

# Getting to know Smart Cities





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## WHAT ARE SMART CITIES?

Smart City is an intriguing concept. It refers to a city that incorporates smart technology to enhance urban services and thereby improve the quality of life of its citizens.

It has the same infrastructure as other cities, like road networks, waste management systems, transit options and housing. However, in a smart city, this infrastructure is better managed and better performing, with the help technological support. Smart cities use Information and Communication (ICT), Internet of Things (IOT), sensors and other physical devices to connect city infrastructure, city officials and citizens together.

At the same time, the concept is a broad one, and there is no definitive standardization to define or classify a smart city. Smart cities may differ vastly from one another, as every city has its unique set of requirements, vision and goals.

There is a rising need for cities to function more efficiently. The global urban population is set to grow to approximately 70% by the year 2050. For the first time in 2008, there were more people living in urban areas than in rural ones. Cities also contribute to a major share of the global greenhouse gas emissions, pollution and other environmental challenges.

Smart cities are one of the solutions to make cities more efficient, manageable and affordable. There are several other similar and related concepts like Cyber Ville, Digital City, Flexi city, Telicity, Intelligent City, Wired City, etc. All these concepts aim to transform the way we live and work through data sharing and innovation.

The smart city concept revolves around collecting data, measuring it and sharing it between different stakeholders. Smart city architecture and network help city officials to monitor, help and interact with citizens in a better way.

**1.3 million people move into cities every day. According to the United Nations 66 percent of the world's population will be living in cities by 2050.**

## EVOLUTION OF SMART CITY CONCEPT

The concept of smart cities has evolved over the years and continues to go through major changes. Silicon Valley, the global center for technology and innovation, has played a major role in the development of the concept.

The idea first began when tech companies undertook to reduce carbon emissions from cities by improving the efficiency of city infrastructure, as part of their commitment to sustainability.

In 2005, the American multinational technology conglomerate CISCO partnered with Bill Clinton's foundation Clinton Global Initiative under the 'Connected Urban Development' program to create smart infrastructure in Amsterdam, San Francisco and Seoul.

IBM too launched its 'Smart Planet initiative' in 2008 to study and research smart infrastructure. A year later, it launched the 'Smarter Cities' program which focused on combining hardware, sensors, data collection and analytics to improve urban services. CISCO launched the 'Smart Communities Division' in 2010.

Both CISCO and IBM have established themselves as leaders in improving smart city infrastructure. Many more players have entered the smart city domain since. For example, Sidewalk Labs- an Alphabet company- is developing smart city solutions for Toronto and Columbus. The International Data Corporation (IDC) estimates investments in smart city technology to grow to \$135 billion by 2021.

# Evolution of SMART CITIES

2015

Barcelona  
declared  
world's  
smartest city

2010

CISCO's  
Smart  
Communities  
Division

2009

IBM's  
Smart City  
Programme

2008

IBM's Smart  
Planet  
Initiative

2005

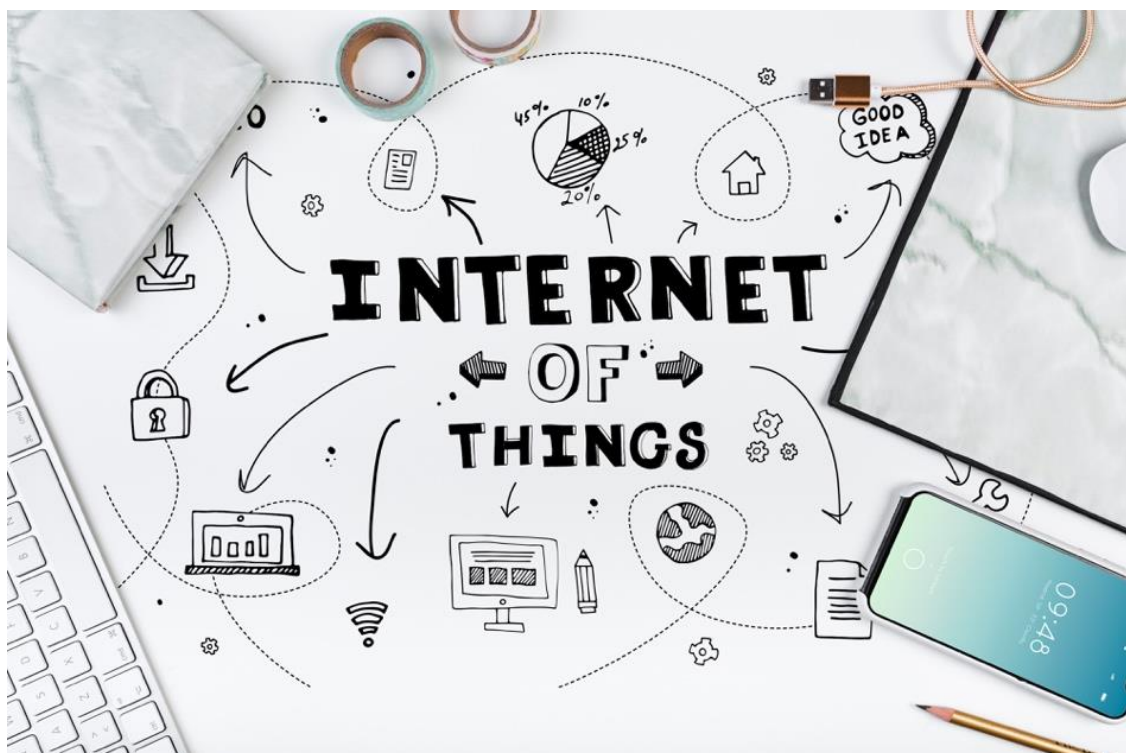
CISCO'S  
Connected  
Urban  
Development  
Programme

## ROLE OF INTERNET-OF-THINGS IN SMART CITIES

Internet-of-Things or IoT is a key component of a smart city. A computing concept, IoT describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices. It also brings the remote monitoring and control to devices and real-time streams.

In smart cities, IoT sensors and devices provide local leaders and citizens with real-time data about community needs. It enables physical devices to be brought onto a common network and toggling actions according to our comfort and requirements.

For example, IoT can enable a car caught in an accident to receive assistance better and faster by sending out automatic updates to the network it's connected to. Plants across the city can be watered using irrigation systems that have access to real-time weather conditions.





IoT can solve several challenges of urban living with respect to health, education, transport and living standards. Increased efficiency and productivity would also mean reduction of costs. IOT has made the concept of smart cities efficient, scalable and reliable. It can be integrated with other computing concept like automation, machine learning and artificial intelligent to create high performing cities.



## SMART CITY BENEFITS AND CHALLENGES

The possibilities and advantages of Smart Cities are countless. The potential of this concept goes beyond where we stand today.

### **Connectivity**

When infrastructure and services are connected on a network, sharing and receiving real-time data, it can transform convenience, safety and efficiency in cities. For example, sensors in a building can automatically send updates and notifications to the city's fire department and damage can be controlled. Emergency response time will be reduced drastically as well. City services such as parking, information, directions, information and billing can all be accomplished automatically.

### **Cost Effectiveness**

ABI Research published a paper in 2017 which said that the concept of smart city could save municipalities, companies, and ultimately citizens over USD 5 Trillion. For instance, ensuring that streetlights turn on only when there are significant number of vehicles on the road could help the city save on energy costs.

IoT can be used track water and energy consumption and thereby identify leaks and inefficiencies in systems. Incentives can be offered by the government to those who can reduce the power consumption of their households. Smart Energy Grids will also help contribute to a greener future. Reduction in traffic and the rate of consumption of fuel will decline as IOT can be used to make sure that the public transport is more effective and efficient than personal vehicles.



## **Efficiency and improved living standards**

If roads and public transport systems are integrated with IoT, Intel estimates that it could save more than 120 hours of waiting time a year for every citizen globally. Self-driving cars can be guided by IoT to serve different users, instead of idling at any time of the day. They can thus help reduce the number of cars operating on roads. IoT would also assist these cars to choose less crowded routes and detect vacant parking spots. Another application is waste management, where sensors in a bin could notify the garbage trucks whenever it reaches its full capacity and is ready to be emptied. Smart solutions can ensure that Wi-Fi and charging points are easily accessible for everyone everywhere. All these strategies will ultimately enhance the quality of life for citizens.

## **Challenges**

Smart cities are not at all about just procuring the latest technology and implementing it throughout the city. For a city to be truly smart, it must be designed in such a way that the impacts translate into actual benefits for citizens. Citizens must be educated about the various aspects of the smart city, so that they are more likely to use, engage and promote with these high-tech interventions. The public and private sector will have to collaborate to make a healthy and beneficial environment for all the citizens and it is very important to bridge the gap between the two.

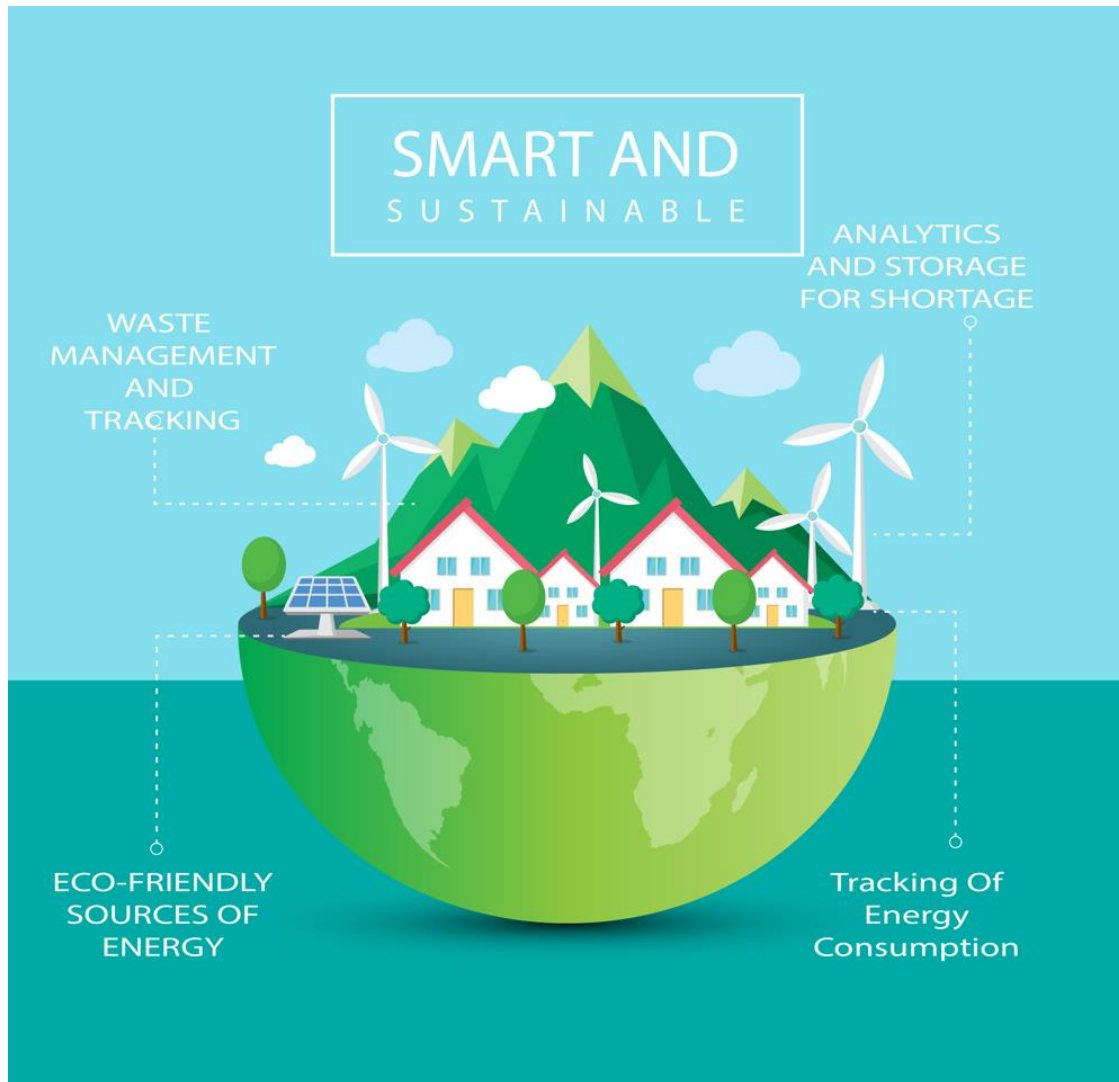
Further, the data being used should be made accessible to the citizens as well and a level of transparency should be maintained. Data being captured should be accessible to people via apps or portals. For example, all households should be provided with real-time updates of their electricity and water consumption.

Security is one of the major concerns faced while implementing the model of a successful smart city. People are concerned that the city officials might not maintain their data privacy, ultimately causing a security threat or an invasion to their privacy. The presence of cameras and sensors everywhere can also be misused to manipulate the collected data and information. Hackers or spies also pose a risk. One way to

prevent data misuse is by anonymizing the data being collected and not linking it to the concerned individuals.



## SMART CITIES AND SUSTAINABILITY



According to the Brundtland Report (1984), sustainability means development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. Sustainability calls for continuously measuring, monitoring and taking corrective actions on energy, water, waste and other systems. Sustainability is a natural extension of smart cities. As a matter of fact, the smart city concept evolved out of the very need to reduce the carbon emissions from city infrastructure.

For example, a smart transport system would help divert vehicles traveling towards a busy route.. While this will help reduce commuting time, it will also reduce vehicular emissions. In this way fuel consumption and resulting greenhouse gas emissions are reduced while helping the commuter save on time and money. This simple example shows how a smart city also contributes towards the sustainability of the city.

Another area of sustainability that can potentially leverage the use of data collection and analytics is water use. Similarly, energy use and waste management could be optimized using smart systems..

However, it is important to note that integrating technology into city infrastructure is a gradual process. It's not practical for cities to adopt smart strategies across all urban services at once.

## ARGUMENTS AGAINST SMART CITIES

There is no definite explanation or defined standards to what the term smart city refers to and so it could be interpreted in a lot of ways by different people. Technologist John Hayduk expressed concern that governments find it difficult to stay updated with the latest technological advances. Consequently, there are many loopholes in laws and policies and people with access to data can exploit for their own selfish and fraudulent benefits. Innovation is great but when it is done without thinking about all the possibilities and a proper vision, it may lead to a massive breach of privacy, security and ethics affecting the personal lives of citizens.

The involvement of government and the political leaders is crucial in the process of make cities smart. Some of the harshest critics even opine that smart cities would benefit only the wealthy, as the funding required may escalate living costs and a major chunk of population may be forced to move out or look for alternatives. All these challenges can be resolved only when citizens, the private sector and the government joins hands and work together in developing solutions.

## SMART CITY EXAMPLES



Several cities are continuously upgrading to smart and sustainable technologies. Europe has been one of the fastest regions to implement the smart city concept. Let's now discuss examples of cities that are already incorporating smart solutions into their everyday operations.

### **Amsterdam**

In the year 2009, Amsterdam Smart City Initiative was introduced which has now grown to almost more than 170 projects, that are being developed together by the private and the public sector. The city is now capable of making real-time decisions as it is connected throughout with the help of wireless devices. It has successfully managed to reduce the traffic on streets and improve public safety. The city even organizes events like Smart City Challenge to engage citizens and encourage them to come up with innovative ways and solutions to tackle everyday problems.



For example, a resident of Amsterdam city developed an app called "Moby Park" which allows owners of empty parking spaces to sell their parking spot.

### **Barcelona**

A very interesting implementation of sensor technology has been implemented by Barcelona in their irrigation systems. Real-time data is shared about the level of water required in their fields and gardens. The city has also implemented a smart network of its traffic lights. Whenever an emergency response is reported, the way for the emergency response vehicle clears automatically by making all the lights along the route turn green.

### **Columbus**

Columbus in Ohio, U.S.A. is also working towards making itself a smart city. It recently received a grant of \$40 Million from the U.S. Department of transportation and \$10 Million from Vulcan Inc. as they have partnered with American Electric Power Ohio to create electric power charging stations as well..

These were just a few examples of smart cities. Global investments in smart city technology are expected to increase rapidly. For example, in North America about two-thirds of cities have already invested in smart city technology, and many others are eyeing implementation. Increased federal funding and strong partnerships with city governments and private sector technology firms will further cement the reality of smart cities.

## SMART CITIES OF THE FUTURE

As mentioned previously in the article there is no one specific standard of what makes a city a smart. A variety of ideas and concepts have been proposed to achieve efficient and sustainable cities. Some of these are listed below.

- Elon Musk's concept of Hyperloop could make inter-city travel a matter of seconds. Hyperloop involves a pod traveling in a vacuum sealed tube and it can reach up-to the speed of 1,200 km/hr.
- Another concept is installing an artificial dome over the whole city that can control the temperature and weather inside.
- Driverless cars and robots would automate pickups and deliveries.
- Robots could be used for ensuring maintenance and cleanliness of the city.
- Weather sensors could be used activate automatic watering systems for irrigating landscapes, as per need.
- Sensors could be installed across the city to manage air quality.

## CONCLUSION

Smart Cities are quite achievable today, given the rapid advancement in every sphere of technology, including sensors, computing or data analytics.

Smart Cities could help us enhance our quality of living. Integrating the concept and the technology with our day-to-day life calls for resolving threats to security and privacy.

Its successful implementation has great potential to help cities achieve sustainability and prosperity. Smart Cities could be a major step to making cities more sustainable, liveable and productive.



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