



# Smart Cities and Infrastructure

Introduction of the Issues Paper

**Mr. Arun Jacob**

Science and Technology Section

UNCTAD

United Nations Commission on Science and Technology for Development,  
Inter-sessional Panel, 2015-16

# Structure

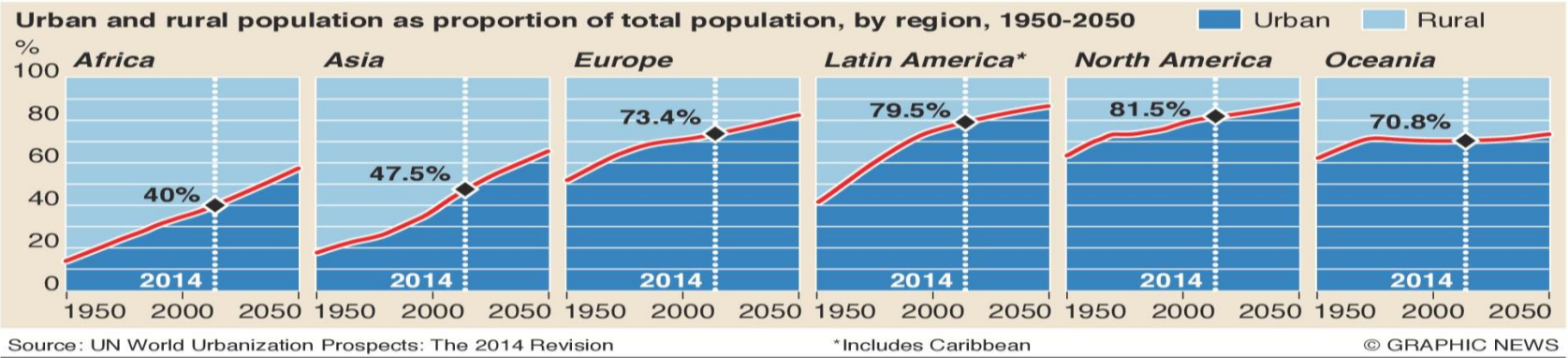
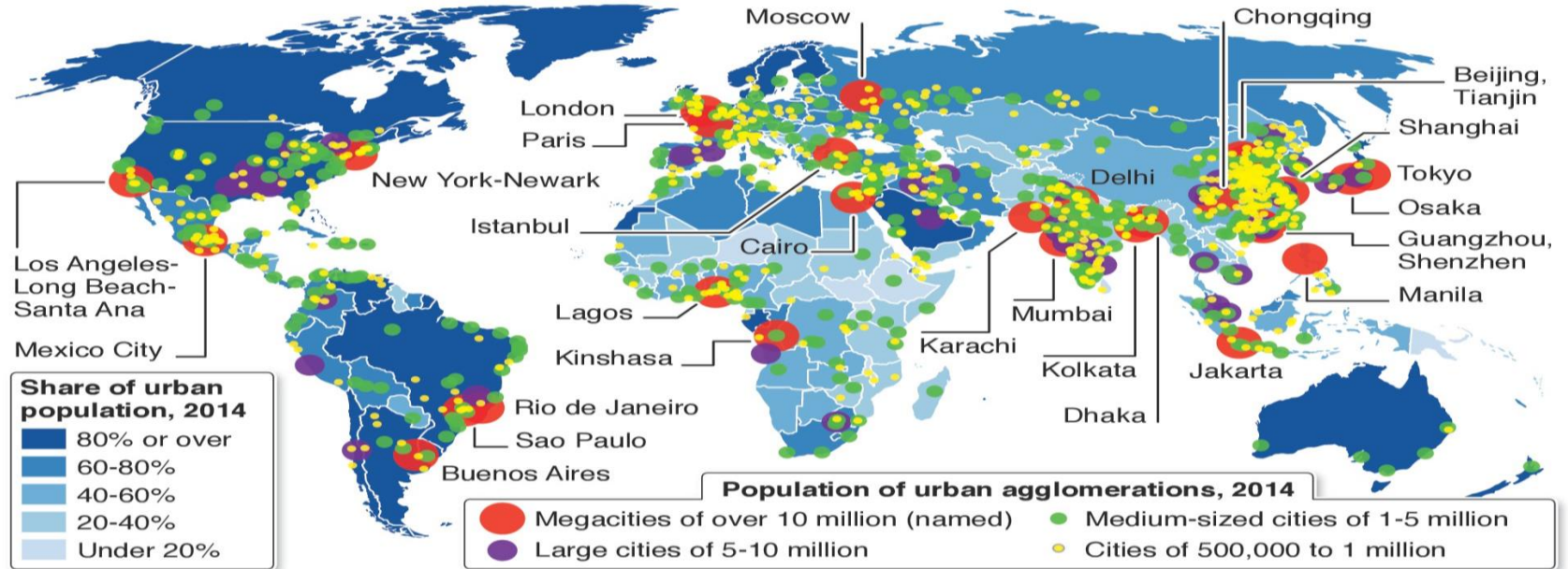
---

- ▶ Urbanization & SDGs
- ▶ Defining Smart Cities
- ▶ Components of Smart Infrastructure
- ▶ Key Challenges in Applying Smart Infrastructure Concepts
- ▶ STI driven Policy Instruments
- ▶ Smart Infrastructure Design Principles



# Urbanization & SDGs

More than half of the global population currently lives in urban areas, with that proportion projected to reach two-thirds by 2050, according to the UN World Urbanization Prospects report



# SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable

---



**No sustainable development without sustainable urban development**

---



# Defining Smart Cities

---

*“A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects”*

*ITU study group on SSC*



---

# Smart Infrastructure

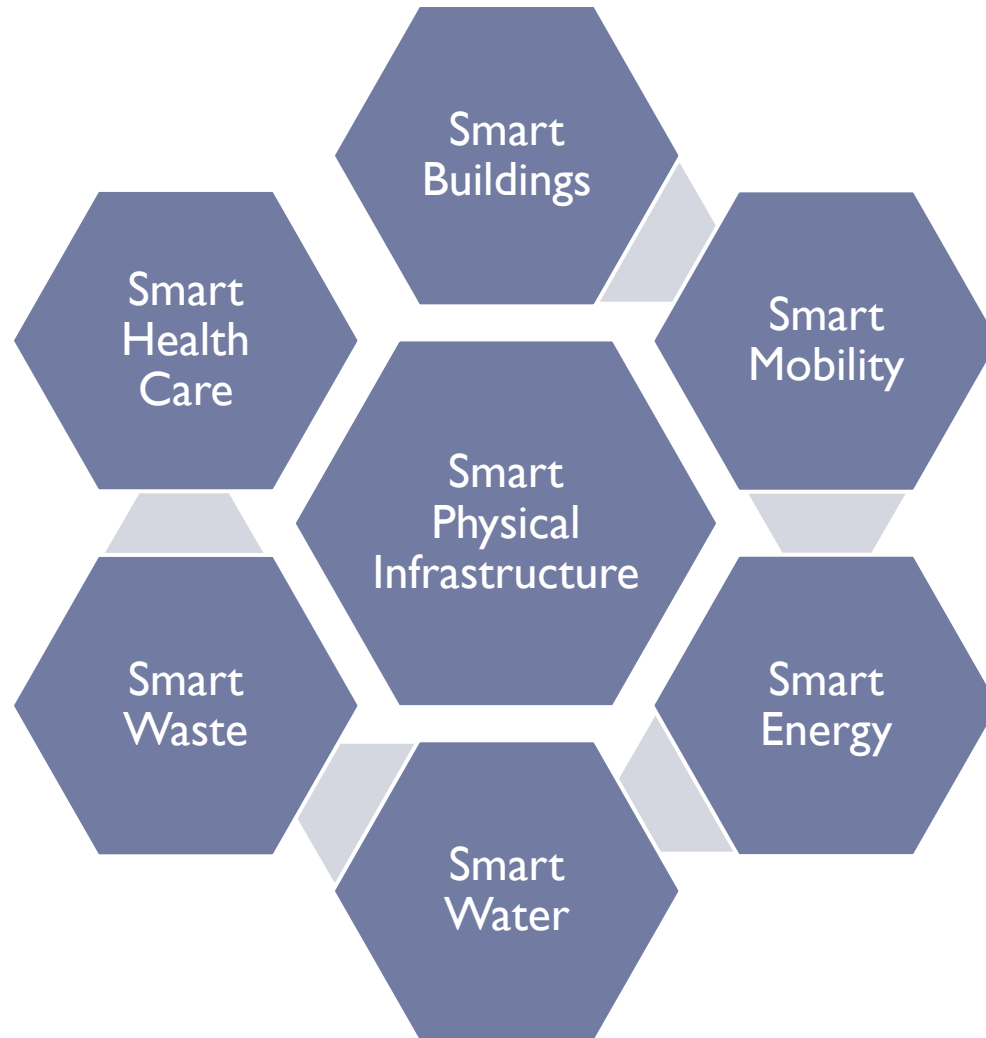
Smart Physical  
Infrastructure

Smart Digital  
Infrastructure



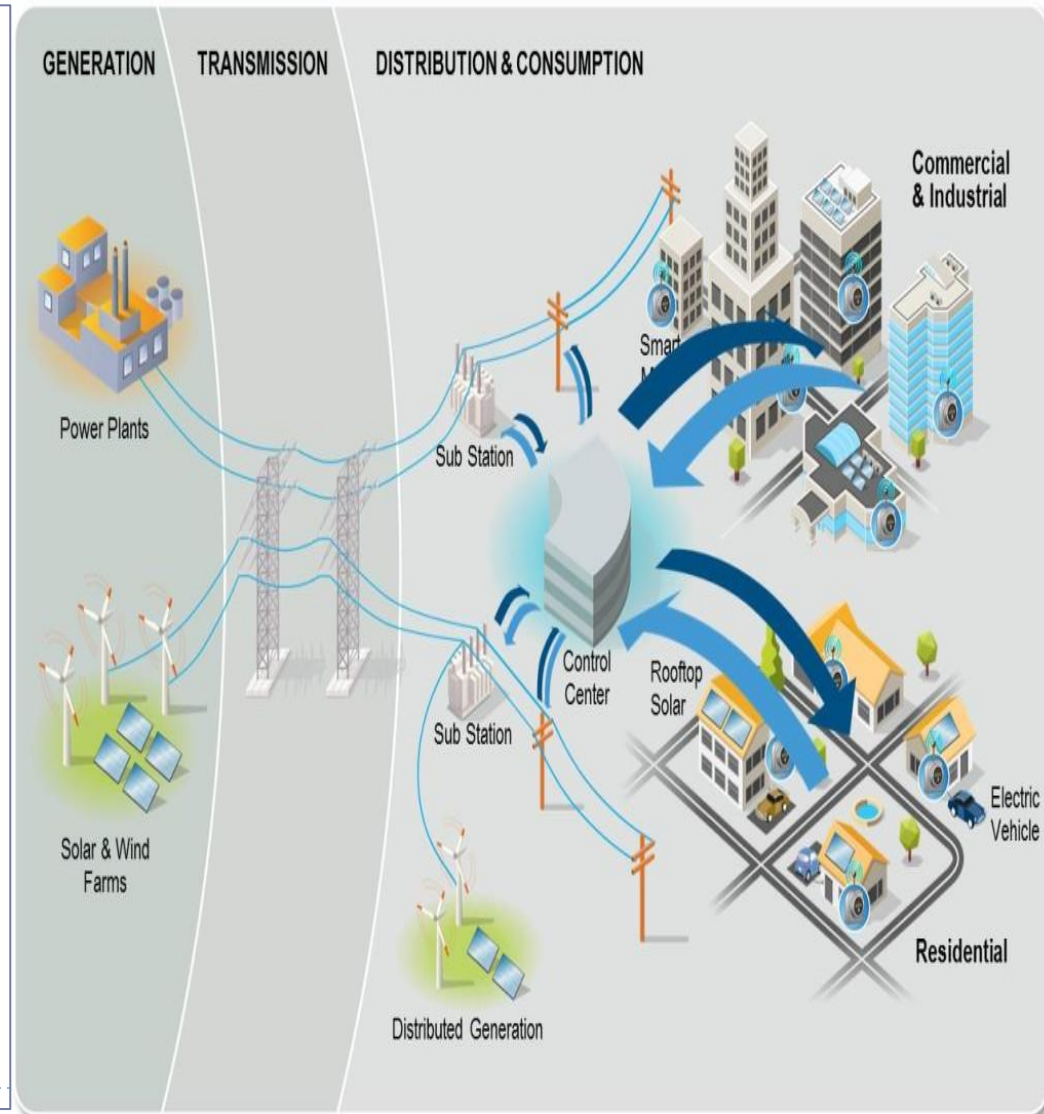
# Smart Physical Infrastructure

---



# Smart Physical Infrastructure : Example

- ▶ **Smart Energy : Meeting energy needs in a sustainable and cost-effective manner**
- ▶ **Includes:**
  - Smart Grids
  - Automated demand response
  - Micro-grids
  - Virtual power plants
  - Smart meters





# Smart Grid, Kashiwa-no-ha, Japan

## Concept of AEMS-based smart grid



# Smart Grid, Puducherry, India



# Smart Digital Infrastructure

*Cheap and real-time transmission of large amounts of collected data*

## Sensors and actuation technology

## Networks

- Sensor technology for data collection
- Actuators (i.e. remotely controllable devices like controllable building thermostats)

- For collecting and sending information to users and actuators
- Availability, security and affordability key

*Low-cost and standardized set of sensors and actuation devices*

*Fast, large-scale data analytics for complex prediction models*

**ICT at the core of smart cities**

- Secure data warehouses
- Policy framework on data usage
- Checks and balances to ensure privacy and security

- Steering according to real-time information and analytics

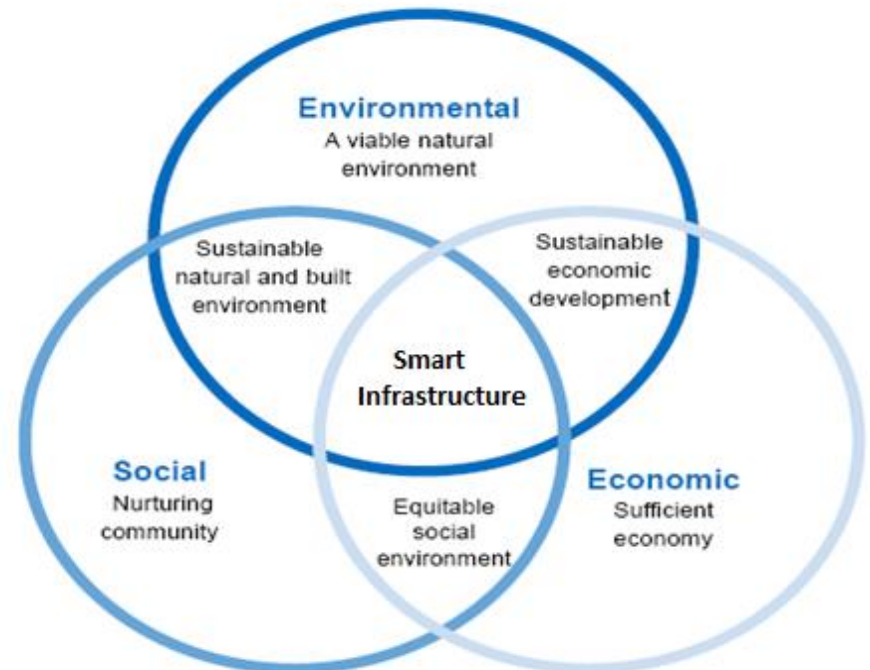
## Data warehouses

## Advanced applications and analytics

*Adequate access to anonymized real-time city data for predictive actions*

# Need for an Integrated Approach for Smart Infrastructure

- ▶ Co-location of smart infrastructure
- ▶ Integrating data generated by different smart infrastructures
- ▶ Smart infrastructure as a system that integrates the core domains of sustainability



# Smart Infrastructure is Context Specific

## Developed Countries

- Need to maintain legacy infrastructure systems
- Monitoring of operations
- Facilitate optimal use of existing infrastructure



## Developing Countries

- Absence of legacy infrastructure
- Technology leapfrogging through smart infrastructure



---

Addressing some key challenges in applying  
Smart Infrastructure Concepts  
through  
STI driven Policy Instruments

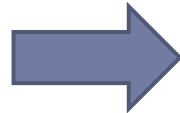


# Challenge I : Localization of Smart Infrastructure

---

## Policy Instruments

- ▶ Harness the local innovation system



Smart Shacks, South Africa

## Challenge I : Localization of Smart Infrastructure

---

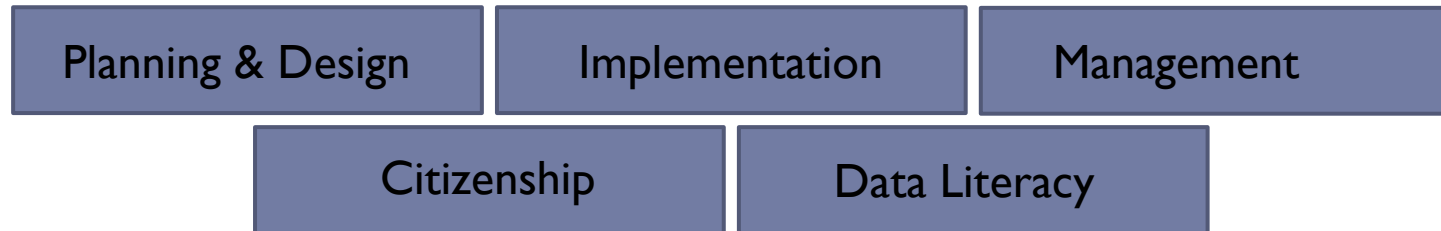
### Policy Instruments

- ▶ Make it a priority theme for local STI institutions
- ▶ Promote open data, open science models
- ▶ Establish urban innovation units and living labs
- ▶ Exploit regional innovation networks and global collaborations



## Challenge II: Skills Gap

---



### **Policy Instruments**

- ▶ Accelerate STEM education programs
  - ▶ Reform Curricula and promote Multi-disciplinary Learning
  - ▶ Develop MOOCS, m-learning and other ICT tools
  - ▶ Partner with Technology Firms
- 

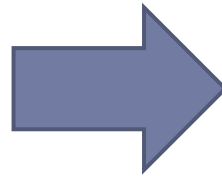




# Challenge III: Lack of Finance and well developed Business Models

## Policy Instruments

### Technology Driven Innovative Financing Models



# Challenge III: Lack of Finance and well developed Business Models

---

## Policy Instruments

- ▶ Crowdfunding Platforms
- ▶ Monetizing Smart Data
- ▶ Smarter use of existing public resources



## Challenge IV: Applying a Suitable Governance Model

### Policy Instruments

- ▶ Smart City Operation Centers to Break down Administrative Silos
- ▶ Platforms for Bottom-up Participatory Governance
- ▶ Effective Use of Overall Smart City Agenda, Smart City Strategies and Technology Plans



## Challenge V: Making Smart Cities Inclusive

---

### Policy Instruments

- ▶ Develop smart infrastructure targeting all vulnerable groups
- ▶ Making Smart Cities Gender Inclusive
- ▶ Use data generated by smart infrastructure to ensure inclusiveness



# Smart Infrastructure Design Principles

---



People-Centered and Inclusive Infrastructure



Resilience and Sustainability



Interoperability and Flexibility



Managing Risks and Ensuring Safety

---



---

Thank You

---

