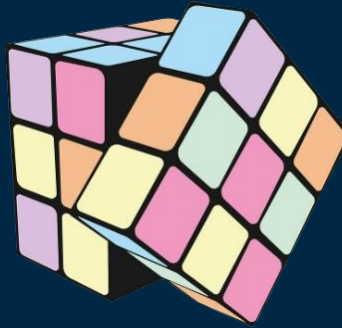


BUSINESS MODELS



One Side of the Smart City Puzzle

QUICK FACTS: USA / ILLINOIS

USA

Size: 3,809,525 mi² / 9,826,675 km²

Pop.: 333.3 Million

Pop. Density: 94 people/mi²

Municipalities: 19,500

Counties: 3,143

ILLINOIS

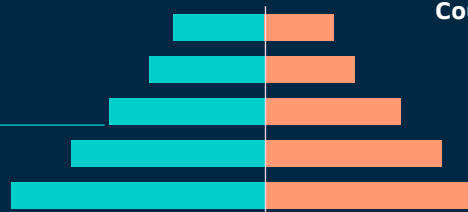
Size: 57,918 mi² / 150,007 km²

Pop.: 12.58 Million

Pop. Density: 230 people/mi²

Municipalities: 1,300

Counties: 102

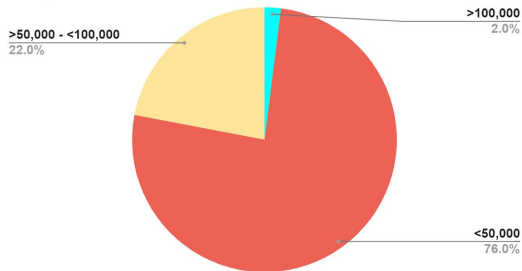


*Municipality= Any incorporated city, town or village
*County= A political and administrative division of a state

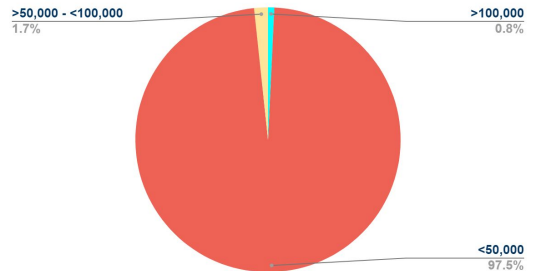
- The information on this slide provides a comparative review of both national and local statistics.
- The national statistics for the United States and local stats for Illinois vary significantly, but the information illustrates a general baseline to illustrate my point in slide 4 regarding the population breakdown among municipalities and the example models to follow.
- A municipality is defined as any incorporated city, town, or village.
- Statistically, it's widely apparent a majority of municipalities adopting technology and incorporating business models to successfully implement the projects consist of communities with populations of 70,000 or greater.
- The next slide highlights the composition of cities based on population breakdown.

POPULATIONS AMONG CITIES

Population Breakdown: USA



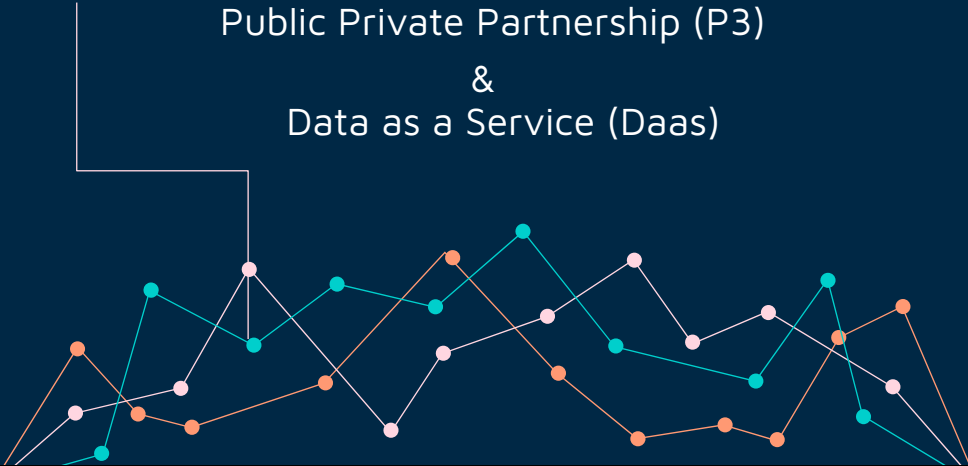
Population Breakdown: Illinois



- The pie charts demonstrate a reality that there are far fewer cities with populations greater than 100k residents than those of any other size. This segment makes up less than 3% nationally and a fraction of a percent locally in Illinois.
- Nationally, approximately 22% have populations greater than 50,000 and fewer than 100,000. Local to Illinois, that segment makes up only about 2%.
- The largest swath of communities exist within a spectrum where the population ranges between 1,500 & 50,000. They make up more than 75% nationally and 97% locally in Illinois. While the larger cities have the resources to adopt business models and integrate the latest technology, those who need it the most (the smaller cities) need to become more aggressive in their desire to understand and implement technology by collaborating in an ecosphere of education and guidance.

Model:

Public Private Partnership (P3)
&
Data as a Service (Daas)



MODEL: (*Combination*)-P3 and DaaS

Example: Chicago's Array of Things (AoT)

Location: Chicago, IL **Population:** 3 million

Overview: Chicago's AoT project is a collaboration between the city of Chicago, the University of Chicago, Argonne National Laboratory, and several participating technology companies. The program deploys a network of sensors throughout the city to collect real-time data on environmental conditions that measure as air quality, temperatures, and acoustic noise levels. This data is open to researchers, policymakers, and the public through an open data portal, enabling data-driven decision-making to address urban challenges.

Impact on Data Management

- AoT project gathers extensive real-time data on citywide environmental factors via sensor nodes.
- Decision-makers access dataset via user-friendly open portal with visualization and analysis tools.
- Automated processes streamline data management for timely access by decision-makers.

- The AoT project collects large quantities of data in real-time that measures various environmental factors, such as air quality, temperature, humidity, and noise levels, from sensor nodes deployed throughout the city.
- Decision-makers receive access to these datasets using an open data policy, which provides easy-to-use tools to visualize, analyze, and explore opportunities.
- Automation has streamlined the data collection processes. Decision-makers have access to both historic and timely accurate information to drive policy and planning initiatives.
- The impact the project has for Data Management has allowed specific facts to be considered as a result of the sensors in what would have otherwise been highly educated assumptions driving policy direction.

Environmental Impact:

- AoT project aids monitoring of environmental trends and anomalies for decision-makers.
- Data analysis informs targeted interventions for environmental challenges.
- Real-time environmental monitoring enables proactive decision-making for public health and sustainable urban development.

- The AoT project enables decision-makers to monitor key environmental indicators. These indicators allow them to identify trends, patterns, and other anomalies related to air quality, pollution levels, and a multitude of other environmental factors.
- Analyzing this data allows policymakers to develop targeted methods of intervention and possible mitigation strategies to combat environmental challenges. Strategies that reduce air pollution hotspots, reducing heat island, and improving overall environmental quality within the community.
- Visibility to real-time monitoring of environmental conditions empowers decision-makers to impose proactive measures with a goal of protecting public health, reduce environmental damage, and promote sustainable communities.

Impact on Accessibility:

- AoT project enhances accessibility with citywide real-time environmental information for all.
- Citizens access neighborhood-specific environmental data for informed decisions.
- The project democratizes environmental data for transparency and community empowerment.

- The Array of Things project promotes greater accessibility by producing real-time environmental information throughout the city, which is available to all residents, businesses, and stakeholders. Not just those involved in the project
- By creating a user-friendly interface and an open data portal, citizens have access to and the ability to interpret environmental data relevant to their specific neighborhoods. This empowers them to make informed decisions about outdoor activities, commuting routes, and health precautions specific to their needs.
- Democratizing access to the data, has given the project the power to enhance transparency, a higher degree of public engagement, and ensure all residents have equal access to vital information for their well-being and quality of life.
- A smart city is a connected city. Connecting residents to information otherwise difficult obtain.

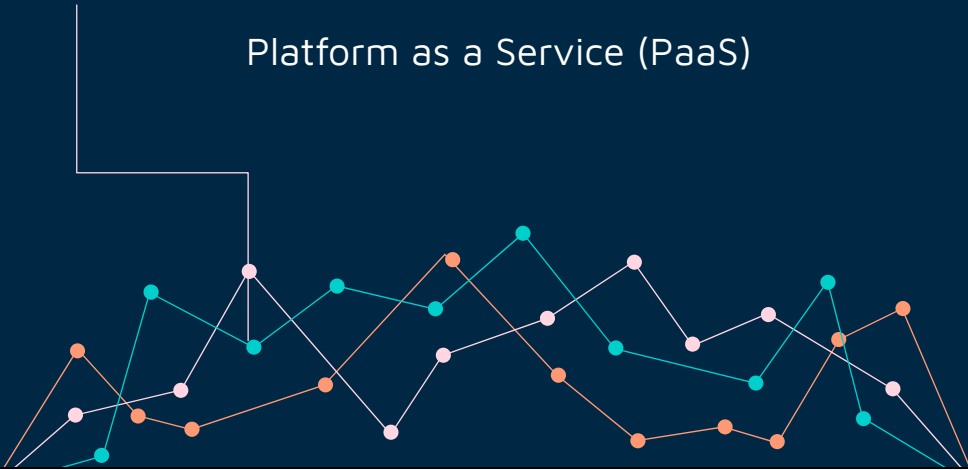
Exchange of Services Between Citizens:

- AoT project enables citizen collaboration and innovation for problem-solving.
- AoT dataset supports local innovation by developers, researchers, and entrepreneurs.
- Examples include apps for air quality alerts and community-driven initiatives.
- AoT project fosters civic engagement and social innovation.

- The AoT project facilitates the exchange of services between citizens by providing a platform for collaborative problem-solving and innovation.
- Anyone wishing to use the platform can leverage the project's data to develop their own innovative applications and services that address specific needs, which culminates in greater community resilience.
- For example, developers could create mobile apps that push real-time air quality alerts, interactive maps where environmental hazards may exist, or community-driven initiatives to call attention to environmental justice issues.
- By fostering a vibrant ecosystem where data drives decisions, the Array of Things project promotes civic engagement, social innovation, and collective action where citizens actively participate in shaping the future of "their city."

Model:

Platform as a Service (PaaS)



MODEL: Platform as Service (PaaS)

Example: Aurora's Smart City Innovation Hub

Location: Aurora, IL

Population: 200,000

Overview: Aurora established a Smart City Innovation Hub, leveraging a platform-as-a-service model to facilitate collaboration among stakeholders and accelerate the development of smart city solutions. The hub provides access to tools, resources, and expertise for developers to create applications addressing issues like traffic management, public safety, and energy efficiency.



Impact on Data Management

- Aurora's Smart City Innovation Hub centralizes diverse urban datasets.
- Decision-makers utilize advanced tools for insights.
- Integrated data and analytics inform evidence-based decisions.

- Aurora's Smart City Innovation Hub has become the city's centralized platform for managing and analyzing a wide array of data related to community's infrastructure, transportation, public safety, and more.
- Decision-makers use advanced data management tools and analytics capabilities within the platform to glean actionable insights from large volumes of both structured and unstructured data.
- By integrating data from various sources and applying machine learning algorithms and predictive analytics, decision-makers can identify trends, patterns, and other relationships to make data driven decisions in areas like planning and zoning, resource allocation, and service delivery.

Environmental Impact:

- Hub integrates sensors and geospatial data for environmental management.
- Real-time monitoring aids trend assessment and intervention.
- Data-driven insights inform proactive environmental measures.

- Aurora's Smart City Innovation Hub lets decision-makers monitor and manage impact to the environment by incorporating environmental sensors, various IoT devices, and geospatial data into the platform.
- Monitoring air quality, traffic congestion, energy consumption, and other environmental indicators in real-time allows city leaders to assess environmental trends, areas of concern, and deploy targeted methods of intervention to mitigate environmental issues and promote greater sustainability.
- Decision-makers roll-out more proactive measures to reduce carbon emissions, improve energy efficiency, and overall environmental quality in the city by leveraging the data-driven insights provided by the platform.

Impact on Accessibility:

- The Hub enhances accessibility for diverse stakeholders.
- Web, API, and mobile access ensure availability to all viewers.
- Open data fosters transparency, community engagement and empowers all stakeholders to contribute.

- Aurora's Smart City Innovation Hub promotes accessibility by providing a user-friendly platform that enables users from all over to access and interact with the municipal data and smart city solutions.
- Decision-makers, city officials, researchers, developers, and residents can access the Hub online, using APIs, and mobile applications, making the information and services accessible anytime, at anywhere.
- By providing open access to the data, using the tools, and reviewing the resources, the Hub provides transparency, open engagement, and community participation in the larger decision-making processes, every stakeholder wishing to contribute to the co-creation of Aurora's smart city solutions.

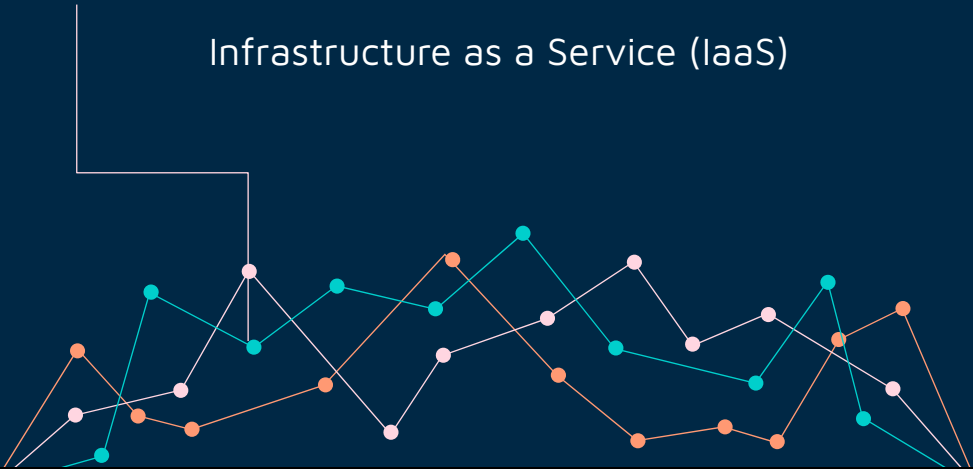
Exchange of Services Between Citizens:

- Hub enables citizen collaboration and innovation.
- Developers use tools and datasets for local solutions.
- Examples include transit apps, interactive maps, and civic engagement platforms.
- Hub fosters digital solutions for social inclusion.

- Aurora's Innovation Hub makes the exchange of services between residents and city leaders collaborative platform for innovation. It opens opportunities for entrepreneurship and acts as a catalyst for increased community engagement.
- Citizen who wish to develop on the platform, startup companies within the community, and community organizations can use the platform's development tools, APIs, and datasets to produce additional or novel applications that address their needs and improve their circumstance.
- One example is a pilot program by APS Data Technologies developing mobile app for real-time parking information interactive maps of community resources, or crowdsourcing platforms for civic engagement and social activism.
- By fostering a vibrant ecosystem of digital solutions and civic innovation, the Smart City Innovation Hub promotes social inclusion, economic development, and collective problem-solving, enabling citizens to actively participate in shaping the future of their city.

Model:

Infrastructure as a Service (IaaS)



MODEL: Infrastructure as a Service (IaaS)

Example: Evanston's Smart Parking System

Location: Evanston, IL

Population: 75,000

Overview: Evanston implemented a smart parking system using cloud-based infrastructure to monitor parking space occupancy in real-time. Sensors installed in parking spaces detect vehicle presence and transmit data to a centralized platform, enabling drivers to find available parking spaces more efficiently. This reduces traffic congestion and enhances the overall parking experience in the city.

Impact on Data Management

- Evanston's Smart Parking Project monitors parking availability with citywide sensors.
- Infrastructure-as-a-service model ensures data flow to a centralized platform.
- Cloud tools aid efficient data management for policy-making

- Evanston's Smart Parking Project utilizes a network of sensors deployed in parking spaces throughout the city to collect real-time data on parking availability.
- This infrastructure-as-a-service model delivers seamless data management, using the sensors to transmit parking data to a centralized platform where the information is processed, stored, and available to end-users.
- By leveraging this model of cloud-based infrastructure as a service and corresponding data management tools, end-users can efficiently manage and analyze parking data to drive policy decisions, optimize parking operations, and improve visitor experience for residents and guests.
- This also allows the city to commoditize existing assets and infrastructure based on demand and usage to increase revenues.
- Local law enforcement can also use the tools to enforce restrictions and issue citations when necessary.

Environmental Impact:

- Smart Parking Project reduces congestion and emissions.
- Real-time data aids quick parking location, reducing idling.
- Efficient parking usage improves air quality and reduces carbon footprint.

- The Smart Parking Project contributes to environmental sustainability by reducing traffic congestion and vehicle emissions associated with circling for parking.
- Real-time availability information provided by the parking sensors enables drivers to quickly locate and reserve parking spaces, minimizing the time spent searching for parking and reducing unnecessary vehicle idling and emissions.
- By promoting more efficient use of parking resources, the project helps alleviate traffic congestion, improve air quality, and reduce the city's carbon footprint, thus positively impacting the environment.


Impact on Accessibility:

- Smart Parking Project offers real-time parking info via apps and signage.
- Accessible parking details aid trip planning for all, promoting inclusivity.
- Improved info enhances mobility options for diverse needs.

- Evanston's Smart Parking Project impacts accessibility by providing drivers with real-time information on parking availability and locations through mobile apps, digital signage, and online platforms.
- Drivers, including individuals with mobility challenges, can easily access information about accessible parking spaces and plan their trips accordingly, promoting inclusivity and equal access to parking facilities.
- By improving the user's access to parking spaces or information about parking, the project opens mobility options for all residents and visitors, ensuring the city's parking spaces are used efficiently and accessible to people with special needs.



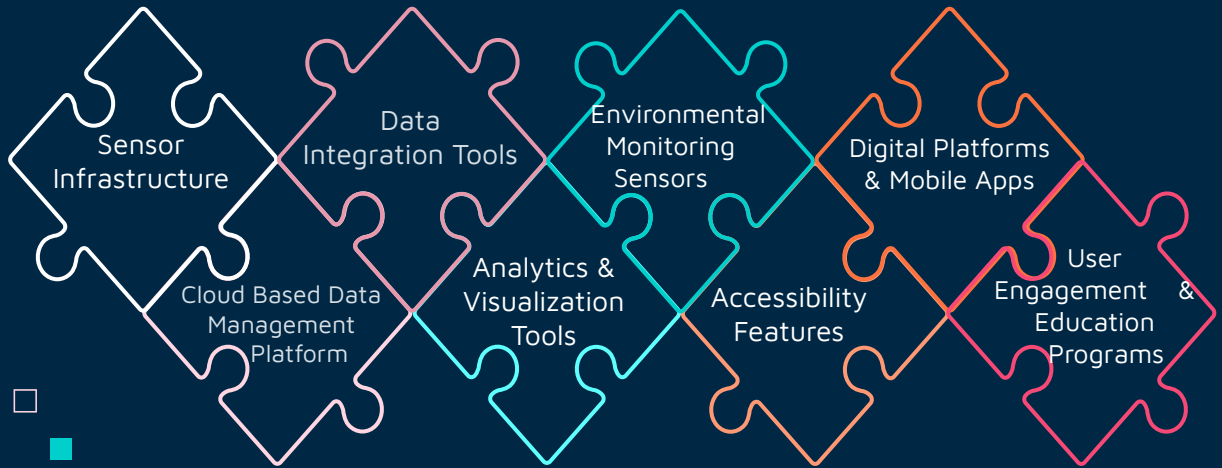
Exchange of Services Between Citizens:

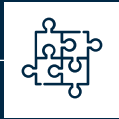
- Evanston's Smart Parking Project enhances parking efficiency and convenience.
 - Benefits include less time searching for parking and improved experience.
 - Innovations may include mobile payments and dynamic pricing for diverse needs.
- 

- Evanston's Smart Parking Project facilitates the exchange of services between citizens by improving the efficiency and convenience of parking services.
- Citizens benefit from reduced time spent searching for parking, increased convenience in finding available spaces, and improved overall parking experience.
- The project may also enable innovative services such as mobile parking payments, parking reservations, and dynamic pricing schemes, fostering a more seamless and integrated parking ecosystem that meets the diverse needs of residents and visitors alike.

RESOURCES NEEDED:

To enable effective decision-making in Evanston's Smart Parking Project, particularly in the areas of data management, environmental impact, accessibility, and the exchange of services between citizens, specific resources need to be positioned or capable of delivering in the following areas.



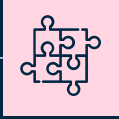


01

Sensor Infrastructure

Deploying a Citywide parking sensor network is essential to enable real-time availability data.

Deploying a network of parking sensors throughout the city to collect real-time data on parking availability and occupancy is essential. These sensors detect the presence of vehicles in parking spaces and transmit data to a centralized platform.



02

Cloud Based Data Management Platform

A cloud-based platform is essential for processing, storing, and analyzing parking data efficiently, with scalable storage and secure access controls..

In this case, a cloud-based data management platform is required as the mechanism to process, store, and analyze the large amounts of data obtained from network of sensors. This platform should provide scalable storage, robust analytics capabilities, and secure access controls for managing parking data effectively.

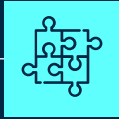


03

Data
Integration
Tools

Integrating parking data with diverse datasets enhances analysis and decision-making across domains.

Tools for integrating parking data with other relevant datasets, such as traffic flow data, demographic information, and environmental data, are essential. Integrating diverse datasets enables comprehensive analysis and informed decision-making across various domains.



04

Analytics & Visualization Tools

Analytics and visualization tools analyze parking data, offering actionable insights on usage trends.

Analytics and visualization tools are needed to analyze parking data, identify trends and patterns, and visualize insights in a user-friendly format. Decision-makers can use these tools to gain actionable insights into parking behavior, demand patterns, and utilization trends.



05

Accessibility Features

Accessible parking features like designated spots and ramps are crucial for disability inclusivity, integral to parking facility design.

Accessible parking spaces and amenities, such as designated accessible parking spots, wheelchair ramps, and signage with braille, are essential to ensure accessibility for individuals with disabilities. Accessibility features should be integrated into the design and layout of parking facilities to promote inclusivity and equal access.



06

Environmental Monitoring Sensors

Parking infrastructure with environmental sensors enables real-time monitoring of air quality and noise levels, aiding environmental impact assessment and mitigation.

Integrating environmental monitoring sensors into the parking infrastructure allows for real-time monitoring of air quality, noise levels, and other environmental factors. These sensors provide valuable data for assessing the environmental impact of parking activities and implementing mitigation strategies

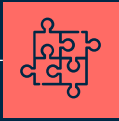


07

Digital Platforms & Mobile Apps

Digital platforms and mobile apps offer citizens parking info and services like real-time availability, reservations, and payments via smartphones.

Digital platforms and mobile apps provide citizens with access to parking information, such as real-time availability, location, and pricing. These platforms enable citizens to search for parking, reserve spaces, and make payments conveniently using their smartphones or other digital devices.



08

User
Engagement
and Education
Programs

User engagement vital for smart parking adoption; workshops, campaigns, and feedback promote awareness and participation.

In order to make any initiative effective it's critical to develop and deploy engagement and education programs in order to promote awareness and greater adoption of the smart parking solution by the public. Outreach efforts, such as community workshops, social media and other messaging campaigns help educate the community about the benefits of using smart parking and educating people about the benefits the solutions offers.