



# SMART CITIES WHITE PAPER 2.0

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American Planning Association  
**Smart Cities Interest Group**

*Creating Great Communities for All*

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## Introduction

Smart city technologies have become critical components of the growth and redevelopment of our cities. Although adopted early by big technology companies, integration with the day to day work of community planners has occurred more slowly. Today, particularly as one reflects on the worldwide societal changes stemming from the Covid-19 crisis, the use of technology is projected to be accelerated into a more prominent role in our daily lives and in the development of our cities.

This White Paper 2.0 defines the smart cities concepts and its applicability to planners, identifies critical principles and policies planners need to be aware of as part of daily decision-making, describes key skills that can help planners serve important roles in assessing, developing and deploying smart cities technologies, and establishes an action plan for developing additional smart city-relevant content for planners' future use. Embodied within the APA Smart Cities Interest Group, this initiative is being led by a core group of planners who are focused on growing the body of literature on smart city best practices and sharing it with other planners and interested allied professionals.

## APA Smart Cities Interest Group

The APA Smart Cities Interest Group was formed in 2019 by a core group of planners who have led the discussion within APA about smart city technologies and sustainability since the topic emerged in 2013 and further developed into a full APA initiative in 2014. The formation of the interest group, in this instance, was initiated to engage interested planners across APA's membership. It is also intended to engage interested technical specialists from all existing APA divisions. Due to its cross-disciplinary nature, however, it is not envisioned that this interest group will seek the future recognition of a fully formed APA division. In this regard, the SCIG can still engage and be a resource to all divisions while staying focused on its mission.

## Smart Cities & Sustainability Initiative Background

As an extension of APA's Sustaining Places Initiative launched in 2010, the Smart Cities and Sustainability Task Force was formed in 2013 and focused on sustainability by addressing recent advances in technology and innovation which led to smarter, more sustainable, and resilient cities. To guide this Task Force, the talents and resources of three APA divisions were coordinated. The three divisions included: Sustainable Communities, Technology, and Transportation Planning Divisions.

The Task Force worked together monthly for almost two years, culminating in a series of deliverables at the 2015 National Planning Conference in Seattle. It started by identifying three critical early outreach tools to engage planners in the smart cities discussion, including an online survey, the creation of an interactive Ideation Tool, and the development of the Innovation Portal administered through LinkedIn. By 2015, the Task Force developed the Tech Zone, Hackathon, and a summary presentation (i.e., ABCs of Smart Cities'0-1s) for the 2015 National Planning Conference in Seattle. It also developed the Smart Cities and Sustainability Initiative White Paper (version 1.0) presented to the APA Board of Directors.

## Smart Cities Divisions Council Initiative

A core group of the original Smart Cities Task Force, under the umbrella of the Sustainable Communities and Technology Divisions, continued the original mission through the initiation and implementation of a 2016 APA Divisions Council grant. The Divisions Council developed five actions to be achieved by the initiative. These included:

1. Invest in Smart Cities Innovation Portal.
2. Maintain "On the Radar" Division Initiative webpage.
3. Develop Comprehensive Plan (CP) Guidelines for the Use of Technology.
4. Identify partnerships to research key technologies.

## Smart Cities Interest Group Mission Statement

The Smart Cities Interest Group formed in 2019 to continue leadership on connecting planners to the smart city movement. They are guided by the following mission statement:

**The Smart Cities Interest Group seeks to address advances in technology and innovation for smarter, more resilient, and sustainable cities; provide APA members with the latest smart cities' information and best practices; and position planners as leaders in these changes by connecting with experts in technology.**

5. Convene Technology Forums to Educate Planners on latest Smart City trends

This core group of planners continued to work together over a period of several years to achieve the Divisions Council objectives and to advance the smart cities discussion for APA.

**APA Smart City Successes**

APA's work on smart cities has been one of the most successful volunteer-led efforts to date and has resulted in many comprehensive and innovative outcomes. These include, but are not limited to:

- **Conference presentations** such as the 2015 *ABCs of Smart Cities' 0-1s* (NPC15 in Seattle), 2019 *Smart Cities* (2019 North Dakota APA/National League of Cities conference), etc.
- **Symposiums** including the 2018 *Preparing Communities for Autonomous Vehicles* symposium which was a collaborative effort between APA, the National League of Cities, and other NGOs to address the implications of autonomous vehicles for cities.
- **Partnerships** including APA sending representatives to participate in a U.S. TDA Trade Mission in 2019 that brought a delegation of city planners and engineers from Andhra Pradesh province and Vizag city in India to see smart city initiatives in Washington, New York City and San Francisco; two panels at the 2018 Smart Cities Council's "Smart Cities Week" in September, etc.
- **PAS Reports** including the 2016 *Big Data and Planning*, 2018 *Planning for Autonomous and Connected Vehicles*, and a forthcoming report on planning for the smart city of the future.
- **Webinars** such as the October 2018 jointly facilitated webinar by APA National and the Technology and International Divisions.
- **Web presence** including APA's On the Radar page which recently got transitioned into the new Smart Cities Interest Group webpage.
- **Comprehensive Plan Standards** update, where smart city concepts were used to prepare the first

comprehensive update to the existing Comprehensive Plan Standards framework (still pending).

- **Student Design Competition**, where members of the Sustainable Communities Division (SCD) and the Student Resource (SRC) developed APA's inaugural competition on smart cities.
- **APAs KnowledgeBase** which was developed as part of the Divisions Council action to further develop the original Innovation Portal.

**What Is a Smart City?**

There are various definitions of a smart city. For Techopedia, "a smart city is one in which sensor-driven data collection and powerful analytics are used to automate and

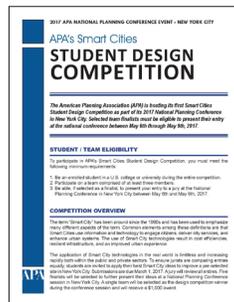
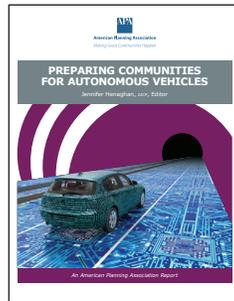
orchestrate a wide range of services in the interests of better performance, lower costs and lessened environmental impact."<sup>1</sup> The Smart Cities Council defines a smart city as using information and communications technology (ICT) to collect, communicate, and analyze data in order to "enhance its livability, workability, and sustainability."<sup>2</sup> For TechTarget and digi.city, a smart city "is a municipality that uses information and communication technologies (ICT) to increase operational efficiency, share information with the public and improve both the quality of government services and citizen welfare."<sup>3</sup>

These and other smart city definitions share two basic elements. The first is the use of ICT and big data to improve municipal operations and services. The second addresses outcomes – from operational efficiency and environmental performance (the narrowest perspective), to communication and information-sharing with the public, to a broad range of potential benefits under the Smart Cities Council's goals of livability, workability, and sustainability.

**Evolution of the Smart City Movement**

The origins of smart cities date back to 1974, when Los Angeles created "A Cluster Analysis of Los Angeles," the world's first urban big data project. In 1994 Amsterdam established the world's first "digital city" – De Digital Stad (DDS) – to promote Internet usage.

In the 2000s, technology companies such as Cisco, IBM, and Siemens developed various software platforms and applications that used sensors, networks, and urban analytics to help cities operate more efficiently. In 2008



**TABLE 1. SMART CITY DOMAINS**

McKinsey Global Institute	Smart Cities Council	ESI Thoughtlab
Energy	Energy	Energy
Healthcare	Health & Human Sources	Living & Health
Mobility	Mobility & Logistics	Mobility & Transportation
Security	Public Safety	Public Safety & Security
Waste	Waste Management	
Water	Water & Wastewater	Water & Other Utilities
Economic Development & Housing		Economy, Trade & Industry

IBM launched the Smarter Planning initiative, based on the premise that “the world’s systems and industries are becoming more instrumented, interconnected and intelligent,” followed by a \$50 million Smarter Cities campaign in 2009. In 2013 Microsoft unveiled CityNext, promoting the idea that smart city innovations “can help citizens lead safer and healthier lives.” In 2016 Esri (purveyor of ArcGIS software widely used by planners) started a Smart Communities initiative, followed by development of the ArcGIS Hub as a framework for smart community implementation. Returning full circle to the city where the smart city movement began, the Los Angeles GeoHub – “the city’s new public platform for exploring, visualizing, and downloading location-based open data” – is one of the first applications of the ArcGIS hub.<sup>4</sup>

Over the last decade communities around the globe have initiated smart city projects. Cities such as Barcelona, Hong Kong, London, New York, and Singapore were among the innovators. From 2013 to 2015 China announced three cohorts of pilot smart cities (277 in all), while in 2015 Prime Minister Narendra Modi launched a “Smart Cities Mission” for 100 Indian cities.<sup>5</sup> A 2021 survey of 167 cities worldwide by ESI Thoughtlab identified 20 cities that are leaders in the deployment smart city technology to achieve sustainable goals.<sup>7</sup> U.S. cities listed include Baltimore, Boston, Los Angeles, New York, Orlando, and Philadelphia.

Smart City commentators have postulated that the ongoing evolution of the Smart Cities movement consists of three generations.<sup>8</sup> These generations can be characterized as:

- **Smart City 1.0:** Top-down control of technology and data by government and technology companies in order to improve governmental efficiency

and sustainability of urban systems.

- **Smart City 2.0:** Combination of top-down control and public participation/access to technology and data in order to improve governmental efficiency, sustainability of urban systems, and citizen engagement with government.
- **Smart City 3.0:** Open access and collaboration between government and citizens (referred to as co-creation) in order to serve the needs of people and the community.

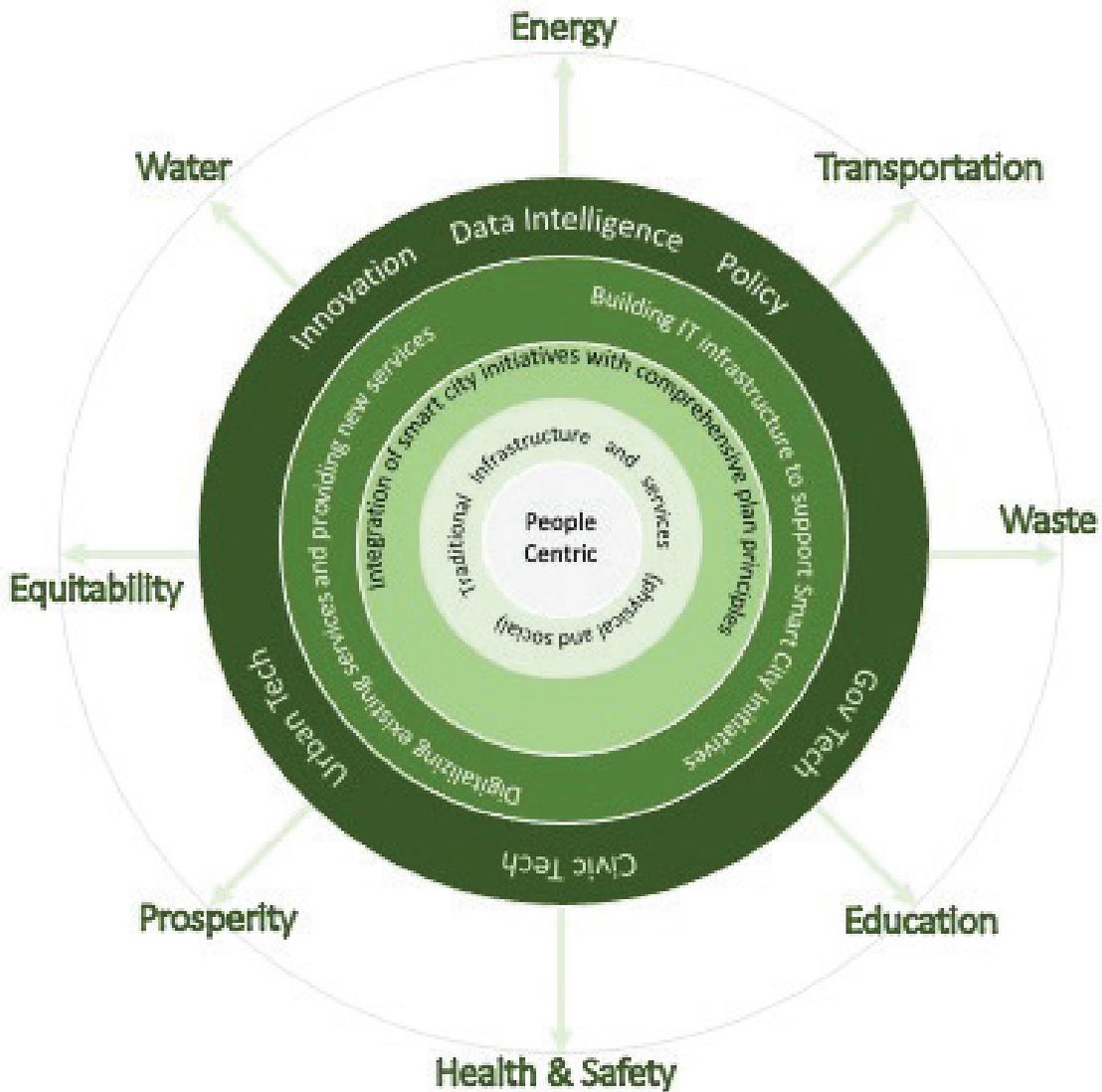
**Components of a Smart City**

There are two basic components of a smart city. The first is broadband: the network of high-speed and high-bandwidth communication infrastructure through which users access the Internet, ranging from large-capacity fiber optic trunk lines to “last mile” connections to individual homes, businesses, institutions, etc. Unequal access to broadband between urban and rural areas, and between rich and poor populations (price is the biggest barrier to adoption where broadband is available), is a major issue.<sup>9</sup>

The second component encompasses the range of technological applications used to improve municipal services and performance. From a broad perspective, these applications can be characterized as helping municipal staff better serve the public (e-government), engaging citizens and making government more accessible to the public (civic-tech), and promoting cross-sectoral collaboration and innovation (urban-tech). Smart city applications can also be categorized according to the different areas (domains) in which ICT is used to improve performance. Table 1 compares performance domains identified by three different sources: *Smart Cities: Digital Solutions for a More Livable Future* (McKinsey Institute, 2018); the Smart City Council’s *SCC Readiness Guide*; and *Smart City Solutions for a Riskier World* (ESI Thoughtlab, 2021).<sup>10,11,12</sup>

This table indicates the range of systems in which smart city technologies is being deployed to advance livability, workability, and sustainability (the Smart Cities Council’s definition of smart city outcomes). It also sug-

gests the potential for planners to play a role in conceptualizing how smart city applications can be expanded and integrated to advance the broader goals of community sustainability, resilience, and equity (Figure 1).



### Smart City Issues on the Horizon

**Small cell networks:** The proliferation of internet connected devices and 5G-enabled phones require an intricate mesh of communications relay stations. The planner’s role will include plan review, permit approvals and coordination with vendors to identify “hotspots” where demand for reliable service is high. Note, many states have enacted pre-emptive legislation, limiting a locality’s ability to regulate these networks.

## Why Are Smart Cities Important to Planners?

### *How Smart Cities Will Change Planning Practice*

The hallmark of smart cities technology is real-time access to large quantities of data and digital technologies that track the conditions and performance of different systems, and analysis to make sense of it. This can facilitate rapid adjustments and innovative ways of addressing systems management (think real-time traffic signal optimization, for example) to provide services more efficiently and effectively. Smart cities technology can also provide new ways of seeing to inform long-range planning and strategic actions. What then do these emerging capabilities mean for planning practice, and how will planning jobs change as a result?

When faced with a disruptive force like smart cities technology, it is important to remember our core competencies as planners and adapt accordingly. “Remember who you are,” counseled Mufasa in *The Lion King*.

Skills that distinguish our profession include:

- **Stakeholder Engagement & Facilitation:** Engaging diverse groups of stakeholders, and facilitating their participation in the decisions that affect them
- **Visioning:** Working with stakeholders to build a shared vision for the future
- **Technical Analysis:** Building insight through fact-based technical analysis
- **Communication and Technical Translation:** Facilitating communication across disciplines, and translating technical analysis into accessible information for decision-makers and the general public
- **Systems Thinking:** Taking a systems approach, and understanding interconnections
- **Long-term Perspective:** Thinking not only about today and tomorrow, but also future generations
- **Problem Solving:** Developing workable solutions to community issues, including understanding the tradeoffs necessary to create optimal solutions.
- **Partnership Development:** Building collaborative teams to address community needs
- **Advocacy:** Working in service to the public interest, with a special emphasis on addressing the needs of the historically disadvantaged, and advancing equity, diversity, and inclusion

The challenge is to ensure that smart cities technologies and data sources are developed and applied to help make our communities more connected, responsive, transparent, equitable, efficient, and innovative. Planners

have an important role in achieving these outcomes. We can help policymakers and decision-makers:

- Establish community-based smart cities goals
- Ensure that new technologies serve all members of the community, including historically disadvantaged populations, through digital inclusion
- Develop organizational and community cultures that can facilitate experimentation and innovation
- Identify effective data sources and collection methods to link information to goals and problem-solving.
- Analyze and interpret data to produce insightful information, and provide appropriate data access to others to do the same
- Prioritize smart cities investments and improvements that respond to community needs
- Support and manage smart cities projects
- Promote public-private partnerships for effective and inclusive use of smart cities technologies and data sources
- Engage and educate stakeholders about the resulting improvements

### *How Planning Jobs Will Change*

Growth in the use of smart cities technologies will create opportunities for planners who can:

- Gain a basic understanding of smart cities technologies and their applications. This includes building a general understanding of the pros and cons of using new tools and technologies.
- Develop data collection and analysis skills. This includes learning about programming languages and statistics. Learn how to convert our existing planning knowledge into comparable business knowledge. For example, this could mean utilizing our budgeting, census data analysis, and community engagement skills to understand finance and economics, conduct big data and customer data analytics, facilitate customer engagement, and provide customer service.
- Learn how to effectively communicate data analysis and application results clearly to others. This includes developing data visualization, communication, and storytelling skills.
- Learn how to work with Information Technology staff, data scientists, and engineers. This includes developing skills in data and information literacy.
- Understand the benefits and drawbacks of using smart cities technologies and data sources. This includes learning about privacy, security, and ethics of using these technologies.

- Develop phased pilot projects, performance criteria, and adoption schedules since most smart city programs will not be fully created all at once with mature hardware and software.
- Find design solutions for communications infrastructure (fiber, transmission towers, kiosks, and small cell networks) that are governed by federal and state laws.
- Manage organizational and community change. This includes understanding the opportunities and challenges of using smart cities technologies for community engagement, social mobilization, and stakeholder collaboration.

In the same way that planners integrated GIS technologies into our practice to improve our map making and geospatial analytical skills, we can do the same with smart cities technologies to improve systems monitoring, management, and engagement. We can play a key role in helping decision-makers understand smart cities technologies and how they can be used to improve community decision-making and operations. We can work with stakeholders to build agreement on appropriate and ethical investments in smart cities technologies, considering issues of efficiency, privacy, and security. And we can help build projects and partnerships to implement smart cities initiatives.

In so doing, we should remember our core planning competencies, and work to ensure that smart cities technologies and data sources are used to help create great communities for all.

### ***Guiding Principles for Applying Smart City Technology in Planning Practice***

Planners have an important role to play in ensuring that smart city technology, first and foremost, serves the needs of communities and people. Five principles are proposed to guide the application of smart city technology in planning practice:

1. **Engage the community in determining how smart city technology will be used.** An open, inclusive process (e.g., a comprehensive plan) should be used to determine shared values, a future vision, and priority issues that technology will be leveraged to address. Engagement should continue as the technology is deployed in a transparent manner that includes reporting on results. Planners will be on the front lines of controversial topics related to the safety of 5G, use of data and the prospect of digital bias.
2. **Focus on outcomes, not the technology itself.** Successful use of smart city technology will be mea-

sured by the benefits it yields that fulfill community goals and priorities. These benefits should be continually monitored and measured through cost-benefit analyses that go beyond fiscal savings to consider “triple bottom line” (environmental, economic, and social) return on investment.

3. **Ensure equity for poor and underserved populations.** Smart cities must benefit not only the affluent and digitally connected, but most of all poor, disabled, elderly, and other community members who may not have access to digital technology. This means applying an equity lens to determine how different groups will be impacted by investments in smart city technology, prioritizing the needs of poor and underserved populations.
4. **Provide for open access to and use of data.** Data should not be controlled by government or technology companies, but rather be made freely available for use and re-use by the public. Benefits include transparency, accountability, empowerment, scientific and technological advancement, and better understanding of the impacts of decisions.
5. **Address data privacy and cybersecurity concerns.** Cyber attacks on companies and cities are increasing, along with individuals’ concerns regarding privacy and how their personal data is being used. Planners should work with tech professionals to ensure that data privacy and cybersecurity are safeguarded in planning applications of smart city technology.

In a time of climate change, increasing racial, social, and economic inequality, and global shocks such as the COVID-19 pandemic, the stakes for the planning profession and the communities it serves have never been higher. Accelerating technological change, including advancements in smart city technology and artificial intelligence, is creating unprecedented opportunities and challenges. Planners are uniquely positioned to lead in helping communities determine how to harness smart city technology to yield more sustainable, resilient, and equitable outcomes.

### **Next Steps**

To build on the substantial, previous smart cities work by APA and its members, the Smart Cities Interest Group proposes the following actions:

To add value to members’ planning practice, it is recommended that APA:

1. Develop a “Call for Materials” to expand the Research

Knowledgebase collections on Smart Cities and related topics.

2. Create a “Quick Start” Smart Cities Guide for Planners, with links to an array of resources.
3. Develop model regional and municipal smart cities standards and contract language, for example to address emerging issues such as small cell networks, e-commerce deliveries, and autonomous vehicles.
4. Partner with universities, technology providers, and other groups on smart city initiatives. Begin by curating a series of short videos on key technologies that will change communities.

To educate planners regarding smart cities, it is recommended that APA:

5. Offer a technology trends component at the National Planning Conference.
6. Jointly sponsor a Smart Cities National Student Design Competition with technology providers.

To provide leadership regarding smart cities, it is recommended that APA:

7. Identify and promote the “top five” smart cities planning practices that can save money and increase sustainability.
8. Expand CM training related to smart cities technology access and equity. Consider revising the AICP Code of Ethics to address technology and planning.
9. Collect and disseminate best practices for community engagement using smart city technology, including how to address the digital divide.
10. Advocate for a national, high speed internet system that connects all communities.

## Endnotes

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