Telecom Regulatory Authority of India

Interoperability and Regulatory Challenges in Smart Cities

World Urbanization Prospects

- UN Department of Economic and Social Affairs (UN DESA), Population Division, 2018 revision
  - 55% of the world's population living in urban areas;
  - Expected to increase to 68% by 2050.
  - Projections show that the overall growth of the world's population could add another **2.5 billion** people to urban areas **by 2050**;
  - Close to **90% of this increase taking place in Asia** and Africa

Challenges due to Urbanization

Population growth

Migration, ageing, social inclusiveness

Resource scarcity

Food, water, energy, waste management

Climate change

Disaster management, mitigation and adaptation

Economic feasibility

Low-carbon economy, jobs, innovation, infrastructure

The United Nations Economic Commission for Europe (UNECE) and International Telecommunications Union (ITU), October 2015

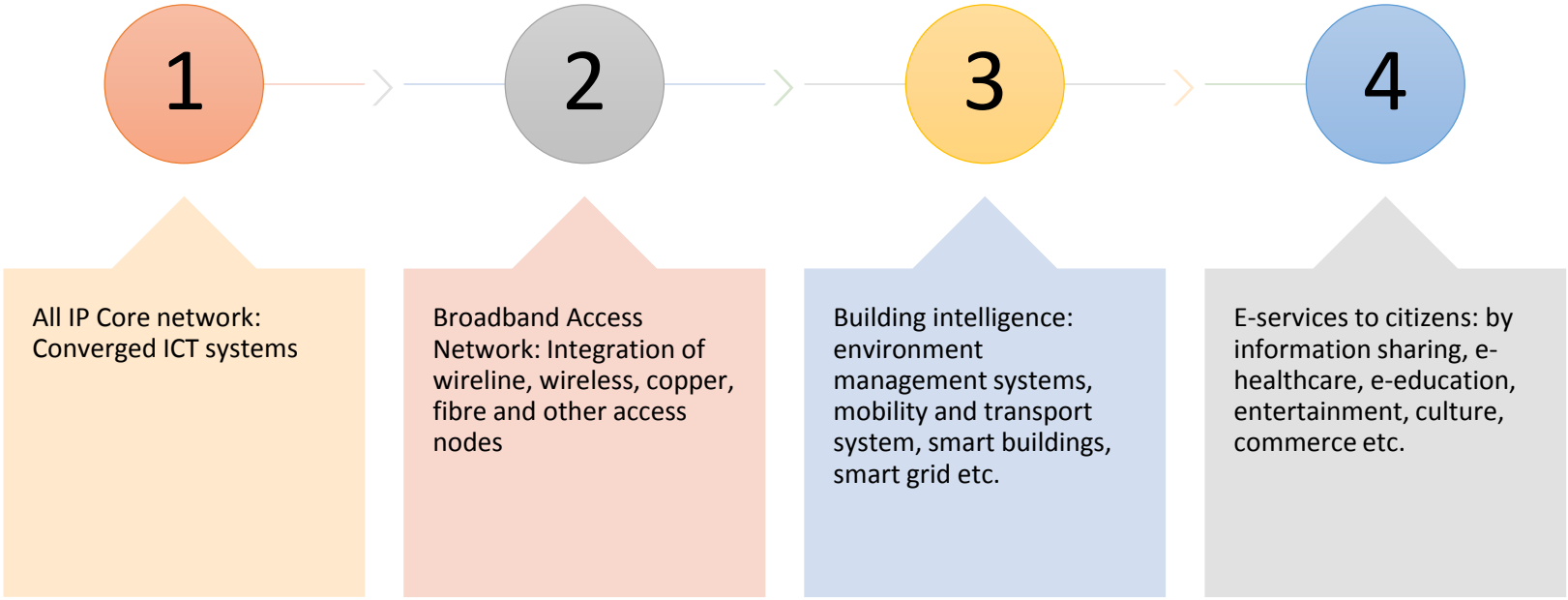
"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect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

Role of ICT in SSC:

turning traditional infrastructure into smart infrastructure

- ICT Tools
  - Wireless communications
  - Sensor networks
  - Data analytics,
  - Platforms and applications,
  - Cloud computing,
  - Technical standards.

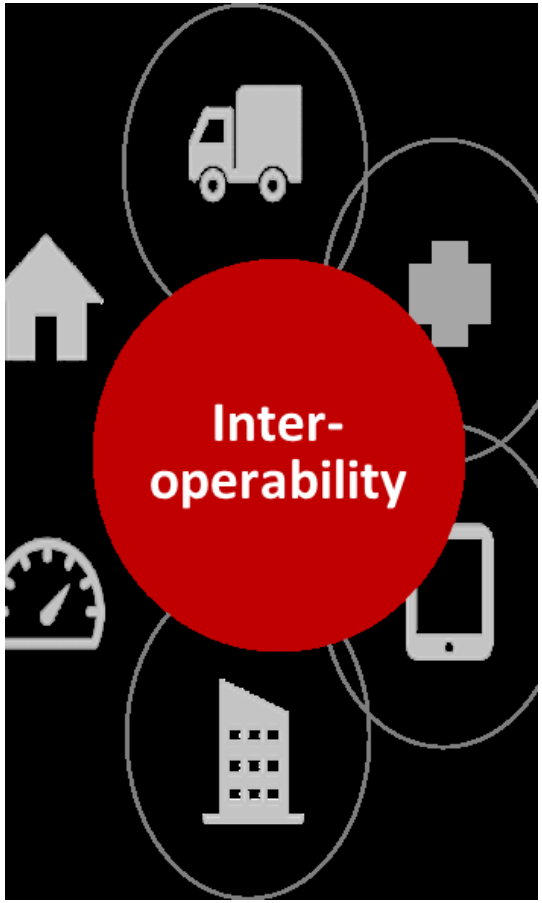
- Better data = better decisions
- Intelligent infrastructure
- Economic competitiveness
- Green and sustainable Low carbon businesses
- Social inclusiveness
- Citizen's engagement



Paving the way to smart cities

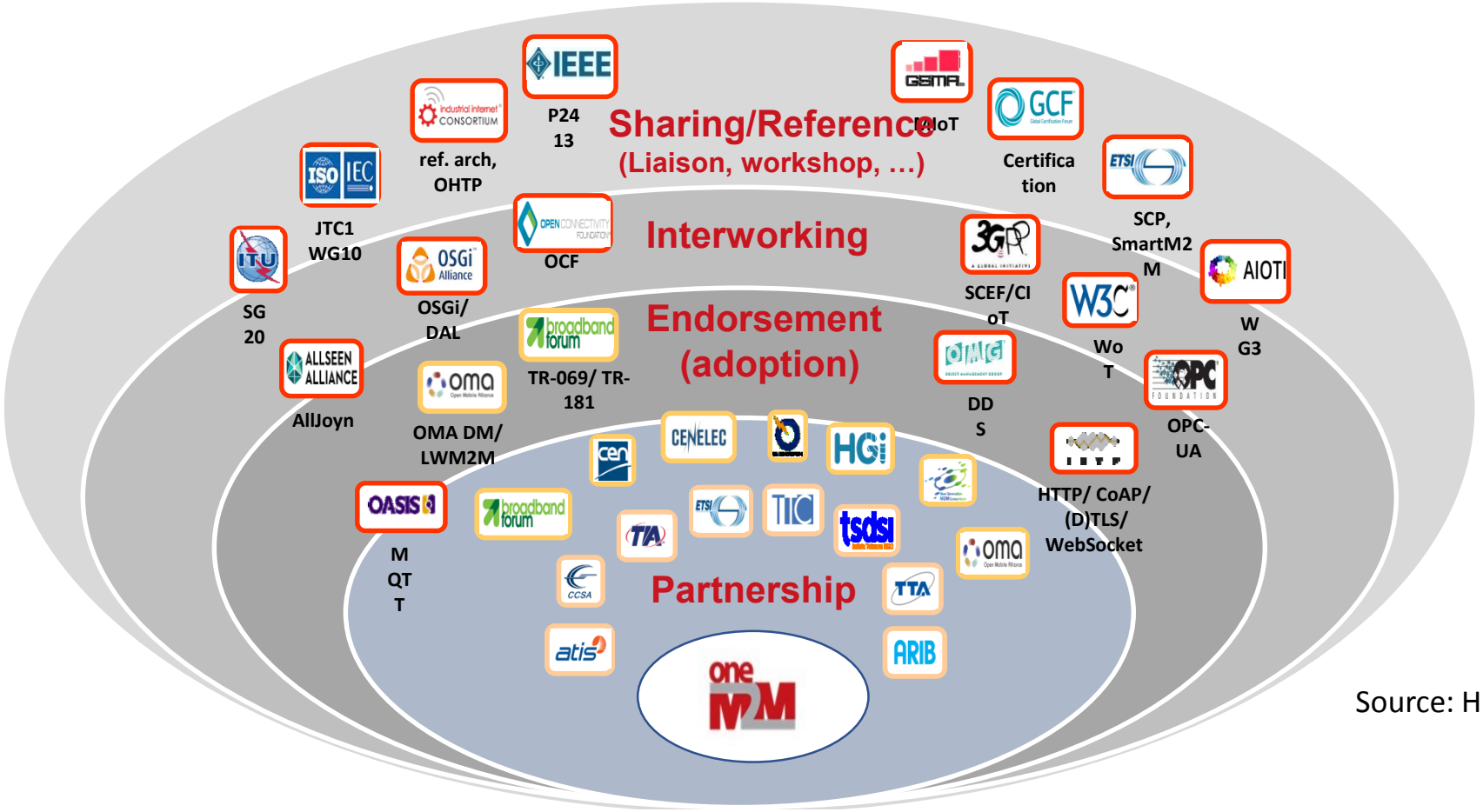
Inter-operability- Needs and Benefits

Inter-Operability between IoT devices



- The Internet of Things (IoT) ecosystem promises tremendous opportunity but **only when interoperability is ensured.**
- **Optimum solution:** A common service layer to ensure seamless communicate between applications and devices.
- One M2M organisation is facilitating, implementing and **promoting IoT standardization and interoperability.**

Ongoing Collaborations



Source: Huawei

Collaboration is important to reach common understanding, avoid overlap and build **interoperable** IoT ecosystems globally.

Benefits of Inter-operability

Lower Costs

CAPEX

- Lower cost of deployment (library of functions)
- Programmers can focus on applications (not on underlying communications)
- Economies of scale for horizontal service layer (common functions for diverse use-cases)

OPEX

- Efficient communications (policy-driven and event triggered)
- Sensor data sharing (produce once, consume many times)
- Transport economics (use best transport network for business needs)

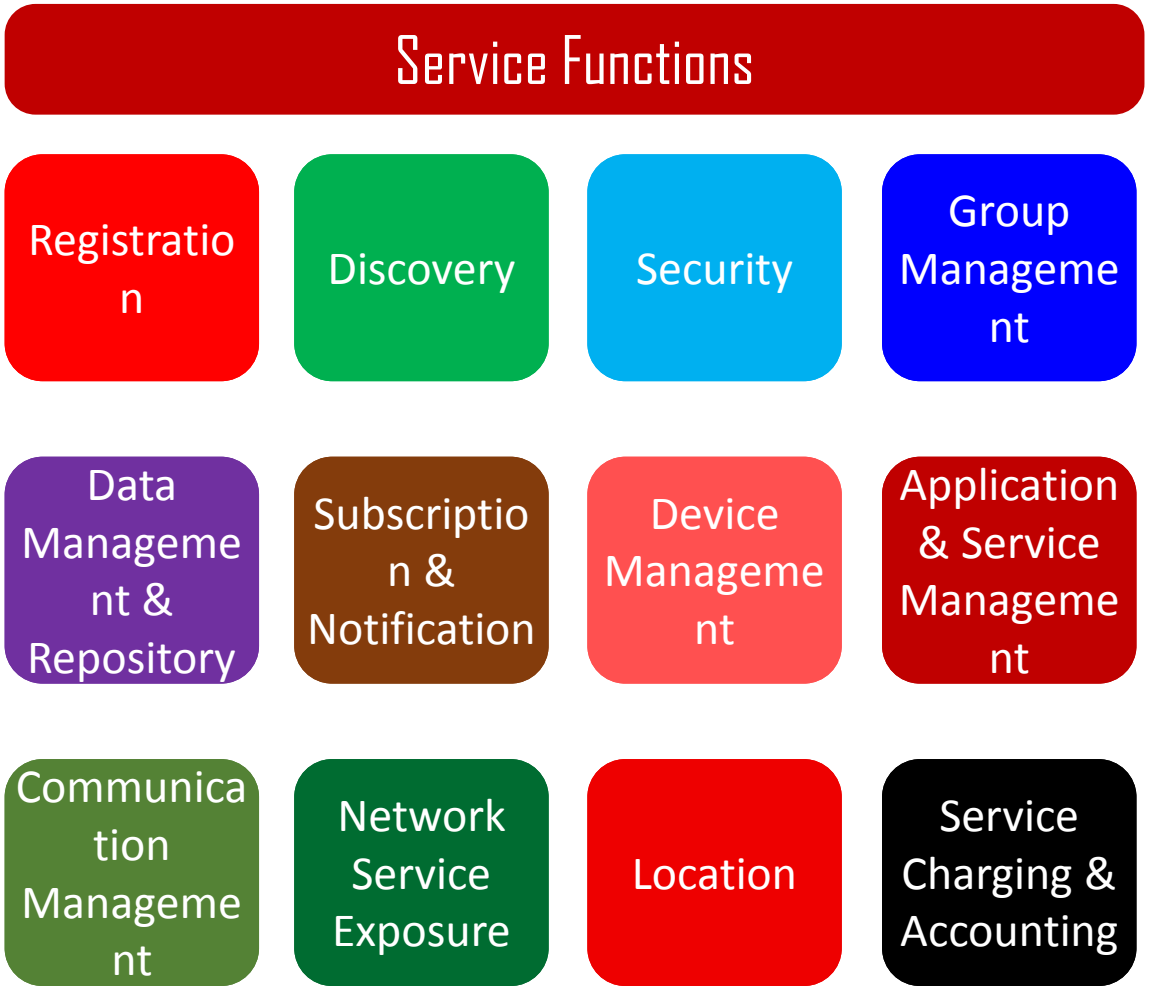
Simplifies the development of applications

- Common services layer for different verticals and segments eliminates the need for application-specific platforms

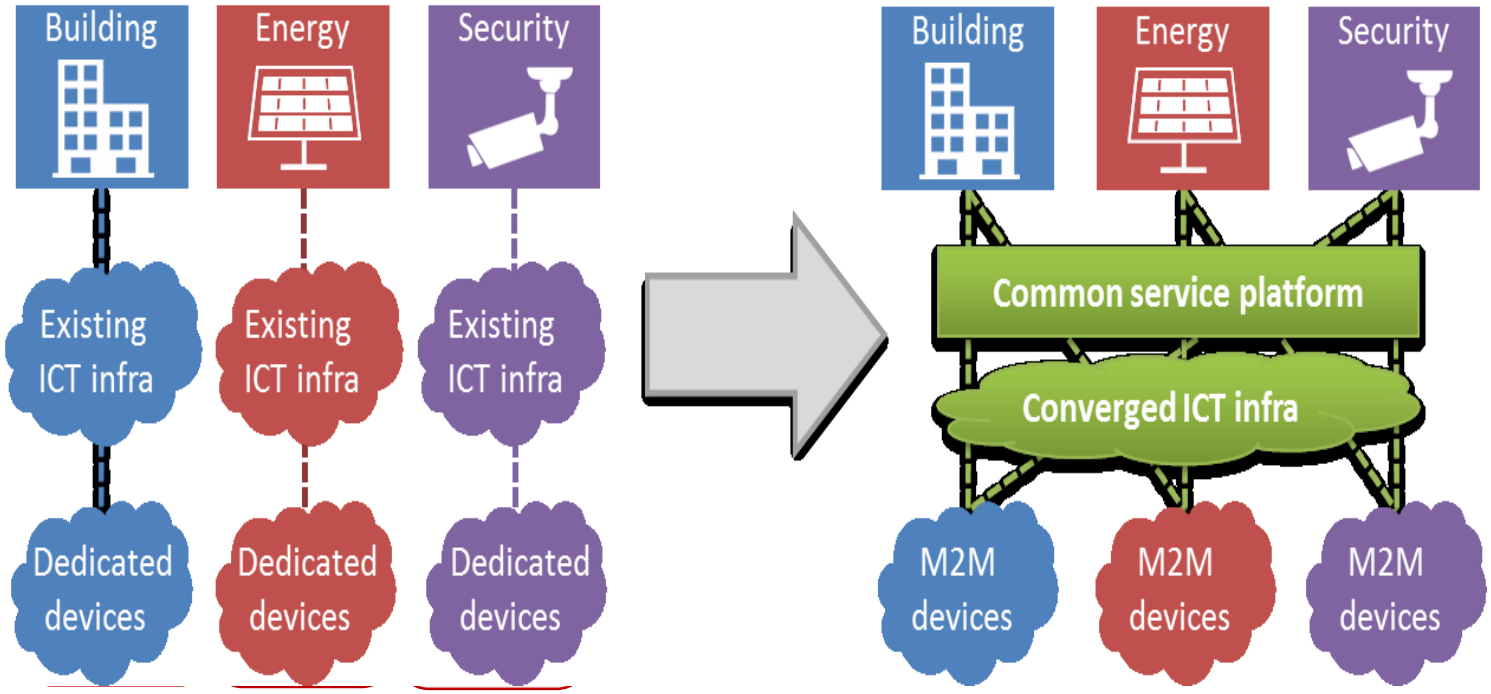
Creates mass-market economies of scale

Accelerates IoT adoption

Inter-operability-Functions



Ultimate Goal: IoT cross-domain interoperability



Without Inter-operability

- **Highly fragmented** market with limited vendor-specific applications
- **Reinventing the wheel**: Same services developed again and again
- Each silo contains its **own technologies** without interop

With Inter-operability

- End-to-end platform: common service capabilities layer
- Interoperability at the level of communications and data
- Seamless interaction between heterogeneous applications and devices

Smart Cities—Regulatory Challenges

M2M Regulatory Framework

Issues for IoT/M2M

- Licensing framework for:
  - Connectivity Provider
  - M2M Service Provider
- KYC norms for SIM embedded IoT/M2M Devices
- Spectrum for IoT/M2M
- Roaming
- Embedded devices (KYC, activation and roaming)
- QoS
- Data Security & Privacy

Smart Cities-Regulatory Framework (Proposed by TRAI, Accepted by Govt)

Salient Features … #1

All access service providers' viz. CMTS, UASL, UL (AS) and UL holders using licensed access spectrum shall be allowed to provide M2M connectivity within the area of their existing authorizations.

All UL (VNO) holders shall also be allowed to provide M2M connectivity in their existing authorizations.

A provider using WPAN/WLAN technologies for M2M connectivity for commercial purposes, operating in unlicensed spectrum, should register with Licensor. Connectivity provider using LPWAN technologies operating in unlicensed spectrum to be under a new authorization under UL namely UL (M2M). May be allowed to bid for licensed spectrum to provide exclusively M2M services.

Salient Features … #2

Government, through DoT, should identify critical services in M2M sector and these services should be mandated to be provided only by connectivity providers using licensed spectrum

To facilitate smooth roll out of M2M services utilizing the license exempt spectrum, 1 MHz of spectrum from 867-868 MHz and a chunk of 6 MHz of spectrum at 915-935 MHz is recommended to 131 be delicensed.

Devices with pre-fitted eUICC should be allowed to be imported only if it has the ability to get reconfigured ‘Over the air’ (OTA) with local subscription. GSMA approved guidelines shall be followed for provisioning of new profile remotely with ‘Over-the-air’ (OTA) mechanism

Salient Features … #3

Devices fitted with eUICC shall be allowed in operation in roaming for maximum three years from the date of activation of roaming in the network of Indian TSP and mandatorily converted/ reconfigured into Indian TSP's SIM within the stipulated period or on change of ownership of the device, whichever is earlier

It should not be mandatory to use only domestically manufactured SIMs in M2M. Embedded SIMs with standard specifications can be imported and relevant information shall be submitted by importer while import of the devices/SIMs

In the present stage of deployment of M2M devices and services, a duty cycle of 10% both at device level and network level would suffice to meet the requirements. These parameters can be reviewed once there is substantial deployment of M2M ecosystem in the country and sufficient data being made available for analysis of use cases.

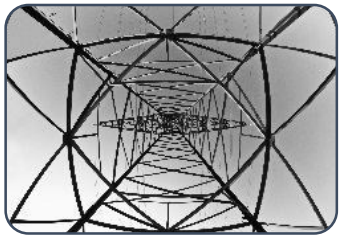
Smartcities—challenges

Cyber-security

Security can be compromised due to user errors, equipment failures, natural disasters as well as deliberate attacks.

High investments

Establishing a network infrastructure along with sectoral needs is estimated to involve high levels of investment in Smart cities.



Data Security

Energy Data, Transport data, Health Care

Smart cities—challenges

Engaging relevant stakeholders

Stakeholder interaction is pertinent for the success of SSC initiatives.

Integration/ Synergy of various sectors:

SSC initiatives to be based on holistic planning and not merely sectoral development.

Public acceptance:

Lack of awareness of the benefits of ongoing smart city initiatives may lead to distrust among the general public.

Other Challenges

Demand of human capital,

Open and consistent data for development of applications,

e-waste management,

EMF radiation, etc

Conclusion

- Both Standardization of Devices for inter-operability and Regulations are important for orderly growth of M2M/IoT services which are building blocks of smart cities
- Delicensed spectrum need to be identified additionally for quick proliferation of IoT and adoption in Smart Cities
- India is amongst the few countries which has brought out a concrete framework for IoT/M2M
- This will help in development of over 100 cities(Brownfield and Green Field)

Thank you!

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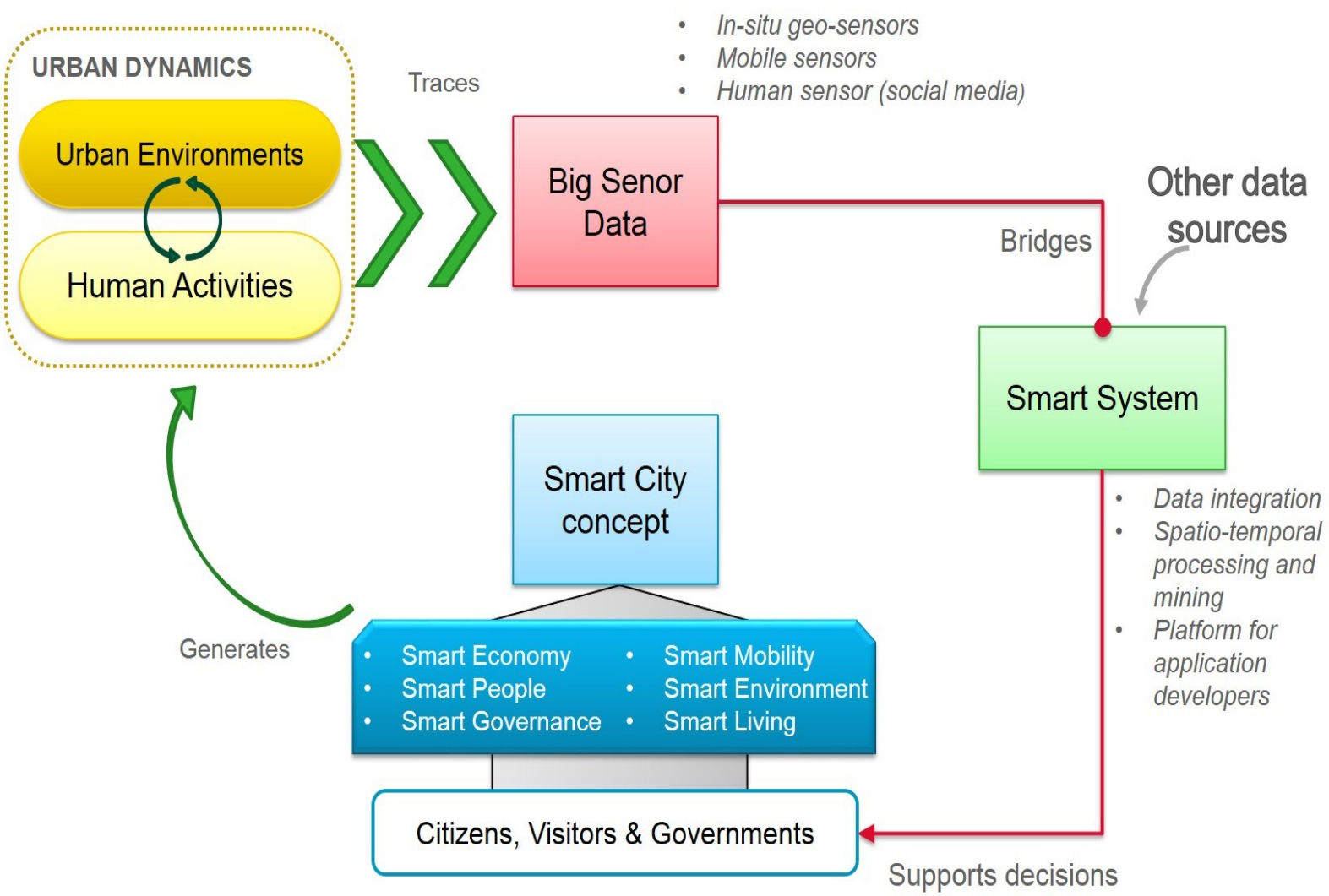

URBAN DYNAMICS
Urban Environments
Human Activities
Traces
In-situ geo-sensors
Mobile sensors
Human sensor (social media)
Big Senor Data
Bridges
Other data sources
Smart System
Data integration
Spatio-temporal processing and mining
Platform for application developers
Smart City concept
Smart Economy
Smart People
Smart Governance
Smart Mobility
Smart Environment
Smart Living
Generates
Citizens, Visitors & Governments
Supports decisions

ructure of Smart City

TRAI

Cloud Computing

Data Gatewa

Firewall

Medical Cloud

Digital Signage Cloud

Service Cloud

XXX Cloud

Interconnected

IoT

Edge Computers

Edge Computers

Edge Computers

A/I

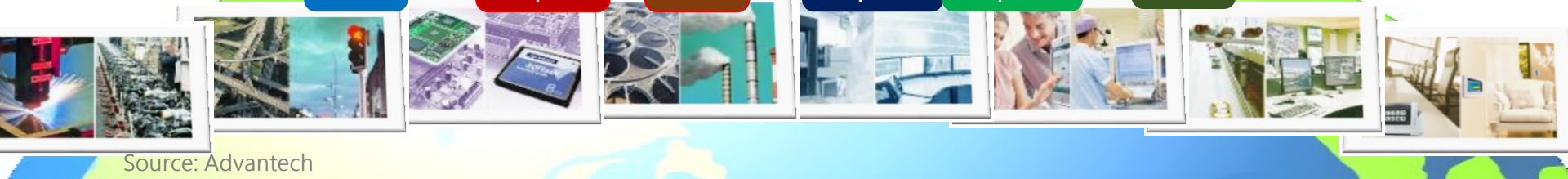
Digital Input

WSN

Audio Capture

Video Capture

WSN



Source: Advantech

ICT Infrastructure

Devices connected in home

ICT Infrastructure

Devices connected in a room