected for interview from the New York survey. About 50 agreed to be interviewed. Twenty-nine interviews were conducted with users of WiFi hotspots; 27 interviews were conducted with experts including community wireless leaders, architects, consultants, technologists, and researchers in New York and also in Tokyo, Budapest, and Berlin. The interviews with users of WiFi hotspots were 1-hour, open-ended interviews, and whenever possible were conducted at the locations in which the informants reported that they used the wireless Internet most frequently. All interviews were documented with notes and recorded digitally. On several occasions, interviews were conducted by phone and recorded via Skype since the informants had moved to new cities since they took the survey. The interviews were not transcribed.

Of the 29 interviews with users of WiFi hotspots, the breakdown in terms of sites was as follows: cafés (19), parks and public spaces (8), and airport lounges (1). In addition, one interview was conducted with a neighbor who is using my WiFi hotspot. It is important to note that individuals often had used WiFi hotspots in a number of different locations, including cafés, parks, and airport lounges, and therefore their responses often reflect their experiences at a number of sites. Among those interviewed, 24 were men and 5 were women.

Interviews focused on informants who reported in response to the survey that they were full-time or part-time

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employees, self-employed, or entrepreneurs. Fourteen of the informants are full-time employees; 13 are freelance, self-employed, or entrepreneurs; and 2 were unemployed during the time that they reported using WiFi hotspots. Among full-time employees, one works remotely in finance for a DC-based firm and another works remotely in technology sales for a Silicon Valley-based firm. Among freelancers, one works remotely in public relations for a Boston-based firm. Informants worked in a range of occupations. One is a university professor, one is a photo-equipment repairman, one works in finance, one is a graphic illustrator, one works in hospitality, one is a lawyer, one works in media production, four work at nonprofit organizations, one is a performer, two work in public relations, seven work in technology, one works in translation, two are Web designers, and three are writers. One of the unemployed informants is a homeless blogger.

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DISCUSSION

Drawing on empirical research from ethnographic observations, a survey, and in-depth interviews, the following subsections discuss the ways in which WiFi networks interact with socioeconomic factors to reconfigure people, places, and information in physical spaces. The first subsection discusses the way in which freelancers in New York, in this example, use WiFi hotspots at Starbucks. Freelancers have an acute knowledge of the locations, advantages, and disadvantages of individual WiFi hotspots and, to some extent, their everyday activities revolve around them. Freelancers rely on WiFi hotspots located in cafés, parks, and other public spaces for connectivity as well as community. For freelancers in search of opportunities for co-working, WiFi hotspots are sites of informal interaction, social support, collaboration, and innovation. The second subsection illustrates the ways in which WiFi networks play a role in reorganizing physical space. For instance, a map of the locations of WiFi hotspots offers a new way of viewing the city, and an image from a spectrum analysis tool illustrates the traffic of digital networks in a city park. Finally, the third subsection shows how WiFi networks mediate information. These examples of the reconfiguration of people, places, and information require a new conceptual framing—codescapes—built on earlier notions of digital information and physical space.

Generation Mesh

On a particularly busy day in one of the world's busiest Starbucks, Victor, a self-employed 30-year-old graphic illustrator, was queuing for his ideal seat. While waiting in line, he began talking to Richard, a freelance Web designer and musician. Victor and Richard became friends and began working together on an almost daily basis. In the morning, the first person to arrive "at work" would stake out space and notify the other by phone. If one Starbucks is too crowded, another coffee shop nearby is checked until an appropriate workplace for the day is identified. Victor and Richard also met Daniel, a search-engine optimizer, at Starbucks and work together with him everyday. Victor and Richard have collaborated on several Web-design projects together, a sign that they have built trusting relationships that enable them to access new employment opportunities. In addition, Richard mentions that working alongside Victor and Daniel allows him to relieve stress more easily, instead of becoming frustrated and giving up on his projects.

Victor had three regular mobile workplaces: a preproduction place, a production place, and a deadline place. While all three places were Starbucks coffee shops, they were unique in their relationship to the physical environment and to his social network. During the preproduction phase of his projects, Victor required books and materials, which surrounded him at a Starbucks located within a Barnes & Nobles bookstore, in order to research the history, settings, and characters for the storyboards that he was illustrating. However, these Starbucks are often smaller and have very few electricity outlets.

During the production phase of his projects, Victor moved to another Starbucks nearby where he could plug in his laptop and light-box (needed for tracing and drawing). It was at such Starbucks that he spent most of his time. His drawings were often spread out on the table and he had a constant stream of friends and visitors who knew that he worked there regularly. Finally, when he was on deadline, Victor went to a Starbucks in Korea-town. He did not know anyone there and could work uninterrupted until he finished his project.

Victor chose each of these Starbucks, which were seemingly identical to the average person, based on their unique physical, technological, and social characteristics. While, for the most part, research on telecommuting and remote work assumes the elimination of commuting time in order to increase productivity and promote more sustainable transportation use (Gillespie & Richardson, 2000), Victor commutes 40 minutes to get to "work" from his apartment in East New York (a poor neighborhood of Brooklyn). In addition, another informant, Jason, a remote technology salesperson for a Silicon Valley-based company, simulates his commute by taking a 30-minute walk to buy the newspaper or coffee on the days when he needs to be at home for private business phone calls before going to Starbucks for about 4 hours in the afternoon.

As a regular patron of one Starbucks, Victor sometimes receives free coffee since he knows the Starbucks barista. He makes copies at the shop around the corner. He gets discounts on lunch nearby and likes to go out to dinner in the restaurants in the area after working from 8 to 12

hours at the Starbucks. When asked why he commutes 40 minutes to get to work, he replies, "Everything is *here*." In fact, he got his first full-time job in the industry when an executive found him working on his drawings at 3 a.m. at a Ray's Pizza in the East Village.

Search and the City

In February 2007, the Pew Internet & American Life Project reported that 34% of all Internet users have used a wireless connection and 27% have logged on from a place other than home or work (Horrigan, 2007). According to my survey, respondents had used WiFi at Starbucks (34%), Bryant Park (33%), the New York Public Library (23%), and independently owned cafés (21%) in the previous 6 months. With the exception of Bryant Park, all of these entities comprised multiple locations throughout the city. For example, Starbucks has 153 locations in the New York area (within a 5-mile radius) where a T-Mobile HotSpot is available.[5] The New York Public Library has 69 locations with free WiFi access in the Bronx, Staten Island, and Manhattan; Queens and Brooklyn operate their own library systems.[6] And, certainly, there are hundreds of cafés throughout the New York area that offer free or paid WiFi access.

In May 2006, at a City Council hearing held by the Committee on Technology in Government, Bryant Park Restoration Corporation Executive Director Dan Biederman testified that the Bryant Park WiFi hotspot attracts 250 users per day. The Bryant Park Wireless Network, which was built in 2002, is one of the first, largest, and most widely used and well-known free, public wireless networks in the world. The project was sponsored by Intel in its initial phase and is currently sponsored by Google. The organization invites New Yorkers to "Turn Bryant Park into your new office," according to its website.

One of the main reasons for the popularity of Bryant Park's WiFi hotspots is that they are outside. Survey respondents said: "It is the best office in the world. . . I can have my feet in the grass and the world at my fingers," and "I love the park and being outdoors while still feeling like I am getting work done," and that the park allows them "to let the kids play outside while I work." Other popular sites visited by over 10% of respondents include 60 Wall Street Atrium, Battery Park, City Hall Park, college campuses, JetBlue Terminal, and Union Square Park. Starbucks (15%), Bryant Park (10%), and independently owned cafÈs (12%) were also the most frequently used hotspots. The remainder of the survey was completed based on the most frequently used hotspot.

One of the most significant findings of the survey is that the availability of WiFi is an important factor in attracting people to the location where they most frequently use the wireless Internet. Forty percent of respondents indicated that WiFi is the reason that they went to the location and 30% said that WiFi is sometimes the reason that they went to the location; a smaller 26% indicated that WiFi is not the reason that they went to the location. However, in total, it is possible to argue that WiFi is a factor in attracting over 70% of the respondents to the location. In addition, when choosing between two coffee shops of similar characteristics and quality, 75% of respondents answered that they would choose one that provides WiFi access over one that does not; 20% say they might; and, 5% said that WiFi would not be a factor in their decision. These findings have potential implications for economic development and support the rationale that WiFi may enable commerce and productivity that would not have occurred otherwise. In fact, in New York, since at least 2002 park organizations and business development organizations have deployed WiFi hotspots in order to attract people to parks and public spaces. However, to date, there has not been any research to verify that their assumptions are correct. In addition, there are still significant differences between specific WiFi hotspots. While some, like Bryant Park, are incredibly successful; others do not attract nearly as many users. This seems to support the idea that there are multiple factors that draw people to specific WiFi hotspots. For example, one respondent that I interviewed, a full-time employee at a university club in Midtown, commutes 20 minutes each weekend in order to use the Bryant Park hotspot to work on his food and wine web site, from which he eventually hopes to earn a supplementary income. He likes Bryant Park because it is "comfortable" (in particular, he mentions the patented chairs that include a desk and cup holder) and he is familiar with the area since he goes there after work. His weekend trips represent additional subway journeys and potentially money spent on food and beverages or possibly even shopping while he is out and about. In addition, his website may soon generate additional taxable income. As such, it is possible to argue that the WiFi hotspot increases city revenue in the form of subway tokens and taxes on purchases.

According to the survey, the primary purpose for the use of WiFi is for both work and personal use (63%). A smaller number of respondents indicate that they use WiFi for personal use only (28%), and even fewer say that they use WiFi only for work (11%). It is often difficult to separate personal and work activities since laptops and the Internet have become embedded into everyday life. Thus, it makes sense that the majority of respondents use WiFi for both work and personal use. However, respondents who cannot access their personal e-mail at work or prefer to use their own computers for personal e-mail are among those who primarily use WiFi hotspots for personal use. This is an interesting reversal of traditional dichotomies about private and public behavior. Normally,

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it might be assumed that people conduct personal activities in private spaces such as homes or offices. However, in this case, people explicitly go to public spaces such as parks and cafés in order to do personal activities. This is also supported by my ethnographic observations at a café on Manhattan's Lower East Side in New York in May 2006. I found that, in part due to the crowded nature of the café space, people often went outside to make phone calls. While the indoor café space would be regarded as relatively more private as compared to city sidewalks and streets, people went into more public spaces in order to make their phone calls. In addition, since the café was often frequented by regular freelancers, it is possible that while the people inside the café were "familiar strangers," those on the street were completely anonymous and therefore provided a greater sense of privacy.

When asked the reason that they used WiFi, 58% indicated that they wanted to get out of their home or office; 27% replied that they wanted to get information when they were passing by and 23% wanted to see familiar people or be part of a community. These limited responses do not begin to account for the wide variety of reasons that respondents gave when prodded for more details about their rational for using WiFi. For example, some emphasized that it was convenient to where they lived or worked, saying, "I live in Harlem and work at Wall Street. I don't want to carry my laptop all over the city," or "For work I regularly travel between Baltimore and Boston. Starbucks is ubiquitous and consistent." Others mentioned that a friend lived nearby or that it was a central location for client meetings. Finally, a few mentioned that they liked accessing it from their car. Others said that they used WiFi at home; some did not have or could not afford Internet access at home. For example, one respondent said, "It's near where I am in the mornings and I can't get WiFi access at my house." Others wrote that they used it because it was free and/or easy to use, explaining, "It's free. I'm in Manhattan frequently and my home office is in Brooklyn. It's the only way for freelancers to stay in touch. I can't afford a BlackBerry or Treo." Some were having problems with their regular Internet provider. Others were in between meetings, traveling, or waiting for something i.e., flight, train, or laundry. For example, one wrote that he/she needed a place to work between two meetings, another wrote that before he/she got a high-speed cellular wireless card, he/she "would use these hotspots to check email in between meetings when away from the office," and another wrote that he/she used WiFi "when I have time between work appointments (free time in schedule and not enough to go home)." Finally, some enjoyed the atmosphere/environment or liked the coffee and/or food at a particular location; others wanted to relax or work while having breakfast or lunch (Hampton & Gupta, 2008).

In order to better understand the reasons that people use the wireless Internet, respondents were asked to answer open-ended questions on *what they like about the wireless Internet*. Freedom of movement to work in different places, i.e., living room; mobility, portability and flexibility; and the ability to work outdoors or remotely outside of the home and/or office were cited by nearly one-third (29%) of respondents. For example, some wrote, "I can sit anywhere in my room or apartment or even outside. . . I don't have to sit at my desk," and "I depend on it. It makes working at home much more pleasant. When I've been on the road, I use open WiFi access points to keep in touch with friends and work." Others explained, "the ability to work from somewhere that isn't my home/office," "the convenience of being able to get work done in a 'pastoral' setting," and "the location's beautiful . . . I can do work there instead of in the office or at home." Another group of respondents, 28% of the total, stressed the convenience of the wireless Internet—in particular, the lack of wires, cables and cords. They wrote: "[There are] no wires! I'm a nervous type. . . like to change positions location a lot. Additionally, I work from home so leaving the house while still being productive is a plus," and "I can get onto the Internet without having to plug into anything." Twenty-three percent of respondents referenced connectivity, the ease of access to information, and the ease of use. For example, one respondent wrote: "the ability to access the wealth of information on the Internet wherever I am. I can always find the answer to a question." Nine percent cited the widespread availability of the wireless Internet; 8% mentioned that it is (usually) free of charge; and, 5% said that it is fast.

Codescapes

The concept of affordances (Gibson, 1977; Norman, 1990) is useful in building a more nuanced understanding of WiFi networks. The most obvious affordance of a WiFi network is its ability to provide connectivity to the Internet. A typical WiFi network currently reaches between 300 to 1000 feet, with some variation depending on the type of equipment and the way in which its software is configured and set up. Because its signal reaches a relatively small, bounded geographic area, people must be situated within close range of the network in order to get online. Thus, it is often common to observe people clustered within range of wireless networks, whether they be at a café, in a park or public space, or merely standing on the street trying to get a signal.

However, it should be noted that a WiFi network does not map onto existing physical or architectural boundaries. Instead, it reconfigures them in a number of ways by permeating walls, bleeding into public spaces, and breaking down some traditional notions of privacy and

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property while reinforcing others. For example, an interview with an architect revealed that the availability of mobile and wireless technology significantly changed the ways in which their clients wanted to use the spaces that were being designed for them. When asked where the office was likely to be, clients responded that they might like to work next to the fireplace, or that they might like to move from room to room while they were working. This contrasted with the architect's preconceived notions about the use of the rooms that the architect were designing. In another interview, wireless-networking experts from Edinburgh remarked that hotel staff members were puzzled when guests called in requesting to stay in specific rooms of their hotel. When asked, guests replied that reception of the recently installed free wireless network in the bar downstairs was stronger in those rooms.

This reconfiguration of space is also reflected in the organizational culture of information technology companies such as Cisco and IBM, which have embraced more flexible employment models for their full-time employees. According to an interview with a Cisco wireless sales employee, works starts "when he decides that it starts." He is not encouraged to go to the office and, instead, works primarily from home. However, when he does go to the office he is free to choose whichever office he pleases, even that held by senior management, since there are no assigned desk spaces for the majority of staff. In this way, the laptop computer and mobile devices themselves become the office. Furthermore, while the Cisco employee works on project teams, they are ad hoc teams, meaning that they can be dynamically reconfigured as needed. For example, IBM employees are allowed to work anywhere that IBM has an office, according to a recruiting seminar by IBM held at the Columbia Business School in 2006. Thus, one IBMer reported having spent most of his summers working from Budapest, Hungary.

The following examples illustrate the ways in which WiFi networks play a role in regulating behavior. Wireless networks can be open and, therefore, free to join and use without a password, or closed, "locked-down" or encrypted, and thereby off limits. As such, wireless networks are important in defining the boundaries of digital spaces, which are increasingly overlaid onto the physical spaces in which we spend our everyday lives. With regard to the openness and closure of networks, both software and hardware play roles in the social, political, and economic regulation of the ways in which these networks can be used.

The security community—in particular, security experts quoted in the mainstream media—has played a key role in persuading people to close off their networks in the name of preventing illegal or undesirable activities such as pornography or file-sharing. For example, in early 2000, when technologists were first experimenting with wireless networks, the majority of networks were open. Many of these networks had generic service set identifiers (SSIDs) such as linksys or netgear, the names of the most widely used routers. However, in the post-9/11 environment, security concerns as well as the strength of the telecommunications lobbies in Washington, DC, have significantly shaped the ways in which software and hardware have developed.

For example, several years ago, I attempted to use Microsoft XP's setup tool in order to install my wireless network. As an intermediary step, I was asked to choose a password. If I did not choose one, I was informed, the tool would select one for me. Of course, it is likely that a technologist keen on leaving his or her wireless network open would be able to circumvent the limitations imposed by such tools. However, for most users, as a result of worries over security and the embedded politics of their software, in recent years, the majority of networks have increasingly become closed.

The majority of people are hesitant to pay a fee to use wireless networks. However, there is still much confusion over the legal and economic aspects of wireless networking. For example, is using a free wireless network stealing? Could it be considered illegal to use a free, open network? There have been few legal cases to provide clarity on this issue. In some cases, it was decided that using a wireless network without authorization (meaning connecting to an open network) was illegal and akin to trespassing. These decisions are highly controversial and the issue remains unsettled.

Most people, in the United States at least, feel more entitled to use something that they have paid for. However, there is significant price discrimination in the market for wireless networking. This problem is particularly noticeable in hotels, where prices range from completely free at the low-end hotels, to $25 USD per day of connectivity at the higher end and luxury hotels. For example, in June 2006, I checked into a budget business hotel in Dresden, Germany, where the International Communication Association conference was being held that year. In order to log into the wireless network, I was required to enter a mobile phone number. To my surprise, I found that when I logged in with a US mobile phone number, I was charged 2 Euros more per day than when I logged in with a German mobile phone number. There was no particular rationale for this price difference—they were not billing the wireless access to your mobile phone bill, the mobile phone number was required only as a unique identification number—and, unlike price discrimination in physical space, i.e., charging more for an Apple PowerBook in Europe than in the United States, digital price discrimination occurs within the same space.

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CONCLUSION

As our homes, offices, cities, and spaces are increasing layered with digital information networks, it is vital that we develop new conceptual categories that integrate digital and physical spaces. Building on earlier discussions of the ways in which software and physical architecture regulate human behavior, this article proposes the term *codescapes*. This article illustrates the ways in which WiFi networks in combination with socioeconomic factors are reconfiguring people, places, and information. Specifically, by examining the lives of freelancers, WiFi hotspots can be understood as places of informal interaction, social support, collaboration, and innovation. This illustrates the ways in which WiFi networks reorganize people. More broadly, WiFi networks attract people to specific locations and allow them to search for information relevant to their geographic locations. In fact, the emergence of the term "hotspots" as a way of describing a physical place in common language speaks to the importance of these digital information networks. Finally, WiFi networks are ways of regulating access to digital information through encryption and pricing.

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NOTES

1. See SurveyMonkey.com for more information.

2. Questions on activities were adopted from the 2000 Pew Internet and American Life Project's Daily Tracking Survey (www.pewinternet.org) and by an earlier survey by Keith Hampton and Neeti Gupta developed in 2004.

3. Questions on standard demographic variables were adopted from a February 2005 survey by Knowledge Networks (www.knowledgenetworks.com). Questions on occupation and industry were informed by the 2000 U.S. Census (www.census.gov) and New York City Economic Development Corporation (http://www.nycedc.com).

4. See www.starbucks.com for more details. Accessed on June 20, 2007.

5. See www.starbucks.com for more details. Accessed on June 20, 2007.

6. See www.nypl.org for more details. Accessed on June 20, 2007.

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