

Dispositions, Sensitivities, and Inclinations: The Importance of the Smart-City Citizen

Michelle Ciccone

Abstract

Smart cities promise to improve the lives of citizens. However, as smart-city systems become more effective and efficient, they become invisible, which may lead to the abuse and disempowerment of smart-city citizens. To achieve an equal and active participation of citizens in the development and regulation of the smart city, diverse stakeholders must work to ensure that the smart-city citizen develops certain dispositions, including sensitivity to opportunity and an inclination to engagement. Three essential principles for any media and information literacy city initiative include developing infrastructure literacy, a sense of continuous technological development, and a sensitivity to embedded ethical dilemmas.

Keywords: infrastructure literacy; maker empowerment; technology ethics; engagement

The smart city is an interconnected space, where “you can derive data from everything that is connected and utilize [that data] to improve the lives of citizens and improve communication between citizens and the government” (Maddox, 2018). The benefits of the smart city to the smart-city citizen range from the profound (e.g., improved efficiency and effectiveness in accessing social services provided by local governments) to the mundane (e.g., finding available parking spots more quickly). As objects become more connected and systems become more interconnected, the smart-city citizen her/himself becomes more connected, increasingly interacting with sensors and initiating identifiable communication with and via interconnected systems. The anticipated and inevitable outcome for the smart-city citizen is that processes that were once difficult to navigate, slow to actualize, and prone to error become highly convenient because of the decrease in necessary decision points and automation of services. As daily activities become more seamless, the “how” becomes invisible.

The smart-city citizen benefits from this increased efficacy, but the individuals and communities are exposed to risks. Assumptions are made when individuals are reduced to data points, and actual needs may be overlooked or misinterpreted when seen in aggregate. Moreover, the smart-city citizen may be unaware of the assumptions being made on her/his behalf because the invisibility of the interconnected systems hides the process. More worryingly, the inevitable invisibility of the process may lead to abuse.

Consider, for example, electronic tolling systems on toll roads which are an early-generation smart-city technology. Cars are automatically charged the required toll, either by scanning an electronic transponder or capturing an image of a car’s registration plate using cameras and sensors, and later sending a bill to the address associated with the registration. This system is highly convenient for drivers and has reduced traffic delays (Scientific American, 2011). However, the data collected via this system—including date and time of travel, location, vehicle speed, and photos of the front and rear of the car—are often stored indefinitely and shared with other departments “when legally required to do so, including with federal officials, law enforcement agencies, and lawyers representing individuals in divorce and other civil cases who obtain court orders” (Rocheleau, 2016). Typically, the department of transportation “notifies people whose information is sought through subpoenas allowing them to take legal action to fight the subpoenas. However, exceptions could be made for serious and time-sensitive cases...” (ibid.), exposing the people to the risk of abuse.

The convenience of smart technologies can mask the necessary trade-offs, which quickly become as invisible as the cameras and sensors tracking car movement on toll roads. At the very least, the increased invisibility obscures how these systems work. This dynamic does not always result in dire outcomes: one can still drive

one's car without understanding exactly what the mechanic has fixed. However, a profound impact occurs on the smart-city citizen when the populace is excluded from all decision points, particularly as entities motivated by incentives other than benign convenience. When smart systems are abused, as is often the case, vulnerable communities are likely to suffer disproportionately. For example, facial recognition software has proven unreliable in identifying people of color (Schuppe, 2018), but the situation has not prevented the United States Customs and Border Protection from adopting facial recognition software to monitor the movement of individuals across the U.S.–Mexico border (Brandom, 2018).

Thus, it is critical but insufficient that the smart-city citizen can access and utilize smart-city technologies (an inability to do so would lead to disenfranchisement). The smart-city citizen must be an active and equal participant in the development and regulation of the smart city; ensuring this participation is a responsibility of media and information cities.

Models already exist for what an active and equal citizen can accomplish, from the perspectives of the technology developer and the regular user. Recently, multiple cases have been reported of developers at major technology corporations seeking a role in how the technology they are developing will be used. In 2018, over 3,000 Google engineers protested Google's intended contract with the United States Defense Department for developing artificial intelligence technologies for warfare. The protests gained attention in the media and contributed to the company's withdrawal from renewing the contract (Harwell, 2018).

The regular consumer has also proven to be powerful when engaged and armed with information, as evidenced by the net neutrality debate in the United States. Home Box Office host John Oliver raised an early public alarm when the Federal Communications Commission (FCC) signaled that it would revoke net neutrality laws, which would have resulted in the freedom for Internet Service Providers (ISPs) to treat all web traffic unequally. Oliver twice sent his audience to the FCC public comment page, and the high traffic volume crashed the webpage (Locker, 2017) on both occasions. Additionally, over 100 YouTube stars joined the discussion by signing an open letter to the FCC, calling to save net neutrality laws (Neidig, 2017), raising an awareness of the issue among young fans. Although the net neutrality regulations at the federal level were repealed, the attention drawn to the issue by regular Internet users contributed to legislators in 30 states introducing over 72 bills requiring ISPs to adhere to various net neutrality principles, as well as attorneys general from 22 states filing a "protective petition for review against the FCC in the U.S. Court of Appeals for the District of Columbia" (National Conference of State Legislators, 2018). What might otherwise have been an invisible policy change brought together millions of regular Internet users.

Consequently, informed and active citizens can have a profound impact on the development and deployment of technologies and systems. How then do we ensure the active participation of all smart-citizen? Different models are required to be developed for different contexts, but general principles should guide this development as smart cities grow, spread, and develop into MIL cities.

Dispositions of the Smart-City Citizen

For smart-city citizens to be equal and active participants in the development and regulation of the smart city (not being only consumers or data points to be analyzed), it is essential that the populace develops certain sensitivities and dispositions. To understand the practicality, we can start by examining the “maker movement,” which is based on “the act of creating allows the maker to be a co-creator of one’s physical world, and not merely a consumer.” Agency *by Design* (*AbD*), a project of Harvard University’s Graduate School of Education’s Project Zero, holds that “maker empowerment” is a “dispositional outcome... comprised of three elements: ability, inclination, and sensitivity... ‘[S]ensitivity to opportunity’ is a key developmental bottleneck: in other words, people often do not activate dispositional behavior because they simply do not notice opportunities to do so” (*AbD*, n.d.). And so, to borrow these ideas, if we hope that the smart-city citizen becomes an active participant in the development of the smart city, then citizens must develop the ability, inclination, and sensitivity to do so.

Growing and developing the sensitivities and dispositions of smart-city citizens will require the efforts of many community stakeholders, including schools, libraries, journalists, technology developers, faith groups, activists, and many more. These diverse stakeholder groups will impact the behaviors, beliefs, and knowledge-base of their constituencies differently. For example, librarians’ interaction with their clientele is different from that of pastors with their congregants. However, a general set of principles can aid the work across these contexts. The text below explores three principles that, when applied in any context, can develop the sensitivities and dispositions required for equal and active participation in the smart city.

Principle #1: Develop Infrastructure Literacy

Firstly, the smart-city citizen must develop sensitivity to the infrastructure that, almost by definition, becomes invisible in the smart city. Invisibility elides: we see this when we discuss “the cloud” instead of “the Internet.” This terminology suggests ephemerality, but in reality, the Internet work is made up of very real

physical components. Similarly, as the systems and services provided by the smart city become more effective and efficient, the systems and services become more invisible, and the smart-city citizen becomes less sensitive in discerning how the systems work, or what part of the system makes the services possible.

Therefore, smart-city citizens must become sensitive to the smart-city infrastructure by developing an infrastructure literacy, which includes knowledge of and familiarity with the basic physical and digital components that interact in creating a coherent experience. Infrastructure literacy allows us to “visualize[] infrastructures in order to facilitate civic participation in debates about network ownership, development, and access” (Forsler, 2018, p. 88). When the infrastructure “become[s] such an embedded part of our lived environments that they fade into the background, they also become harder to critique” (ibid.). Hence, developing infrastructure literacy is the first essential step of participating genuinely to the development and regulation of an infrastructure.

To start noticing this invisible infrastructure, an “infrastructural inversion” (Bowker, 1994) is helpful to bring pieces that have faded from into the background to the foreground. This can be achieved by drawing the picture of a given system utilized and enacted by the smart city. This activity can reveal assumptions, misunderstandings, and incomprehensiveness. The desired level of technical knowledge will vary with each context, but it is critical in developing an “infrastructural disposition” (Parks, 2015, p. 357) that considers—concretely, physically, and elementally—system components. Thus, smart-city citizens can begin to ask: What do we miss out on when we do not see the systems we use every day? Answering this question will encourage the sensitivities and dispositions for, which this study is aimed at.

Principle #2: See Technology as Constantly Evolving

For smart-city citizens to become opportunity sensitive, they must believe that an opportunity for change exists. As infrastructure becomes invisible, opportunity for change seems to disappear, as it begins to feel like the way systems work now is “just the way things are.” Susan Leigh Star and Karen Ruhleder’s (1996) definition affirms that an infrastructure is built upon older structures and systems and linked to a community’s established practices. It is no wonder, then, that the infrastructure embedded in our daily lives feels inevitable and natural. The smart-citizen citizen must interrogate these assumptions to view technology and systems as evolving.

To develop this sensitivity to opportunity, we can highlight the ways technologies have evolved and, more importantly, continue to evolve. It can be interesting—especially for young people with a developing sense of history—to examine the history

of the technologies and systems embedded in everyday life. As these histories are explored, it is important to also trace shifts in purpose. For example, the commercial purpose of the Internet has evolved over time and only really introduced 40 years into its history (Zimmermann & Emspak, 2017). Knowing and understanding that purposes can shift based on stakeholder input helps to develop the required sensitivity to opportunity.

When the system evolution is, the smart city becomes, in the eyes of citizens, changeable and malleable. The smart-city citizen can feel empowered to take a stand on net neutrality, for example, because of the expectation that policies can and do change. Truthfully, smart city has not reached a final development stage, and the smart-city citizen can help in developing and regulating the infrastructure, so that it can become better.

Principle #3: Explore Hidden Ethical Dilemmas

This third principle is where the assumptions that are made—and the risk of abuses associated with these assumptions—reveal themselves to the smart-city citizen. To see the ethical dilemmas the smart city raises, the smart-city citizen must develop sensitivity to them, and this sensitivity must go beyond a self-focused concern. Carrie James (2016) writes, “Central to ethical thinking is impartiality, or disinterest: the capacity to look beyond one’s own interests, feelings, and empathy for close relations in order to make decisions that are in the interests of a larger group, public, or society” (p. 5). Without a sensitivity to these ethical dilemmas (in addition to an infrastructure literacy), smart-city citizens develop “blind spots” (ibid., p. 10), where the true impact of systems is rendered invisible. Powerful entities may be motivated to keep these blind spots invisible to the smart-city citizens as possible.

The goal is for these abstract and impersonal ethical dilemmas to become places where smart-city citizens can make choices that protect the interests and safety of fellow inhabitants. Kade Crockford, Director of the Technology for Liberty Program at the American Civil Liberties Union in Massachusetts, speaks of encryption like vaccines:

“How is encryption useful for people who are not targets of government surveillance? It sort of works like vaccines... Maybe you are not likely to get the measles, but we get vaccines as a community...because of something called herd immunity. If we all do it, the weakest among us are protected from diseases like measles and mumps. The same thing is true with encryption. Maybe you yourself are not going to be a target of government surveillance in a special, individual kind of way. But what about other members of your

community? Muslims, dissidents, young black people, immigrants -- those people are targets of government surveillance. And if you want to help protect them, you should use encryption because doing so works like herd immunity with vaccines. It makes it so that those communications don't look suspicious and it pushes back against the... argument that somehow encryption means you're doing something wrong" (ACLU of Massachusetts, 2016).

This understanding shifts the conversation from personal-based to community based, which is an essential disposition for a citizenry that is sensitive and eager to engage in the ethical development of these systems.

Some ethical dilemmas we face today are truly complex and difficult to grasp in the abstract. Hence, case studies are a helpful way of exploring these dilemmas. In this work, consider actual controversies that have touched the lives of your constituencies (knowingly or unknowingly) and explore how these controversies have been resolved. Highlight the choices that were available (or unavailable). Why was the situation resolved in this way and not in another way? By highlighting the choices available, that sensitivity to opportunity will grow.

Below are four categories of ethical dilemmas that may be meaningful to various constituencies of the smart city:

1. Inequality of access: We incorrectly assume that all are connected in the smart city. Consider, who does a smart city leave out? Whose basic connection needs must be addressed? Why are these people and places still not connected? What policies are in place that extend or limit access?
2. Customization of experience: The customized experience that the smart city provides can feel like "magic," but this customization is actually very predictable. Information literacy-related dilemmas, particularly around targeted ads, spread of disinformation on social networks, and the existence of a "filter bubble," are all important topics to explore.
3. Rise of automation: As discussed, smart cities are automated cities; complex and nuanced decisions are being made based on rapid analysis of diverse sets of data. Self-driving car technologies can be an interesting case study to explore the implications of automated decision making: When a self-driving car must decide its next move between two bad choices, what considerations should guide the vehicle's decision? MIT's Moral Machine is a great conversation starter (<http://moralmachine.mit.edu/>).
4. Surveillance: Smart cities are surveilled cities; the data collected in smart cities can be surveyed on a mass scale. Exploring the interplay between governmental and commercial surveillance capabilities and systems opens the door to divergent thinking. The evolving use of facial recognition software, as discussed above, makes for an interesting case study.

Conclusion

The smart city has the potential of improving the lives of people around the world, only if the smart-city citizen is an active participant in the smart city development. With a developing infrastructure literacy, an understanding of constantly evolving technology, and a sensitivity to the ethical dilemmas embedded within technologies, the smart-city citizen can develop the necessary opportunity sensitivities and dispositions required to become an equal and active participant in that development. Getting necessary stakeholders to address these needs will be based on the hard work of media and information literacy cities, otherwise, the smart city will inevitably disempower and disenfranchise.

References

- Agency by Design. (n.d.). *Thinking routines*. <http://agencybydesign.org.s219538.gridserver.com/edresources/thinkingroutines/>
- Bowker, G. (1994). Information Mythology and Infrastructure. In L. Bud-Frierman (Ed.), *Information Acumen: The Understanding and Use of Knowledge in Modern Business* (pp. 231-247). Routledge.
- Brandom, R. (2018, June 5). New Homeland Security system will bring facial recognition to land borders this summer. *The Verge*. <https://www.theverge.com/2018/6/5/17427150/facial-recognition-vehicle-face-system-homeland-security-immigration-customs>
- ACLU of Massachusetts. (2016, December 30). *Kade Crockford: Why should you care about digital security if you're not a target?* [Video]. YouTube. https://www.youtube.com/watch?v=kfWKEXta_JM
- Forsler, I. (2018). Towards infrastructure literacy in media education. *Journal of Media Literacy*, 65 (1 & 2), 87-91.
- Harwell, D. (2018, June 1). Google to drop Pentagon AI contract after employee objections to the “business of war.” *The Washington Post*. https://www.washingtonpost.com/news/the-switch/wp/2018/06/01/google-to-drop-pentagon-ai-contract-after-employees-called-it-the-business-of-war/?utm_term=.993132090df5
- James, C. (2016). *Disconnected: Youth, new media, and the ethics gap*. MIT Press.
- Locker, M. (2017, May 8). John Oliver wants you to flood the FCC website to save net neutrality, again. *TIME magazine*. <http://time.com/4770205/john-oliver-fcc-net-neutrality/>
- Maddox, T. (2018, July 16). Smart cities: A cheat sheet. *TechRepublic*. <https://www.techrepublic.com/article/smart-cities-the-smart-persons-guide/>

- National Conference of State Legislators. (2018, October 1). *Net neutrality legislation in states*. <http://www.ncsl.org/research/telecommunications-and-information-technology/net-neutrality-legislation-in-states.aspx>
- Neidig, H. (2017, July 6). YouTube stars urge FCC to save net neutrality. *The Hill*. <https://thehill.com/policy/technology/340889-youtube-stars-call-on-fcc-to-preserve-net-neutrality-rules>
- Parks, L. (2015). "Stuff you can kick": Toward a theory of media infrastructures. In P. Svensson & D. T. Goldberg (Eds.), *Between Humanities and the Digital* (pp. 355-373). MIT Press.
- Rocheleau, M. (2016, August 22). What to know about your privacy and the new tolling system in Massachusetts. *The Boston Globe*. <https://www.bostonglobe.com/metro/2016/08/21/what-does-state-plan-with-information-collected-from-all-electronic-tolling/lnT5ud-WXn1YSaUil0H2WHO/story.html>
- Schuppe, J. (2018, July 30). Facial recognition gives police a powerful new tracking tool. It's also raising alarms. *NBC News*. <https://www.nbcnews.com/news/us-news/facial-recognition-gives-police-powerful-new-tracking-tool-it-s-n894936>
- Scientific American. (2011, February 11.). Pay-off: Have E-ZPass and similar toll programs reduced traffic and pollution? <https://www.scientificamerican.com/article/has-ezpass-reduced-traffic-pollution/>
- Star, S. L. & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research* 7(1), 111-134
- Zimmermann, K. A. & Emspak, J. (2017, June 27). Internet history timeline: ARPANET to the World Wide Web. *Live Science*. <https://www.livescience.com/20727-internet-history.html>