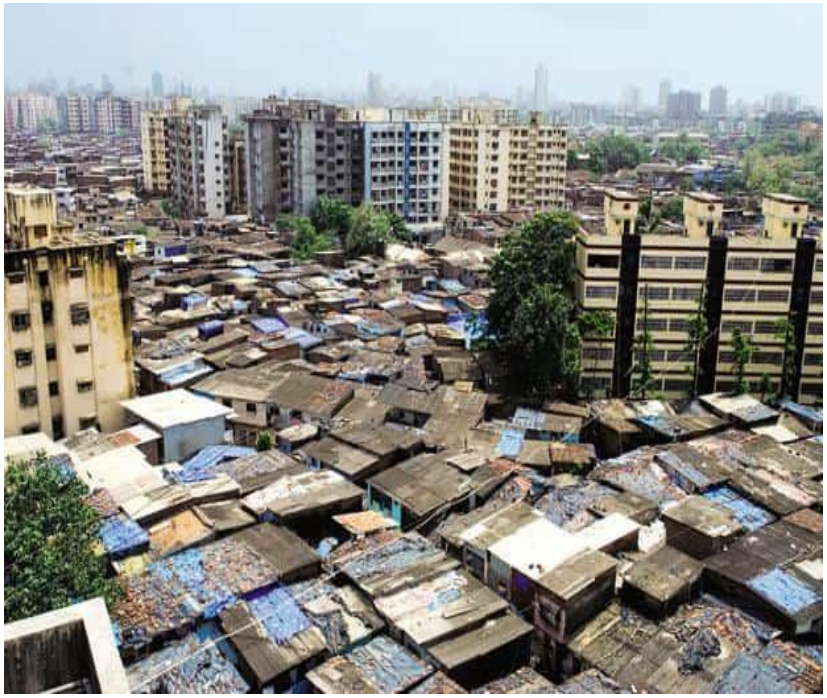
RAMAIAH
Institute of Technology

INFRASTRUCTURE



Infrastructure is the set of fundamental facilities and systems that support the sustainable functionality of households and firms.

Categories of Infrastructure

- Soft Infrastructure
- Hard Infrastructure

Soft infrastructures are the institutions that make up an economy, like healthcare systems, law enforcement, financial institutions and educational systems.

Hard infrastructures are the physical systems that help run a region or nation such as roads, bridges and telecommunications.

HARD INFRASTRUCTURES

- Aviation
- Telecommunications
- Bridges
- Power and energy
- Railways
- Roadways
- Water
- Waste management
- Recreation facilities

SUSTAINABLE INFRASTRUCTURE

- Sustainable Energy
- Sustainable Water
- Sustainable Waste Management
- Sustainable Transportation
- Sustainable Materials

HABITATS

A habitat (which is Latin for "it inhabits") is an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.

Source: *United Nations-Economic and Social Commission for Western Asia.*

Early Human Habitats

Traditional Homes

RAMAIAH Institute of Technology

DEPARTMENT OF CIVIL ENGINEERING

Course: Basics of Civil Engineering & Mechanics
Credits: 3:0:0

Present Day Housing Scenario in Urban Area

Unplanned Slums

Developed Communities

RAMAIAH Institute of Technology

DEPARTMENT OF CIVIL ENGINEERING

Course: Basics of Civil Engineering & Mechanics
Credits: 3:0:0

PRESENT DAY INFRASTRUCTURE IN URBAN AREA

RAMAIAH Institute of Technology

DEPARTMENT OF CIVIL ENGINEERING

Course: Basics of Civil Engineering & Mechanics
Credits: 3:0:0

Animal Habitats

Human Habitats

HABITATS OF ANIMALS & HUMAN

RAMAIAH Institute of Technology

DEPARTMENT OF CIVIL ENGINEERING

Course: Basics of Civil Engineering & Mechanics
Credits: 3:0:0

Cities are complex systems, which include ecosystems, physical infrastructure, and diverse social groups.

MEGA CITIES

A megacity is, according to the definition of the United Nations, a city with more than 10 million inhabitants.

A University of BonnA University of Bonn report held that they are "usually defined as metropolitan areas with a total population of 10 million or more people".

The world had 33 according to the UN (in 2018), 37 according to *CityPopulation.de* (in 2020), and 35 according to ***Demographia*** (in 2020).

Tokyo (Japan) is currently the largest 'megacity' in the world with 37.4 million inhabitants.

Problems arising from megacities

- Slums
- Traffic congestion
- Urban sprawl
- Air pollution
- Energy and material resources

Problems arising from megacities could be generic, socio, socio- economic and case specific.

Innovation will be key in responding to the problems arising from megacities

- Reduce the carbon footprint
- Create mechanisms aimed at listening to the inhabitants
- Create fresh urban islands-tree cover.
- Install green roofs
- Promote city agriculture, .
- Implement Internet of Things (IoT) applications
- Use of eco-efficient technologies.
- Develop an intelligent public transport system

- Cities are complex systems, which include ecosystems, physical infrastructure, and diverse social groups.
- Growth in the majority of India's cities has been inherently unsustainable.
  - Most lack core infrastructure: for instance, 18 percent of households in Delhi have no drinking water supply, 30 percent discharge wastewater into open drains or have no drainage at all, and 17 percent do not have toilets.
  - India's cities fail to integrate environment and social sustainability into their planning and resource management.

Source: https://ecfr.eu/special/what_does_india_think/analysis/imagining_smart_cities_in_india

- Several cities are dealing with the crisis of overpopulation, causing a dearth of resources.

STATE OF INFRASTRUCTURE & CITIES

OUTDATED DESIGN

OUTDATED DESIGN IN USE

DESIGN BASED ON *Need*

Need: New urban growth which are a *step ahead* towards breaking this traditional paradigm through a more bottom-up approach

SMART CITY

A **smart city** is a technologically modern urban area is a technologically modern urban area that uses different types of electronic methods, voice activation methods and sensors to collect specific data is a technologically modern urban area that uses different types of electronic methods, voice activation methods and sensors to collect specific data. Information gained from that data are used to manage assets, resources and services efficiently; in return, that data is used to improve the operations across the city.

Source: ***https://www.mdpi.com/2071-1050/14/1/3/htm***

The journey to smart cities starts way back from the 1970s

- 1974 – Los Angeles created the first urban big data project: "A Cluster Analysis of Los Angeles" report.
- 1994 – Amsterdam created a virtual 'digital city' – De Digital Stad (DDS) – to promote Internet usage.
- 2005 – Cisco put up $25m over five years for research into smart cities.
- 2008 – IBM Smarter Planet project investigated applying sensors, networks and analytics to urban issues.
- 2009 – IBM unveiled $50m Smarter Cities campaign to help cities run more

HISTORICAL DEVLOPMENT AND FURTHER SCENARIO

2009 – American Recovery and Reinvestment Act (ARRA) provided funding for US smart grid projects.

2009 – EU Electricity Directive required EU states to roll out smart meters to 80% of consumers by 2020.

2010 – Japanese government named Yokohama as a smart city demonstrator project.

2015 – India's Government launched "Smart Cities Mission" for 100 Indian cities.

2030 – By 2030, the number of cities in the world with a population of more than 10 million will grow to 43.

2050 – By 2050, up to **70% of the world's population** is expected to live in cities.

Source: *https://www.verdict.co.uk/smart-cities-timeline/*

ROADMAP TO SMART CITIES

- **Define exactly what is the community**: maybe that definition can condition *what you are doing in the subsequent steps.*
- **Study the Community**: Before deciding to build a smart city, *first we need to know why*.
- **Develop a smart city Policy**: Develop a policy to drive the initiatives, where *roles, responsibilities, objective, and goals, can be defined.*
- **Engage The Citizens**: This can be done by *engaging the citizens*

People, Processes, and ***Technology*** (PPT) are the three principles of the *Success* of a ***SMART CITY INITIATIVE***.

A ***smart grid*** is the ***foundational piece*** in building a ***smart community***." –, Pat Vincent-Collawn

Pat Vincent-Collawn, chairman of the Edison Electric Institute

FRAMEWORKS

The *creation, integration*, and *adoption* of smart city capabilities require a ***unique set of frameworks*** to realize the focus areas of opportunity and innovation central to smart city projects.

Technology framework
- Digital
- Intelligent
- Ubiquitous
- Wired
- Hybrid
- Information city

Human framework
- Creativity
- Learning
- Humanity
- Knowledge

Institutional framework
- Human/Social
- IT infrastructure

Energy framework

Data Management framework

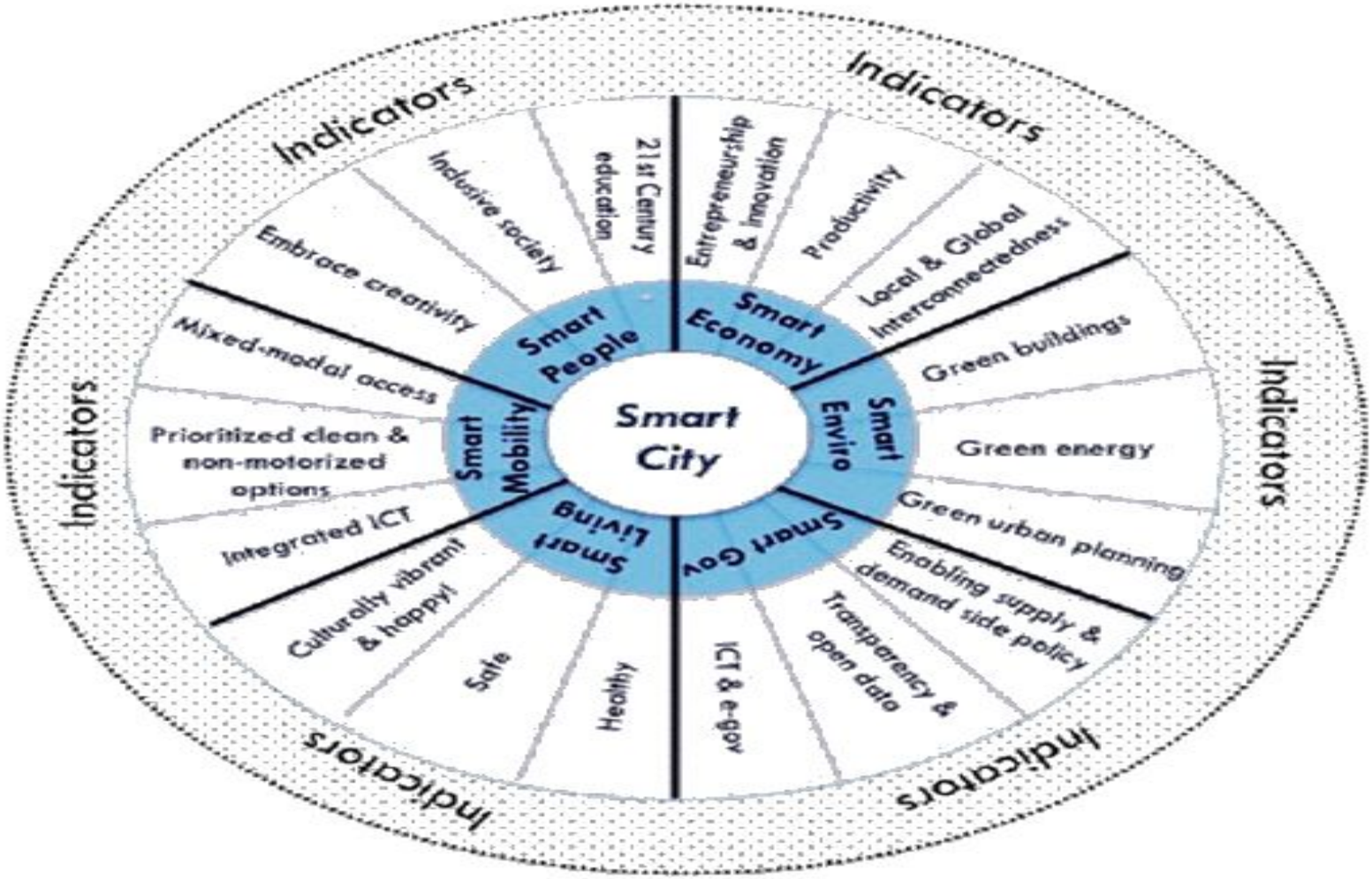
Source: Sharifi, Ayyoob (October 2019). "A critical review of selected smart city assessment tools and indicator sets". *Journal of Cleaner Production*. https://www.sciencedirect.com/science/article/abs/pii/S0959652619321341?via%3Dihub

RAMAIAH Institute of Technology

DEPARTMENT OF CIVIL ENGINEERING

Course: Basics of Civil Engineering & Mechanics
Credits: 3:0:0

SMART CITY CONCEPT & IMPLEMENTATION



SMART CITY IMPLEMENTATION IN INDIA

Cities are engines of growth for the economy of every nation, including India. Nearly 31% of India's current population lives in urban areas and contributes 63% of India's GDP (Census 2011).

What is a 'smart city' in regard to Indian Context

The first question is what is meant by a '***smart city'***. The answer is, there is no universally accepted definition of a Smart City. It means *different things* to ***different people***. The conceptualization of Smart City, therefore, varies from **city to city** and **country to country**, depending on the **level of development**, **willingness to change** and **reform**, **resources** and **aspirations** of the city residents.

Indian Government launched "Smart Cities Mission" for 100 Indian Cities in 2015

VISION

The purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes.

Source: Smart Cities Mission Statement & Guidelines *Ministry of Urban Development, Government of India*

"We shape cities, and they shape us." – Jan Gehl

Jan Gehl Hon. FAIA is a Danish architect and urban design consultant

Mission Objectives

It is a city, which is livable, sustainable and has a thriving economy offering multiple opportunities to its people to pursue their diverse interests.

Source: *https://smartcities.gov.in/about-scm*

Core infrastructure elements in a Smart City

- Adequate water supply
- Assured electricity supply
- Sanitation, including solid waste management
- Efficient urban mobility and public transport
- Affordable housing, especially for the poor
- Robust IT connectivity and digitalization
- Good governance, especially e-Governance and citizen participation
- Sustainable environment
- Safety and security of citizens, particularly women, children and the elderly
- Health and education.

Source: Smart Cities Mission Statement & Guidelines Ministry of Urban Development, Government of India

Smart Solutions-Illustrative Example

ILLUSTRATIVE LIST

Smart Solutions

E-Governance and Citizen Services

1. Public Information, Grievance Redressal
2. Electronic Service Delivery
3. Citizen Engagement
4. Citizens - City's Eyes and Ears
5. Video Crime Monitoring

Waste Management

6. Waste to Energy & fuel
7. Waste to Compost
8. Waste Water to be Treated
9. Recycling and Reduction of C&D Waste

Water Management

10. Smart Meters & Management
11. Leakage Identification, Preventive Maint.
12. Water Quality Monitoring

Energy Management

13. Smart Meters & Management
14. Renewable Sources of Energy
15. Energy Efficient & Green Buildings

Urban Mobility

16. Smart Parking
17. Intelligent Traffic Management
18. Integrated Multi-Modal Transport

Others

19. Tele-Medicine & Tele Education
20. Incubation/Trade Facilitation Centers
21. Skill Development Centers

**Cities are free to add more applications*

SMART CITY FEATURES

- Promoting mixed land use in area-based developments
- Housing and inclusiveness
- Creating walkable localities
- Preserving and developing open spaces
- Promoting a variety of transport options
- Making governance citizen-friendly and cost effective
- Giving an identity to the city
- Applying Smart Solutions to infrastructure and services in area-in order to make them better.

These are the eight different stages of developing smart cities:

- Determine a start point.
- Identify the objectives.
- Define the relevant projects.
- Evaluate the feasibility of each project.
- Evaluate the impact of each project.
- Choose the most promising projects.
- Develop and implement pilot projects.