Getting to know

Smart Cities

ENVIRONMENTAL DESIGN SOLUTIONS PVT LTD [EDS]

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EDS is committed to sustainability by continuously providing capacity building and training programs on various topics for diverse group of professionals, government officials, students and faculty. Through the Global Sustainability Education program, EDS is reaching out globally with high quality courses for professional development that are also qualified for GBCI CE credits.

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.

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

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 lead to transforming 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.

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

EVOLUTION OF SMART CITY CONCEPT

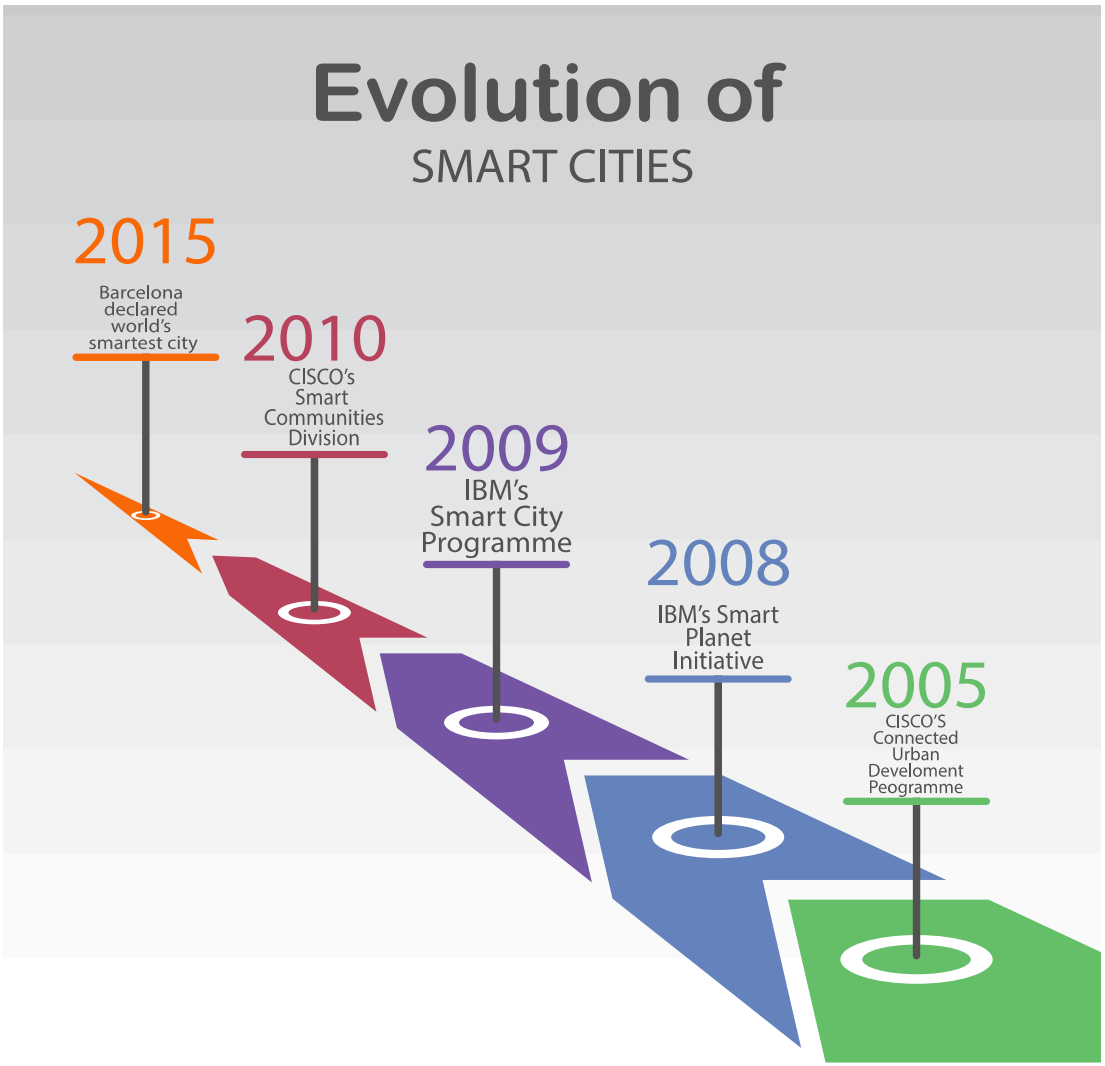
The concept of smart cities has evolved over the years and continues to go through major changes. Silicon Valley, the global center for technology and innovation, has played a major role in the development of the concept.

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 the 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 proving smart city infrastructure. However, they are not the only ones in this field any more. Hundreds of Start-Ups backed by huge companies and Investors are working day and night to make smarter and more efficient models.

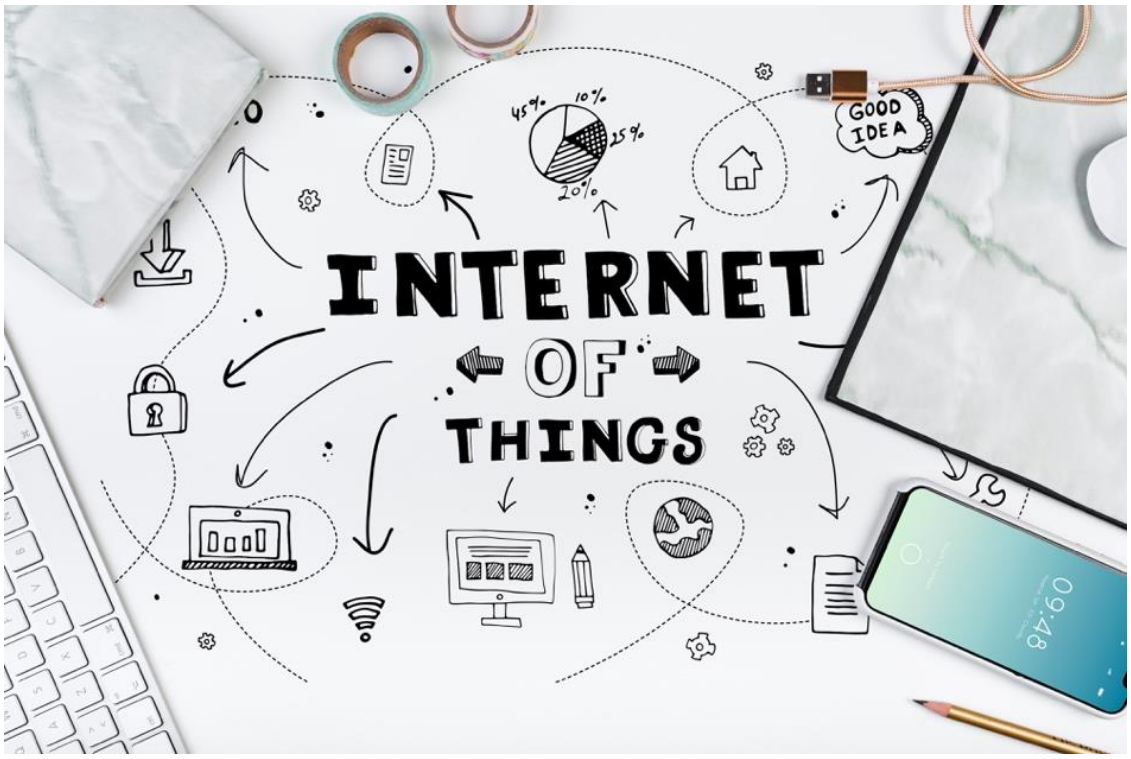

Evolution of
SMART CITIES
2015
Barcelona declared world's smartest city
2010
CISCO's Smart Communities Division
2009
IBM's Smart City Programme
2008
IBM's Smart Planet Initiative
2005
CISCO'S Connected Urban Develoment Peogramme

ROLE OF INTERNET-OF-THINGS IN SMART CITIES

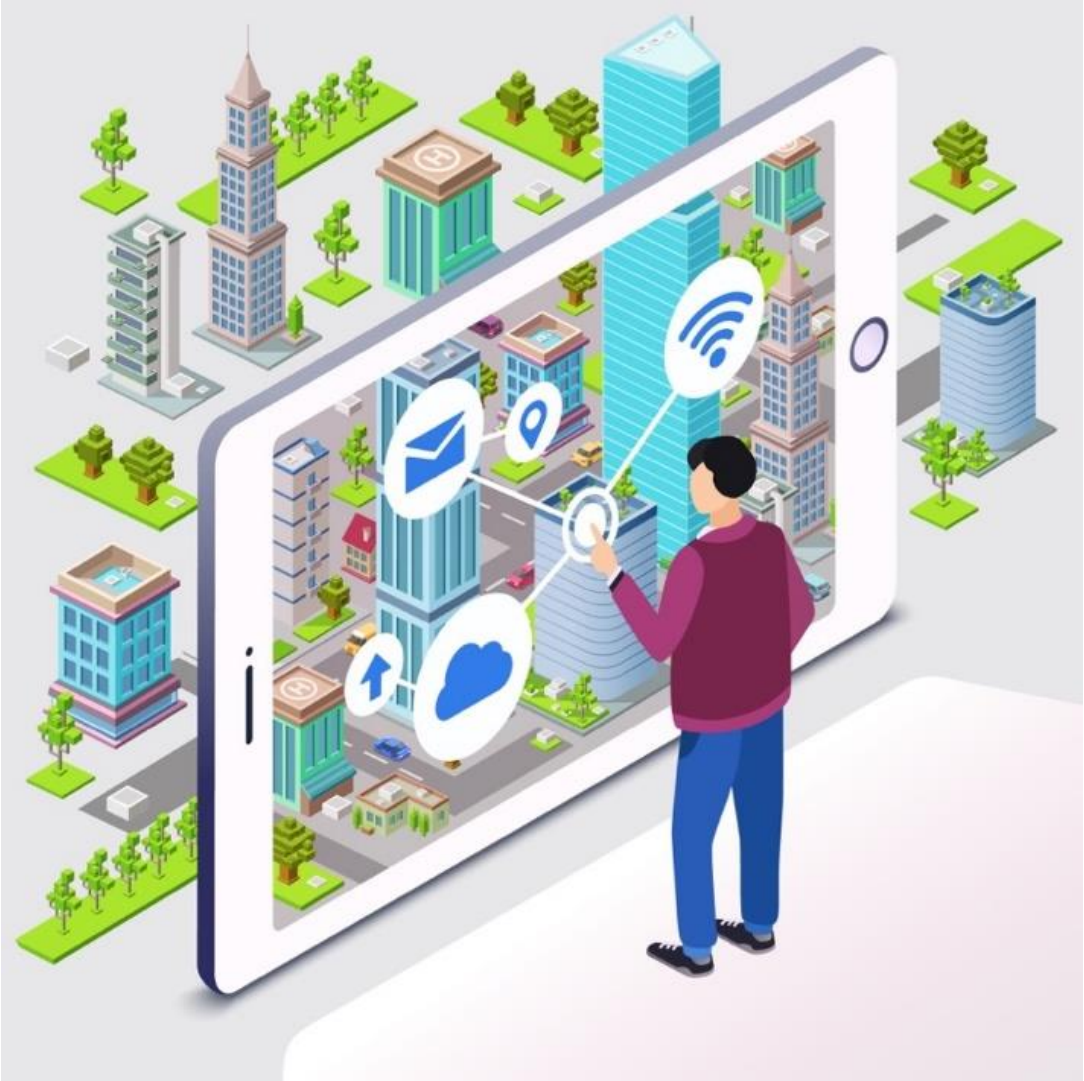
Internet-of-Things or IoT is a key component of a smart city. A computing concept, IoT describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices. It also brings the remote monitoring and control to devices and real-time streams.

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.



This technology has several other applications for smart cities and it can solve several challenges of urban living with respect to health, education, transport and living standards. IOT plays a huge role in reduction of costs as well. The reason is the increased efficiency, utilization of the physical objects in a better way and increased productivity. 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 on a 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 update and notifications to the city's fire department and damage can be controlled. Emergency response time will be reduced drastically. 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 street lights turn on only during the presence 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

A lot of time is wasted in waiting for public transport or amidst traffic. If roads and public transport systems are integrated with IoT, Intel estimates that it could save more than 120 hours a year to every citizen globally. Self-driving Cars are not just driverless cars but can be guided by IoT to serve different users, instead of lying idle 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 find empty parking spots. Another example is more efficient waste management, where sensors in a bin could notify the garbage trucks whenever it reaches its full capacity and is ready to be emptied.

Living Standard

Smart Cities can transform the way we live in several ways. Wi-Fi and charging points are easily accessible for everyone everywhere. Smart Parking would ensure that a person never goes in rounds looking for a parking space. All these impacts a citizen's mind and makes their lives way better as they have been designed by keeping in mind their problems and the proposed solutions.

Challenges

Smart cities are not at all about just getting 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 it benefits the citizens of that city. The citizens must be educated about the various aspects of the smart city. By doing this people are more likely to use, engage and promote the changes as they are now aware about the benefits which will be the result of their actions. The data being used should be made accessible to the citizens as well and a level of transparency should be maintained. 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.

People coming up with new and innovative methods to save costs, increase efficiency and increase living standards. Data being captured should be accessible to people via apps or portals so that for example All households should be provided with the real-time updates of the electricity and water consumed.

Security is one of the major concerns and challenges faced while implementing the model of a successful smart city. People are concerned that the city officials might not maintain their data privacy and can ultimately be a security threat or an invasion to their privacy. There is a threat presence of camera and sensors everywhere can also be an act of invasion of privacy and that data and information can be manipulated. Hackers or spies can also misuse data and pose risk to the city or even the country. One way to prevent this misuse of data from arising 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 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 need to reduce the carbon emissions from city infrastructure.

For example, in a smart transport system, if there is more traffic on a route, vehicles traveling that way would be alerted to different routes. While this will help reduce commuting time, it will also reduce the emissions from the vehicles which will be spending lesser time on road now. 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 leverage the use of data collection and analytics could be water use. Similarly, energy use and waste management could be optimized as well.

At the same, integrating technology with 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 too and so it could be interpreted in a lot of ways by different people. Technologist John Hayduk expressed concern that governments were finding it difficult to stay updated with the latest technological advances and therefore laws and policies had many loopholes. These could be exploited by people having access to data for their own selfish and fraudulent benefits. Innovation is great but when it is done without thinking about all the possibilities and proper vision, it may lead to a massive breach of privacy, security and ethics in the personal lives of citizens.

To make cities smart, the involvement of government and the political leaders is crucial. Some of the harshest critics opine that smart cities would benefit only the wealthy as the funding required to make a smart may lead to increased living costs and a major chunk of population may be forced to move out or look for alternatives. Developing and implementing smart cities do have their own obstacles but these can be resolved if the citizens, the private sector and the government joins hands and work in developing solutions.

SMART CITY EXAMPLES

Several cities are working constantly on updating themselves and be a smart and sustainable city eventually. Europe has been one of the fastest countries to implement this concept in various cities around the country. Some of the cities who can be considered as the role models are

Amsterdam

In the year 2009, Amsterdam Smart City Initiative was introduced which has now grown to almost more than 170 projects, which 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 increase public safety. The city even organizes events like Smart City Challenge to involve citizens and in this the citizens come up with innovative ways and solutions to tackle everyday problems.

For example, a citizen developed an app called "Moby Park" which allows owners of empty parking spaces to sell their parking spot for a fee. The city is providing incentives to people who have brought down their energy consumption.

Barcelona

A very interesting implementation of sensor technology has been implemented by Barcelona in their irrigation systems. Real time data is being shared with the maintenance about the level of water required in their fields and gardens. The smart network of their traffic lights is also beyond commendable as whenever an emergency response is reported, the route for the emergency response vehicle is cleared automatically by making all the lights green from the vehicle to the destination.

Columbus

Columbus in Ohio, U.S.A. is also working towards making itself a smart city and 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. They are also working on converting existing public vehicles to electric cars and even autonomous cars in the future.

These were just a few examples of smart cities. Other smart cities include Singapore, London, San Francisco and Malta. 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 definite standard of what makes a city a smart. A lot of ideas and concepts have been proposed to achieve that. Some of these are listed below.

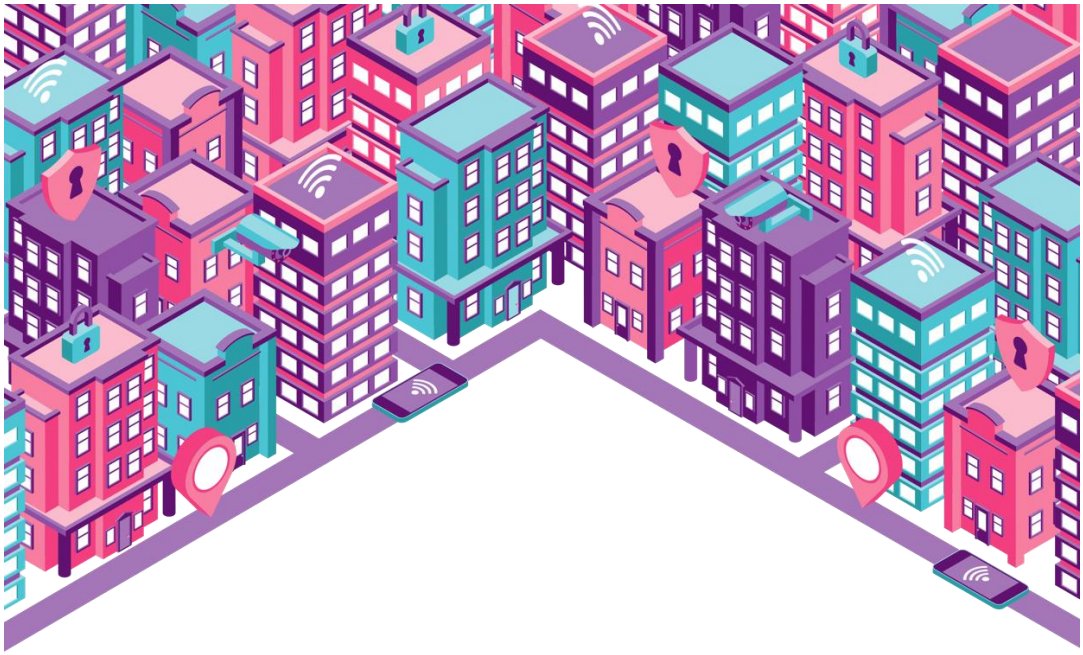
- Elon Musk's concept of Hyperloop could make inter-city travel a matter of seconds. Hyperloop involves a pod traveling in a vacuum sealed tube and it can reach up-to the speed of 1,200 km/hr.
- Another concept is installing an artificial dome over the whole city that can control the temperature and 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, be it 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 without endangering security or privacy threat.

It will prove a boon for our society and help us achieve sustainability and prosperity. They have the potential to bring an end to some severe problems our society is going through conservation of energy or water shortage and other resources. Smart Cities could be a major step to making cities more sustainable, liveable and productive.



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