

Resisting and Remaking the Smart City and the ‘Internet of Things’

Laura Forlano, Ph.D.
Institute of Design
Illinois Institute of Technology
lforlano@id.iit.edu

Abstract

Current discussions about urban media and technologies such as smart cities and the “internet of things” reinforce a corporate vision that is based on values of efficiency, productivity, innovation and security, which has been embraced by government stakeholders. Advocates of open technologies, on the other hand, reinforce civic values such as privacy, openness and transparency. Yet, both interpretations often bolster technologically deterministic views about the revolutionary potential of information technology. Specifically, with respect to smart cities and the “internet of things,” discussions often focus on the potential of ubiquitous and invisible computers with “anytime, anywhere” access to the Internet. These popular framings are important sites of appropriation and resistance because they greatly shape our imaginations of the opportunities and constraints of urban technologies. This paper seeks to address the considerable gaps between the discourses around these technologies with the empirical lived experience based on media representations, speculative and critical design interventions and field studies.

Keywords

smart cities, internet of things, urban informatics, digital materiality, speculative design

Three Myths of the Smart City and the ‘Internet of Things’

Discourses around the smart city and the ‘internet of things’ emphasize the ubiquity and invisibility of computing and ‘anytime, anywhere’ access to the Internet. These framings are purported by corporations that sell their technologies to cities, politicians that fight for a more efficient government and productive economy, and hactivists that aim to create more open and transparent systems. Yet, all three stakeholder groups reiterate these three basic principles of the smart city and the ‘internet of things’. This paper resists these dominant framings in an attempt to remake urban technological futures in the image of the lived reality of the people and objects as well as the built and natural environments that coexist in cities. I argue that computing and Internet access is not and should not be ubiquitous, invisible or ‘anytime, anywhere’. Furthermore, these framings are dangerous in misleading society towards a reality imbued with values that we do not want to reinforce.

While they may not be ubiquitous, invisible or ‘anytime, anywhere,’ the technologies of the smart city and the ‘internet of things,’ along with socio-economic transformations over the past several decades have reconfigured and rearranged earlier dichotomies around global and local, digital and material, public and private, and amateur and professional. In order to better understand these emergent socio-technical practices, it is helpful to reference theories from communications (Carey, 1988; Innis, 1951), and science and technology studies (Bijker, Hughes, & Pinch, 1987; Latour, 2005; Nissenbaum, 2001; Star, 1999). For example, Innis argued that media and communication technologies either functioned to control distant lands or to reinforce place-based communities. My research on mobile workers in New York has illustrated the ways in which the appropriation and use of WiFi via laptops, tablets and mobile phones (along with the specific affordances and constraints of wireless spectrum) allows for both connection to distant colleagues and clients but also the formation of place-based friendships, epistemic communities based in specific cafés on the Lower East Side, and, more recently coworking communities.

Over the past five years, a growing body of academic scholarship has employed new concepts that challenge the separation of physical from digital, global from local, and private from public, which are relevant to the understanding of the way in which digital technologies are enabling emergent forms of organizing (Humphreys, 2008), new modes of citizen engagement (Foth, 2008; Foth, Forlano, Gibbs, & Satchell, 2011) and novel ways of experiencing urban space (Ito, 2003). Specifically, terms such as net locality (Gordon & Silva, 2011), code/space (Kitchin & Dodge, 2011), situated technologies (Shepard, 2011), and codescapes (Forlano, 2009) have been introduced in order to better articulate the ways in which digital interfaces, artifacts and networks have been integrated into urban space.

Ubiquity

First, the myth of ubiquity. This claim harkens back to Mark Weiser's (1991) manifesto to Xerox PARC in which he argued that researchers should look beyond the desktop and towards a future in which computers would be ubiquitous. His dictum became the manifesto for an emergent field of ubiquitous computing, which sought to create just that future (Dourish & Bell, 2011). However, this framing promises a reality that is not possible or even desirable. For example, different kinds of building structures and materials, network density (i.e. the number of wireless networks or cable users in a given geographic area), weather patterns and the natural environment can and frequently do disrupt the availability of electricity and Internet connectivity. One theoretical and practical response is to argue for the seamful design (Chalmers, MacColl, & Bell, 2003), which acknowledges that these technologies are not ubiquitous or seamless and, instead, exploits these gaps.

Invisibility

Second, the myth of invisibility. These technologies are not and should not be invisible and, thus, we must find ways to make them present. One such example from the realm of interaction design is Timo Arnall's 2011 "Immaterials: Light Painting WiFi" (<http://www.nearfield.org/2011/02/wifi-light-painting>) "Immaterials" project, a project that used Arduino-boards equipped with sensors to illustrate the shape of wireless networks on the streets of Oslo using a technique called lightpainting. Similarly, drawing on critical and speculative design, Mark Shepard's Sentient City Survival Kit (<http://survival.sentientcity.net>) resists technologies of control by outfitting an umbrella outfitted infrared LEDs that are only visible to surveillance cameras. In my research, I have used spectrum analysis in order to understand the spatiality of wireless networks in public spaces as a kind of network ethnography (Howard, 2002) of physical spaces. This further underscores the point that despite the fact that these technologies seem to be invisible to the naked eye, they are still observable and, in fact, their observation can reveal interesting patterns of socio-technical practices.

'Anytime, Anywhere'

Third, the myth of the 'anytime, anywhere.' This language has been used historically to advertise the benefits of emerging technologies such as hot water, electricity and battery power. For example, a quick glance through *Popular Mechanics* magazine in the 1940s contains all manner of references to this term according to a search of Google Ngram citations (Figure 1).

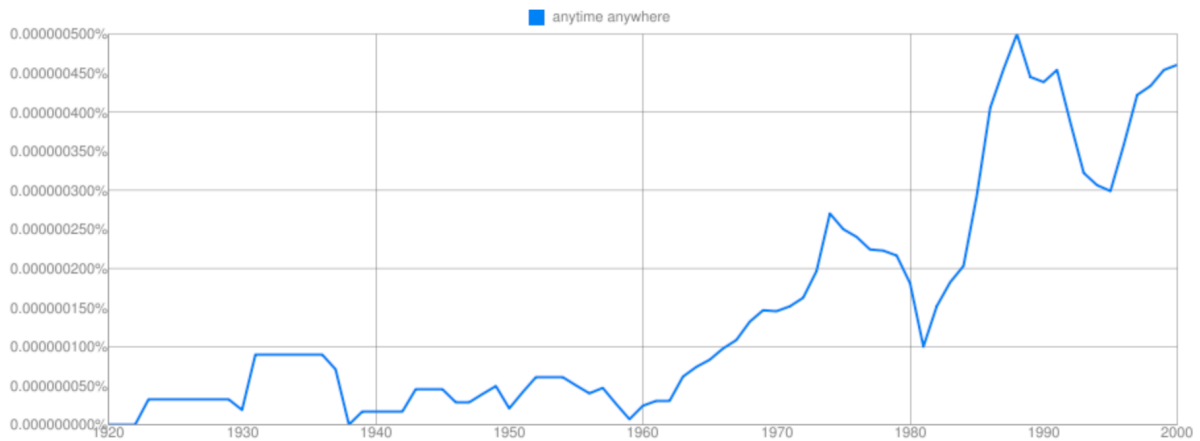


Figure 1: Source: Google Books Ngram Viewer (<http://books.google.com/ngrams>), Accessed on March 14, 2013.

However, as the chart above illustrates, the popularity has been growing in the last decade in which it has been explicitly linked to mobile, wireless and broadband connectivity. Yet, while this framing seems to capture the imagination, in particular with respect to online commerce and remote working, it is in stark contrast with our lived experience. Specifically, my study of mobile workers confirmed that specific people, in specific professions, at specific times in their projects and workdays selected particular cafés, parks and public spaces in which to work.

In conclusion, this paper debunks the myths of ubiquitous and invisible computing and ‘anytime, anywhere’ access to the Internet but, in resisting these framings, it is also necessary to remake them through a theoretical tinkering that is linked to the lived experiences of people and objects as well as the built and natural environments that coexist in cities. Critical and speculative design as well as empirical field studies as the above examples illustrate are useful to the co-construction of emerging understandings of the smart city and the ‘internet of things’. In order to resist and remake the smart city and ‘internet of things,’ it is necessary to both work within these definitions (since they have been widely adopted) in order to adding nuances and complexity to the discussion while, at the same time, creating a more developed socio-technical vocabulary that captures the values that we seek to reinforce in society more broadly.

References

- Bijker, Wiebe E., Hughes, Thomas P. , & Pinch, Trevor. (1987). *The Social Construction of Technological Systems*. Cambridge, MA: The MIT Press.
- Carey, James W. (1988). *Communication As Culture: Essays on Media and Society*. New York: Unwin Hyman, Inc.
- Chalmers, M., MacColl, I., & Bell, M. . (2003). *Seamful design: showing the seams in wearable computing*. Paper presented at the Eurowearable.
- Dourish, Paul, & Bell, Genevieve. (2011). *Divining a digital future : mess and mythology in ubiquitous computing*. Cambridge, Mass.: MIT Press.
- Forlano, Laura. (2009). WiFi Geographies: When Code Meets Place. *The Information Society*, 25, 1-9.
- Foth, Marcus. (2008). *Handbook of Research on Urban Informatics: The Practice and Promise of the Real-Time City*. Hershey, PA: IGI Global.
- Foth, Marcus, Forlano, Laura, Gibbs, Martin, & Satchell, Christine. (2011). *From Social Butterfly to Engaged Citizen*. Cambridge, MA: MIT Press.

- Gordon, Eric, & Silva, Adriana de Souza e. (2011). *Net locality : why location matters in a networked world*. Chichester, West Sussex ; Malden, MA: Wiley-Blackwell.
- Howard, P. (2002). Network ethnography and the hypermedia organization: new media, new organizations, new methods. *New Media & Society*, 4(4), 550.
- Humphreys. (2008). Mobile Social Networks and Social Practice: A Case Study of Dodgeball. *Journal of Computer-Mediated Communication*, 13(1), 341-360.
- Innis, Harold. (1951). *The Bias of Communication*. Toronto, Canada University of Toronto Press.
- Ito, Mizuko. (2003). *Mobile Phones, Japanese Youth, and the Re-Placement of Social Contact. Front Stage - Back Stage: Mobile Communication and the Renegotiation of the Social Sphere*. Grimstad, Norway. <http://www.itofisher.com/PEOPLE/mito/mobileyouth.pdf>
- Kitchin, Rob, & Dodge, Martin. (2011). *Code/space : software and everyday life*. Cambridge, Mass.: MIT Press.
- Latour, B. (2005). *Reassembling the Social: an introduction to actor-network-theory*. Oxford: Oxford University Press.
- Nissenbaum, H. (2001). How computer systems embody values. *Computer*, 34(3), 120.
- Shepard, Mark (Ed.). (2011). *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*. Cambridge, MA: MIT Press.
- Star, S. L. (1999). The Ethnography of Infrastructure. *American Behavioral Scientist*, 43(3), 377.
- Weiser, M. (1991). The Computer for the Twenty-First Century. *Scientific American*, 265(3), 94-104.