



# City of Scottsdale Smart City Strategic Roadmap SUMMARY EXTRACT

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This is intended to be used as a supplement to the full roadmap.

PREPARED BY **thinkBIG**

## Overview

The City of Scottsdale has been consistently recognized as one of the best places to live in the United States. Whether you are seeking a healthy environment to raise a family with access to great public schools, or wanting to retire in a great climate, Scottsdale is hard to beat.

Not surprisingly, Scottsdale has also experienced tremendous growth because of these positive attributes and the attractiveness of the overall Maricopa Country region. According to the U.S. Census American Community Survey estimates, Scottsdale's population has grown nearly more than 17% between 2010 to 2018, compared to the US average population growth of 6%<sup>1</sup>.

Like many other cities, Scottsdale continues to experience population growth, also known as urbanization. Unlike many other cities, however, Scottsdale's population growth is significantly faster than other cities and is part of the fastest growing county in the United States with an average of 200 people moving there per day<sup>2</sup>. This growth can create many positive opportunities for the City to support choices that people and business are making to live, work and play in Scottsdale, but must be managed smartly to avoid potential negative consequences of this growth and the stress that it places on the city and its infrastructure.

Historically, a city's infrastructure was thought to be only physical and technology was not strongly associated with its function. But there is a fundamental paradigm shift to understand that today's modern city infrastructure is more than just roads, bridges and buildings. It is also made up of digital platforms, data and policies designed to help address the challenges of urbanization. By using connected technologies, also known as the Internet of Things (IoT) technologies, cities are becoming "smart." This is where the transformation journey to becoming a smart city begins.

Smart cities bring together infrastructure and technology to improve the quality of life of citizens and enhance their interactions with the urban environment. To appreciate the full potential impact of smart technology, we must understand that cities are giant systems with countless subsystems. But there are costs to making this journey. These costs can be financial or social, and are a series of "tradeoffs" the city and citizens alike must embrace. For Scottsdale to make this journey successfully, it must make it together with the residents, businesses and visitors on a local and regional basis.

These systems provide essential city services (such as electricity, clean water, etc.) to Scottsdale citizens to create a safe, vibrant community in which to live their daily lives. Every system today relies on a blend of physical and digital infrastructure that is affected by technology.

In order for the City to thrive in the 21<sup>st</sup> century, both reaping the benefits of its population growth while preserving its attractive, high quality of life, technology must be seen as an essential foundational layer for success across every system, subsystem and function. Technology will create a platform to more effectively, efficiently and strategically address Scottsdale's current and future needs. This platform will also create large amounts of data, which is a powerful tool to enable the City to make more informed, real-time decisions to help improve the quality of life for all people.

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<sup>1</sup> Population estimates, United States Census Bureau, 2010 thru 2019

<sup>2</sup> Office of the Governor of Arizona, *Maricopa County #1 In U.S. For Population Growth*, 2019

Every system and subsystem will not only benefit from more precise control, but the City will also be able to lower its operating costs, increase efficiencies and help the City stretch its budget further by using technology as a “multiplier.” This exponential effect can produce significant financial, social and strategic benefits and an extremely attractive return on investment (ROI). Conversely, there is also a cost and negative ROI impact in doing nothing. A well-designed smart city platform designed with a human-centric focus will provide Scottsdale a powerful tool to help address the challenges of urbanization, preserve a high quality of life and help it maintain its attractiveness as one of the best places to experience.

A smart city is about the modernization of digital, physical and social infrastructure to improve people’s lives. It is important to build on foundations that Scottsdale already has in place while keeping up with the demands of urbanization and taking advantage of rapid advances in technology.

Think Big Partners’ was retained by Scottsdale to develop this important Smart City Strategic Roadmap. Think Big’s analysis process relied on its experience, expertise and insights derived from its smart city work in over 30 communities across North America. Through a series of workshops, interviews and research, a Smart City Strategic Roadmap has been created.

The goal of this roadmap was to inform the City on how to build a smart city program that would:

- Help define the smart city vision of city leadership while reflecting the needs of the community
- Complement and take full advantage of improvement efforts (physical and/or digital) currently in progress and build on Scottsdale’s existing foundation
- Create an adaptable platform to integrate new technological advances as they become available
- Provide a platform for new common (Scottsdale-wide) or department goals as they are adopted
- Identify and prioritize technology recommendations in support of Scottsdale’s smart city transformation efforts
- Provide insight into financing strategies to help fund technology investment, develop funding partnerships and support procurement activities
- Organize these recommendations into an easy to understand narrative to inform the community, educate stakeholders and provide a mechanism to engage partners

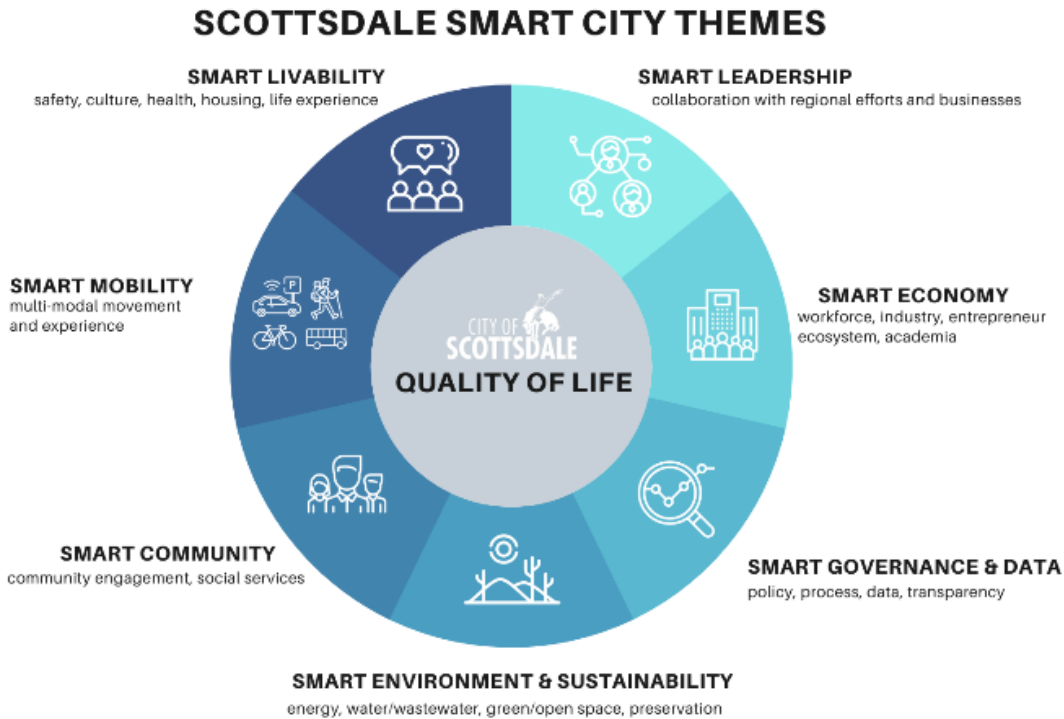
## Smart City Themes

This planning process distilled down Scottsdale’s goals into seven smart city themes:

1. **Smart Leadership** (collaboration with regional efforts and businesses)
2. **Smart Economy** (workforce development, support of industry, entrepreneur ecosystem development and the role of academic institutions)
3. **Smart Governance and Data** (the role of data and the policies/processes that affect it)
4. **Smart Environment & Sustainability** (conservation, the protection of the environment and its natural resources)
5. **Smart Community** (the engagement of people to develop an inclusive and equitable community and social services supporting the community)
6. **Smart Mobility** (the ability to move about the city easily using different modes)
7. **Smart Livability** (the preservation of a high quality of life, to include creating a safe, accessible place to live, promoting public health and wellness, and supporting the arts and Scottsdale’s rich cultural history)



Figure 3 (from full roadmap), Scottsdale Smart City Themes



## Smart City Technology Layers

All recommendations have been associated with the required technology or other infrastructure through the “lens” of layers. These layer-oriented categorizations are based on the component’s critical architecture, functional impact and/ or complementary characteristics. Each recommendation discussed in this plan has been classified under one or several of three different categories:

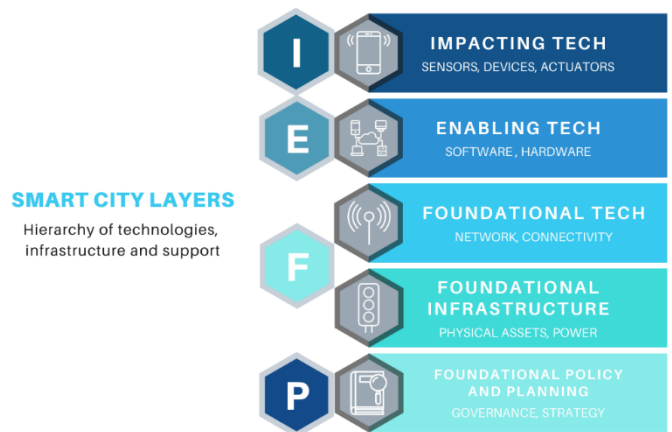
**Foundational** - Essential technology that provides a dependent foundation for other technology applications to function

- It should be noted that physical infrastructure can also be a foundational layer, although it may not be “technology”
- Policies can also provide a foundation for operational compliance and may be depicted in this plan as a foundational element

**Enabling** - Technology that provides specific functions

**Impacting** - Technology that enhances or complements technology, usually at the enabling technology layer

Figure 4 (from full roadmap), Smart City Layers



## Smart City Recommendations

The following Roadmap at a Glance represents the recommendations classified by theme, then cluster. A brief summary of each recommendation cluster is included and expanded later in the report. This reflects a holistic view of Scottsdale’s needs and smart city technology opportunities.

Figure 5 (from full roadmap), Smart City Roadmap at a Glance

### SCOTTSDALE SMART CITY ROADMAP AT A GLANCE



### TOP RECOMMENDATION CLUSTERS

#### SMART LEADERSHIP

- Digital Connectivity** - Continue to develop existing and new connectivity. This includes the enhancements of existing 4G/4G+ and fiber, along with the development of newer 5G services. Work with service providers as needed and identify areas that need new or enhanced connectivity. Develop policies as needed for 5G rollout.
- FirstNet** – This technology provides a secure, robust and dependable connectivity network for first responders during a crisis. This is critical for future safety, security and resiliency. Scottsdale should make efforts to adopt this technology throughout the entire city.
- Smart Multi-Sensor Nodes** - Multi-sensor nodes provide a cost-effective solution to impact a wide variety of areas and needs. These sensors are highly customizable, and Scottsdale should deploy these nodes in tandem with physical infrastructure modernization (or new installation) to provide future functionality for certain needs.



## SMART ECONOMY

- 4. Smart Urban Planning Policies** - Smart urban planning and policymaking must be in order to address the challenges of urbanization balanced carefully against the region's appetite for innovation. Areas such as autonomous vehicles and housing need to be evaluated with peoples' needs and urbanization challenges in mind.
- 5. Smart Economic Development Strategies** – Continue efforts to attract both talent and employers who can provide high quality jobs, retrain workers (reskill) to modernize their knowledge and talents to meet modern industry needs and take an integrated view of the workforce development, transportation and mobility, and housing dynamics. Additionally, engage top employers to understand their unique needs.



## SMART GOVERNANCE & DATA

- 6. Master Data Platform** – Creating this will provide a platform for the collection of smart technology data which enables better, more impactful decisions. This system may be comprised of a single vendor platform for an end-to-end solution, or several vendors to provide all functions needed to include storage, visualization and provide access via an open data platform. Develop supporting data collection, usage, sharing, privacy and other policies as needed at a local and regional (Maricopa County) level. Develop business models within each department that can benefit from access to new data to create specific ROI and workflow process improvement opportunities.



## SMART ENVIRONMENT & SUSTAINABILITY

- 7. Smart Streetlights** – Smart streetlights (networked, tunable LED lighting systems) not only can reduce operating costs, but this physical asset can provide a secure location for other technology installations that provide additional functionalities (foundational, enabling and impacting technology layers). Smart streetlights are also potential revenue-oriented partnership opportunities as Scottsdale grows, which will require more connectivity that can be placed on these assets.
- 8. Smart Water Technologies** – Scottsdale should continue to work on its automated metering system program upgrades that provide an integrated system of smart water meters, communications networks, and a data management that enables two-way communication between Scottsdale Water and its customers.



## SMART COMMUNITY

- 9. Create a Smart City Communication Plan** - Community engagement events revealed the Scottsdale community wants to be involved to better understand Scottsdale's smart city plans. Provide a mechanism for residents, businesses and other stakeholders to help “co-create” Scottsdale’s smart city platform.



## SMART MOBILITY

**10. Mobility-focused Technology Solutions** – These technologies include but are not limited to intelligent traffic signals that can also provide traffic signal pre-emption, accident related re-routing insights, enhanced parking solutions and geospatial intelligence regarding traffic patterns. Smart traffic data services will help Scottsdale manage its growth as it brings on additional modes of transit.



## SMART LIVABILITY

**11. Expand Mobile Engagement Platform** – Scottsdale should expand the mobile phone engagement through either mobile optimization of websites or an application (app). Being a mobile-friendly, engaged city is important to digitally engaged citizens of all ages seeking digital citizen services. Functionality such as wayfinding (pedestrian navigation), integration with city services (interaction with departments to include making payments) and communication tools to enhance user engagement are extremely valuable. Tourism also will be enhanced, especially if multi-lingual. Additionally, any mobile phone access should consider Scottsdale’s older than average resident population and design functions for the vision and/or hearing impaired.

**12. Optical Sensors / Camera Systems** – Public cameras systems, along with modern optical sensor-based systems (that can interpret what the camera “sees” without an operator), can provide enhanced public safety, security and functions that support Scottsdale’s most important goals. Surveillance is also important to protect tourism and Scottsdale’s reputation.

Additionally, technology maturity will continue to be a factor in the design, development, enhancement and future modification (technology replacement) to Scottsdale’s smart city platform. Each of the seven themes have associated technology solutions that are continuously undergoing active innovation.

## Funding and Procurement

Scottsdale must have adequate financial resources to procure the technologies required to achieve these goals. Many of these technologies require both a capital expense (Cap Ex) to purchase and an operational expense (Op Ex) to operate the technology solution. Additionally, while many of these technologies will provide financial savings, there is also a cost of human capital (training, new skills or even new employees) that should not be overlooked.

The procurement strategies must:

- Provide the vendor marketplace confidence that the City has the financial capacity to procure technology (City should be ready to fund technology partially or entirely)
- Provide a risk management assessment (due diligence of technology to make sure it should perform as stated, delivering an acceptable ROI within the stated range or internal projections)
- Be aligned with budgeting cycles (city along with regional, state and federal when possible)

- Be “agile and creative” in respect to potential public-private partnerships (P3)
- Cultivate collaborative opportunities stretching budgets between departments or the region
- Cluster together technologies that can be deployed with a multiplier effect based on installation efficiency, technology layer dependencies or specific technology solutions that work better together

The following models could be used:

- **Public Private Partnerships (P3)** – Engage potential funding partners in dialogues designed to identify solutions powered by technologies that have mutually beneficial impact.
- **Self-funding Pools Based on Expense Reduction** – Evaluate existing budget to understand the current funding available and the ROI impact that smart technology can have during planned modernization or achieved costs savings.
- **Grants** – Confirm the technology solution as “awaiting funding” and identify federal, state, regional and niche grant opportunities as they become available and respond quickly to RFPs.
- **Data Monetization** – Evaluate data that may be shared or sold in an acceptable manner (Scottsdale policy, resident sentiment, General Data Protection Regulation (GDPR), etc.)
- **Performance Based Financing Models** – Develop a financial model to procure the technology while having a third party pay for the Cap Ex and/or Op Ex based on the cost savings derived from the gained financial efficiency of the replaced asset with the new solution.

The average “smart city” technology ROI’s has been reported between 3.1% to 4.1% annually:

- Traffic Management – 3.3%
- E-Governance – 4.1%
- Public Health – 3.9%



# Activating Scottsdale's Smart City

## Prioritization Scoring

The objectives shown in this plan are classified based on priority score (Figure 10 in full document) which is derived from rating the following variables:

- **Citizen Value** – People are at the center of Scottsdale's smart city design. The positive impact that technology can make on improving the quality of life remains as the top priority. Accordingly, the more positive impact an objective makes, the higher the score. This is the highest weighted variable in our model.
- **Importance** – Each objective has its own varying levels, types and underlying reasons for importance (urgent, foundational, leadership priority, related dependencies, etc.). Some are the result of insights gained from interviews. Other levels of importance were established based on past planning documents and stated goals. The objectives are scored on general importance while weighing all relevant factors.
- **Difficulty to Deploy** – The difficulty level of deploying a technology plays a part in the speed of rollout, likelihood of immediate impact and dependencies on other technologies for its success. The ability to rollout projects faster and show quick wins produces significant dividends in terms of trust, perception and the ability to demonstrate value to all stakeholders. A project's difficulty to deploy may place a strain on resources, which would result in a lower score.
- **Revenue Generation / Positive Financial Impact** – If there is opportunity to generate revenue or reduce expenses (direct or indirect) from the achievement of a certain objective, then those funds can be used to pay for other smart city projects or technologies. A higher score is given for positive financial impact opportunities on a relative basis.
- **Supports Goals of the City** – Each objective has been compared to the prior planning documents to ensure the smart city program aligns with the city's vision and goals. A score is assigned based on the strategy alignment (aligns with more city priorities receives higher rating). Please note: The rating does not indicate the strength of support for any one specific goal.
- **Technology Maturity** – The technology marketplace is rapidly changing as the result of innovation. The ability to assess the maturity of a specific technology is an important factor to consider when prioritizing projects. A higher score is given to those technologies that are more mature (proven). Rapidly evolving or emerging technologies should not be considered negatively, however, the risks must be managed accordingly.

## Recommended Next Steps

- 1. Review this Smart City Strategic Roadmap**
  - a. Develop a thorough understanding of its meaning, relevance to Scottsdale's goals and provide an education to stakeholders that may not be familiar with the concept of smart city or its necessity to address urbanization.
- 2. Identify the people that need to be involved in the execution of Strategic Roadmap**
  - a. Create a master planning group and/ or a project-based group to identify and confirm the most important technologies, initiatives or objectives to act on now, to deliver either "quick wins" or a long-term impact
- 3. Determine the requirements necessary to move each project forward**
  - a. Identify the necessary resources such as people, plan, policy, communications strategy and procurement model with financing options
- 4. Manage each individual project as part of an integrated smart city program**
  - a. Develop a communication strategy to keep all stakeholders informed
- 5. Manage each project until completion**
  - a. Understand that the technology landscape is dynamic, but goals must be met to ensure long term project support from senior leadership and residents alike.

### Ongoing activities for success:

- 6. Engage the community**
  - a. To develop a bi-lateral exchange of information, education and trust to make sure Scottsdale's smart city plan keeps the human-centric focus in view, it will be critical to engage the community along the way in various methods
- 7. Evaluate financial resources on a regular basis relevant to the selected technology solutions**
  - a. Identify gaps in funding, enhancements to ROI and prospective inter-department collaboration opportunities that result in self-funding opportunities
- 8. Begin a procurement strategy**
  - a. Where there are funds, begin a procurement strategy that manages the risk while seeking enhanced ROI and ensures foundational technology is in place
  - b. Where insufficient funds exist for desired technology, develop alternative strategies that include P3s, performance-based models, grant support, data monetization or any combination of these
- 9. Create a smart city platform procurement model**
  - a. Develop a procurement model that encourages the private sector to "self-organize" and take on as much of the risk (financial, ROI attainment, technology performance, interoperability, etc.) as possible for asset classes that have more mature technology or underlying systems and subsystems
- 10. Enlist the help of qualified experts, industry partners, potential regional collaborators and others as soon as able to develop micro-strategies to execute this roadmap**
  - a. Including Scottsdale's and senior leadership and sponsoring stakeholders

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