

# URBAN PLANNING

## **Introduction**

The city has been a vehicle for humankind's technological and economic progress for centuries. The concentration of human capital in a city or centralized settlement allows for increased specialization of labor, expedited knowledge sharing, and more-efficient social welfare programs; however, it can also produce unique challenges in health and equity. [1,2,3] As Internet-connected technology progressively redefines many social interactions, workplaces, and channels of commerce, these changes may have profound effects on the long-term sustainability and structure of cities. [4] This short paper explores technology and tools that are shaping the way local officials, urban planners, entrepreneurs, and city residents reimagine and experience their communities.

## **Background**

The discipline of urban planning affects everyday citizens through its long-term influence on the physical layout and connectivity of the areas citizens inhabit. Urban planners are concerned with laying the foundation for an efficient and equitable built environment through proper choices of zoning policies, transportation and utility network layouts, and design and placement of public spaces and private amenities. [5]

Modern transportation networks and urban energy systems seem poised to evolve based on emerging advances in self-driving vehicles and Internet-of-Things (IoT)-enabled smart buildings.<sup>1</sup> Meanwhile, the rising ubiquity of “big data” informatics,<sup>2</sup> crowd-sourcing, and human-centered design allow decision-makers to become more responsive to the needs of local citizens.

## **Examples**

### *Transportation*

Self-driving cars, such as those pioneered by Uber, Google’s Waymo, and research labs around the world, receive near-constant buzz in technology and popular media. The potential pro-social applications of this technology - ranging from enhancing access to social services and jobs [6] to reducing fatalities and injuries from collisions [7] - are significant.

Equally significant are autonomous cars’ expected disruptions to the economics of traditional transport networks. A so-called sharing economy for motor vehicles may develop, in which many citizens do not own a car but rather call a robot taxi when needed. [8] This could have wide-ranging implications, from removing the need to devote large amounts of urban space for parking lots, to increasing traffic on side roads as smart navigation algorithms vary routes to avoid congestion. [9,10] These possibilities should be considered when planning new land developments, zoning policy, and roadways. However, the huge technological, psychological, and regulatory hurdles that must be overcome to mainstream autonomous vehicles engender criticism of this approach. [11]

Another important issue surrounding the adoption of autonomous transportation is its interaction with public transport. On a space per person level, public transport such as subways are far more efficient than ride-hailing

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<sup>1</sup> The Internet-of-Things refers to everyday objects, like a glove, a mirror, or a lock, being able to send and receive data.

<sup>2</sup> “Big Data Informatics” refers to processing large amounts of data to answer questions.



services, as well as more affordable. [12,13] Pilot programs to replace manually driven buses with autonomous ones have run into roadblocks. Gainesville's recent experiment with a self-driving bus route has been delayed by several months due to additional safety testing. [14] Meanwhile, the Swiss town of Neuhausen Rheinfall has successfully integrated an autonomous public bus into its transit system. The bus has a maximum speed of 25kph. [15] Municipalities and other government entities will likely continue to experiment with different modes of public transportation in the coming decades.

### *Internet of Things (IoT) and the Smart City*

A "smart grid" is an electrical distribution system that can respond intelligently to changes in demand for power. [16] "Smart" meters, "smart" substations, and "smart" building Heating, Ventilation, and Air Conditioning (HVAC) systems communicate with each other and feed information to grid control to better predict demand and balance the loads on the network. These grids are being deployed to municipalities around the world to increase power efficiency and reduce the probability of blackouts, which affect half a million people per day in the United States. [17] Additionally, networks of traffic and occupancy sensors, combined with free WiFi coverage, are being rolled out to make the experience of mobility within a city more seamless. Korean researchers have termed this concept the "ubiquitous city," referring to the constant-on connectivity that allow users to access the Internet and city systems to respond in real-time to changes in demand, for example by cooling a building in advance of a large crowd. [18]

The city state of Singapore has made becoming a "Smart City" part of its central development plan. [19] Key achievements in smart transportation include a real-time bus tracking app, camera networks that identify traffic blocks for attention by towing crews, and a parking map service that shows available spots. Singapore is attempting to innovate in other areas as well; for example, a government app called myResponders notifies "good Samaritan" citizen volunteers when a person nearby is undergoing cardiac arrest so they can perform CPR. This idea was less successful due to its low market penetration; fewer than 2000 people signed up to be certified responders. Better progress has been made with creating a "single sign-on" for government services, publishing government data sets, and installing "smart" recycling bins that automatically alert sanitation services when they are full.

### *Empowered Citizens*

Technology can empower citizens like never before. Crowdsourcing has historically been associated with online fundraising sites such as Kickstarter, GoFundMe, and Patreon. In recent years, crowdsourcing has expanded into a valuable method for local governments to listen to their citizens. The NYPD has turned to the crowdsourcing tool called Ideascale to help the department better understand the priorities of its citizens. [20] The program resulted in police attention to "action items" submitted and voted on by citizens. It was considered a success due to a successful marketing campaign that led to a critical mass of citizen adoption in serviced neighborhoods, as well as to the introduction of "community time" in NYPD officers' daily schedule to address the targeted issues. [21]

A less successful attempt by NYPD to integrate citizen feedback through technology was its #myNYPD social media campaign, which solicited photographs of NYPD officers in action. The feed was overwhelmed by recordings of prior misconduct by officers. While we may assume that the everyday interactions of NYPD officers with citizens are proper, this example demonstrates the power of social media to concentrate public attention on selected information. [22] That is not to say that governments should hesitate to implement a similar program; depending on a government's reaction to such a phenomenon, it could galvanize social change.



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