CPLN 5000: Planning History, Theory, and Practice

Final Paper

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The Evolution and Consequences of Smart Cities

Introduction

Since the beginning of planning history, there has been a sanguine belief in the possibilities of technology and its application to urban problems. While in some cases, the introduction of technology has improved the quality of life of citizens, the potential of such interventions has also often been overestimated. Smart Cities, as we know them today, are usually defined as cities that integrate Information Communication Technologies with traditional infrastructures, using new digital technologies. (Batty et al. 2012) However, there have always been processes and materials deemed “smart” by the relevant zeitgeist. In this essay, I will trace the development of three such transitionary moments in history and the contexts in which they developed, beginning with the mapping of the cholera outbreaks of the early 19th century, progressing into the development of the City Scientific movement and the modern implementations of smart city technology.

Public Health Data Collection in the Early 19th Century

In the early 19th century, many cities across the world were plagued by cholera, a highly contagious and potentially fatal bacterial infection. Many professionals tried to mitigate the spread of this disease including "surveys, statistics, and field observations." (Troen, 1988) The concept of rationality and science leading to urban improvement originated in France with scientists focusing on collecting data to mitigate the spread of communicable diseases. This was an early instance of scientists and researchers using data collection as an innovative or “smart” way to think about urban public health problems. This trend is reminiscent of the Enlightenment Planning era, during which philosophers argued that societies could be improved using mathematics and scientific methods. (Ammon, 2022) Though the contexts are largely different, both circumstances place the onus of developing society on select educated elites, creating an urban hierarchy. (Porter 2016)

The French study focused attention on the existing utility infrastructure in Paris and the concentrated poverty and population. Data collection was made possible in Paris as compared to other regions in Europe because the city had a wealth of institutional mechanisms that supported social

investigations by French doctors into population evaluations. Dr. Pierre Charles Alexandre Louis was one of the seminal figures in French research, who looked for numerical correlations to explain the causes of disease and public health. The research produced the “miasma” theory, which blamed polluted regions for the spread of the disease versus person-to-person contact. It was argued that if sources of pollution such as improper drainage or carbon emissions were contained, the spread of the disease could be controlled as well.

This ideology made its way to different parts of Europe and across the Atlantic through academic exchange. The study in England was pioneered by Edwin Chadwick, a reformer who mobilized doctors across the region to collect data and create a report on the sanitary conditions of medical facilities and housing areas. Both French and English doctors concluded that the influx of population into high-density settlements was leading to higher death rates in those areas. These areas were largely occupied by working-class citizens. Chadwick’s study was appreciated in England as it drew attention to the plights of the urban poor. These investigations, in conjunction with developments in preventative medicine, were able to partially limit the spread of the disease.

As cholera outbreaks hit New York City, their prevalence in high-density, poorly-constructed areas occupied by communities of color was sensationalized. (Moga 2020) Americans were quick to echo the suggested association between disease risk and the presence of African American communities. Through the work of epidemiologists like John Snow, maps were created targeting predominantly “colored” neighborhoods and labeling them as high-risk areas. These representations codified the existing “miasma” theory. The production and consequent reliance on these maps inadvertently communicated a malevolent desire to segregate areas by looking at problems in geographic isolation. The creation of “problem areas” on the basis of environmental conditions led to further disinvestment in the form of substandard housing and restricting mortgage investments. This trend was further concretized by the development of the Home Owners' Loan Corporation (HOLC) redlining maps, which bluntly demarcated areas that were non-white and resource-poor, further driving the trajectory of racial segregation. (Light

2009). These developments indicate the risks of smart interventions and how they can reinforce negative societal hierarchies, and why looking at innovation through a broader lens of social impact is essential.

Zoning, City Beautiful and City Scientific

In the early 20th century, Patrick Geddes, an English biologist, motivated by earlier French and English data collection, stressed the importance of surveys, as a precursor to city planning. (Hall 2008) In his valley section, Geddes distributes land uses across different parts of a theoretical valley according to occupation, which can be inferred as a rudimentary zoning analysis. The provision of geography-based occupations coming together to form a larger, functional society is reflective of Geddes' data-oriented image of social cohesion. This ideology was furthered by Ebenezer Howard in his magnum opus "Garden Cities of To-morrow", a pioneering document for the City Beautiful movement. (Wakeman 2016) The idea was to create a hybrid of the city and the countryside, in which residential, industrial, and agricultural areas were combined in a planned development. This model would be supported by innovative new rail and road networks. The methodology associated with the City Beautiful movement exemplified the rational comprehensive city planning theory. The goal of rational comprehensive planning is to create a more efficient and sustainable urban environment through the use of scientific and analytical methods to develop and implement plans for the physical development of cities. (Wilson 1989) This era reinforced the top-down notion of smart city planning, putting experts such as Howard at the top of the decision-making process, and resisting the participation of communities that would occupy the spaces that rational planning created.

Rational and scientific planners shared the notion that congestion is a problem that needs to be solved. Reformers and educators like Benjamin Marsh and George Ford formalized planning education and thereby pushed for "scientific integrity" in the profession. This was done with the intention of making cities more orderly, safe, and healthy - this era's definition of "smart". This reform led to the formation of organizations such as the New York City's Committee on Congestion of Population. (Freund 2010) The dire need to eliminate "congestion" was often synonymous with the need to raze through low-income

immigrant communities, such as Harlem. Racial science and eugenics quickly converted city planning into a tool for exclusion in the name of efficiency and economic gain. Evidence of these discriminatory zoning practices and racial segregation is still found in North American Planning. This becomes another example of how zoning, an inherently "smart" or data-driven process at the time, eventually caused significant harm to marginalized citizens. While the desire to improve public health was not ill-intentioned, the overt reliance on science and expertise, and ignorance of social factors such as race and class eventually worsened an already segregated America.

Smart Cities Today

The issues around segregation and inequitable distribution of resources that came up in the late 19th and early 20th century, along with the invention of newer and faster Information Communication Technologies such as the internet gave rise to a search for more modern solutions, giving birth to the notion of Smart Cities, as we know them today. (Lassiter 2022) The phrase "Smart Cities" was developed in 2008 as part of an IBM marketing campaign that leveraged sensors, data, and communication to create "instrumented, interconnected, and intelligent" cities. (Townsend 2013) Smart city technology is undergirded by urban analytical processes and geographic information systems (GIS). The processes could include integrating data into urban governance, predictive policing, or simply tracking public transportation uses. Theoretically, smart cities can be distinguished through their reliance on continuous streams of information flowing through the built environment, through a network of internet-enabled devices or the Internet of Things (IoT).

Robert Lake pioneered the research and criticism of GIS. He focused on the lapse that it created in our understanding of social problems, by reducing complicated issues to simple data points. He also wrote about how the challenge of access to the internet and computer/smartphone ownership can vary greatly by race and income in the United States. (Dolcini et al. 2021) His work served as a cornerstone for advocates of public participation in studies that advocated eliminating the digital divide along racial and class lines.

It is important to note that while smart cities today seem much more technology-forward than in previous eras, the underlying principle remains consistent: the desire to solve urban problems using innovation. A direct comparison can be drawn between the cartographers of the early 19th century tracing the concentrations of disease-ridden areas to the modern mapping of Covid-19 through geographic information systems. Smart technology has, however, given rise to new concerns in the urban atmosphere. (Engin et al. 2020) Most algorithms rely on massive amounts of citizen data, a large portion of which citizens are not or cannot consent to share. With real-time urban management and Artificial Intelligence based decision-making becoming a reality it is important to focus on smart citizen participation. The "smartness" of cities should be gauged by the citizens' ability to engage with the smart city infrastructure and not the mere existence of the infrastructure itself. Building digital literacy is foundational to building smart cities as smart cities cannot exist devoid of an informed public. (Seltzer and Mahmoudi 2013)

As is the case with most innovations discussed thus far, smart technologies are not free of biases. It is telling of the history of American planning, that "problem areas" identified as early as the 18th century, continue to be the ones worst affected by new urban evils such as gun violence and health hazards. This history of exclusion and disinvestment cannot be solved through infrastructural changes themselves. It needs to be looked at systemically and through the critical lens of social sciences and humanities in order to affect positive change. If we continue to look at technology in isolation, the social issues that have existed for centuries will embed themselves in new algorithms and replicate the patterns of discrimination we have seen thus far.

Conclusion

In summation, the history of smart cities has been one of steady evolution, as cities have embraced new technologies to improve urban life. Starting from rudimentary data analysis to modern machine learning-based algorithms, there continues to be a vested interest in societal improvement through science and technology. As technology continues to advance, we can expect to see even more ambitious smart city initiatives in the future. Planners of the current era, however, have a surplus of

historical evidence that illustrates how the same means of technology and innovation have been used to institutionalize the oppression of marginalized communities; Be it through the codification of undesirable neighborhoods in the 19th century initiating years of targeted disinvestment, or the modern issue of social biases in the training data being used to make city-wide algorithms. With this knowledge, 21st-century planners must implement technology holistically and focus on empowering citizens' ability to engage with new infrastructure. We need to evolve beyond technology and include equity and accessibility into our current definition of "smart" cities, to disrupt the cycles of exclusion and truly grow.

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