

IoT enabling Smart and Sustainable Cities:

Internet of things (IoT) and Smart cities and communities (SC&C)

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ITU-T

11-04-2018

IoT enabling connected living in Smart Cities

Fast growing urbanization needs optimized infrastructure

By 2050,
70% of the
world
population
will live in
cities

60%
live in urban areas
by 2030

+ 1.500.000
urban population
every week

+ 70%
urban waste
by 2025

over
40
(12 million +)
megacities
by 2025

By 2020, **50
billion
devices** will
be connected



SMART HOME

IoT-based home automation
(appliances, security, energy)
→ Making life safer, easier &
more convenient



ADMINISTRATION

Optimized administration
networks
→ Effective citizen
services



SECURITY

Safeguarded public spaces
→ Authentication &
Identification



WATER

Smart Water supply
management
→ Optimized monitoring &
maintenance



HEALTH

Emergency management
network
→ Improved healthcare



ENERGY

Smart energy supply
management
→ Excellent infrastructure
for life & business



TRAFFIC/TRANSPORT

Connected cars & public
transport network
→ Efficiency & less air pollution

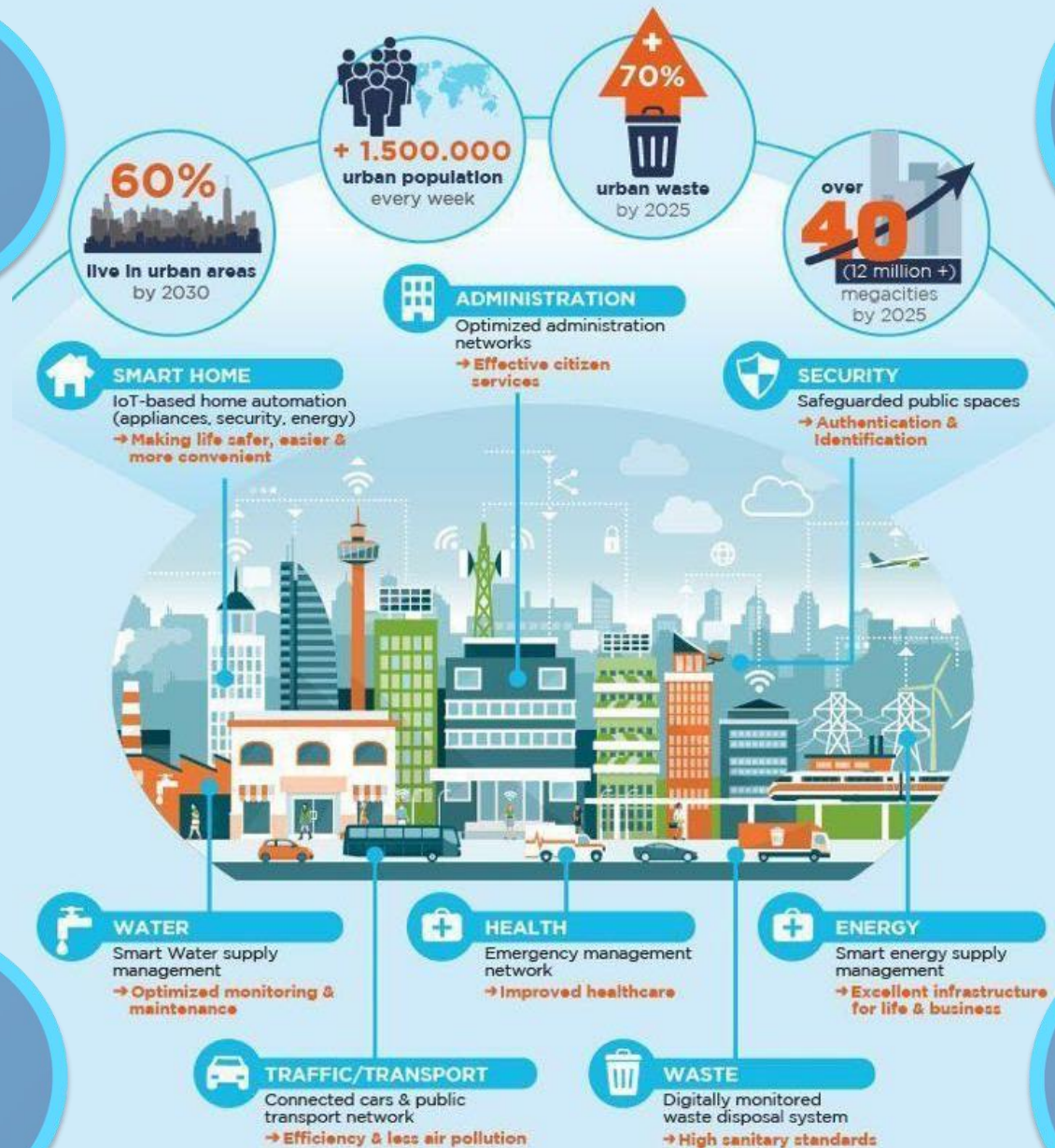


WASTE

Digitally monitored
waste disposal system
→ High sanitary standards

There will be
more than **40**
megacities
worldwide by
2015, each with
a population of
at least 10M

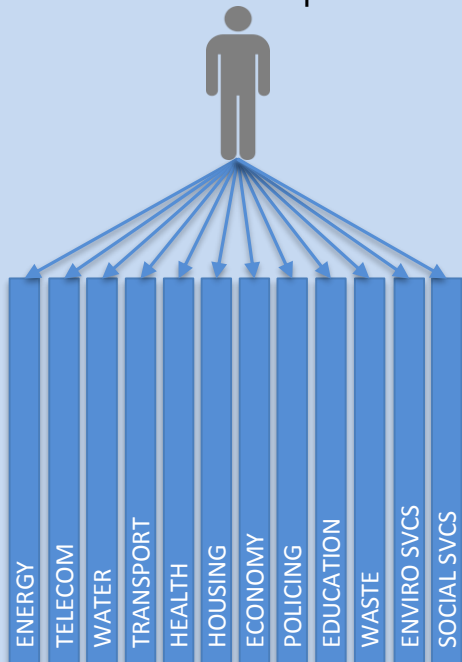
Smart City
Technologies
will increase
IoT Revenue
to **\$49.95B**



ITU-T SG20: IoT and Smart Cities & Communities

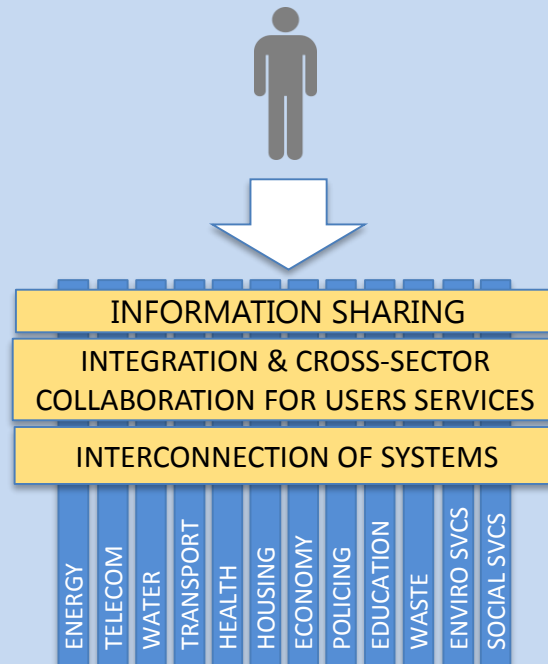
FROM

Closed & un-connected vertical silos of functionally-oriented service providers



TO

Innovative and collaborative new models that connect these vertical silos



Internet of things (IoT) and its applications

Smart cities and communities, including its e-services and smart services

Internet of things identification

What is SG20 currently working on:

Internet of things (IoT)

- **Drones** for IoT
- IoT requirements for **edge computing**
- **Artificial Intelligence** and IoT
- Smart Manufacturing - **Industrial Internet of things**
- **Blockchain** and IoT
- IoT for **developing countries**
- **Intelligent Transport Systems (ITS)** based on IoT
- **Privacy and trust** of IoT systems
- **Interoperability**

Smart cities and communities

- **Open Data** in Smart Cities
- **Use cases, requirements and architectures** for Smart cities and communities
- **Smart Services in rural communities**
- **Disaster notification** of the population in smart cities and communities
- **Smart Tourist** destinations
- *Smart City Infrastructure*

Data management & processing

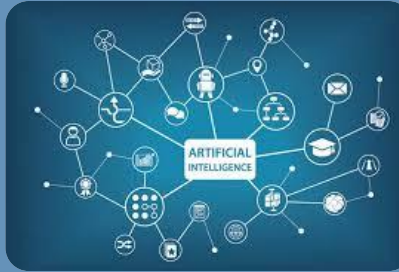
- Data structure and data transfer protocol for **automotive emergency response system**
- Function description and metadata of Spatio-temporal Information Service for SSC
- *Integrity*

Some examples of SG20 current work items:



Draft ITU-T Y.SRC “Requirements for deployment of smart services in rural communities”

This Recommendation aims to establish basic conditions of operation of services (such as e-government, health, education, etc.) and contribute to the development of enterprises and create conditions for making smart communities attractive to the population.



Draft ITU-T Y.SSC-AISE-arc “Reference architecture of artificial intelligence service exposure for smart sustainable cities”

This Recommendation introduces concept of artificial intelligence service exposure (AISE) for smart sustainable cities, analyses its common characteristics and high-level requirements, brings a reference architecture of AISE and relevant common capabilities.

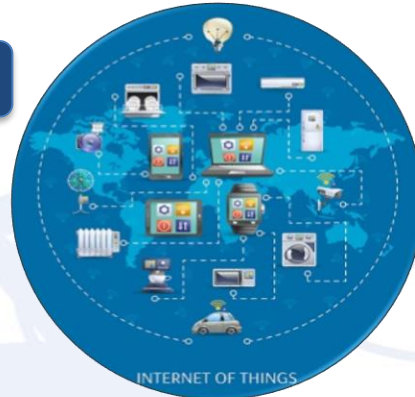
Draft ITU-T TR.AI4IoT “Artificial Intelligence and Internet of Things”

ITU-T SG20 main results

October 2015 – January 2018

20 New Recommendations approved

- ITU-T Y.4101 "Common requirements and capabilities of a gateway for Internet of Things applications"
- ITU-T Y.4116 "Requirements of transportation safety service including use cases and service scenarios"
- ITU-T Y.4117 "Requirements and capabilities of Internet of Things for support of wearable devices and related services"
- ITU-T Y.4119 "Requirements and capability framework for IoT-based automotive emergency response system"
- ITU-T Y.4455 "Reference architecture for IoT network service capability exposure"
- ITU-T Y.4456 "Requirements and Functional Architecture for Smart Parking Lot in Smart City"
- ITU-T Y.4805 "Identifier service requirements for the interoperability of Smart City applications"
- ITU-T Y.4806 "Security capabilities supporting safety of the Internet of Things"
- ITU-T Y.4113 "Requirements of the network for the Internet of Things"
- ITU-T Y.4451 "Framework of constrained device networking in the IoT environments"
- ITU-T Y.4452 "Functional framework of Web of Objects"
- ITU-T Y.4453 "Adaptive software framework for IoT devices"
- ITU-T Y.4553 "Requirements of smartphone as sink node for IoT applications and services"
- ITU-T Y.4702 "Common requirements and capabilities"
- ITU-T Y.4114 "Specific requirements and capabilities of the IoT for Big Data"
- ITU-T Y.4115 "Reference architecture for IoT device capability exposure"
- ITU-T Y.4500.1 "oneM2M- Functional Architecture"
- ITU-T Y.4200 "Requirements for interoperability of smart city platforms"
- ITU-T Y.4201 "High-level requirements and reference framework of smart city platform"
- ITU-T Y.4500.22 "oneM2M-Field Device Configuration"



10 New Supplements agreed

- ITU-T Y.Supp.45 to ITU-T Y.4000 series "An overview of smart cities and communities and the role of information and communication technologies"
- ITU-T Y.Supp.42 to ITU-T Y.4100 series "Use cases of User-Centric work Space (UCS) Service"
- ITU-T Y.Supp.34 to ITU-T Y.4000 series "Smart Sustainable Cities - Setting the stage for stakeholders' engagement"
- ITU-T Y.Supp.33 to ITU-T Y.4000 series "Smart Sustainable Cities - Master plan"
- ITU-T Y.Supp.32 to ITU-T Y.4000 series "Smart sustainable cities - a guide for city leaders"
- ITU-T Y.Supp.31 to ITU-T Y.4550 series "Smart Sustainable Cities - Intelligent sustainable buildings"
- ITU-T Y.Supp.28 to ITU-T Y.4550 series "Integrated management for smart sustainable cities";
- ITU-T Y.Supp.29 to ITU-T Y.4250 series "Multi-service infrastructure for smart sustainable cities in new-development areas";
- ITU-T Y.Supp.30 to ITU-T Y.4250 series "Overview of smart sustainable cities infrastructure";
- ITU-T Y.Supp.27 to ITU-T Y.4400 series "Setting the framework for an ICT architecture of a smart sustainable city".

2 Draft new Recommendations determined

ITU-T SG20 main results

October 2015 – January 2018

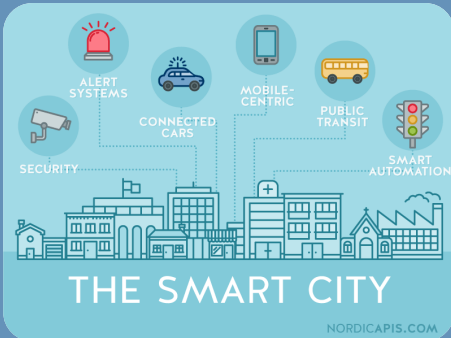
6 Technical Reports agreed

- Y.oneM2M.Ind.DE **"oneM2M Industrial Domain Enablement"**
- Y.oneM2M.UCC **"oneM2M Use Case Collection"**
- Y.oneM2M.DG.AppDev **"oneM2M- Application developer guide: Light control example using HTTP binding"**
- Y.oneM2M.DG.CoAP **"oneM2M Developer Guide of CoAP binding and long polling for temperature monitoring"**
- Y.oneM2M.DG.DM **"oneM2M- Developer guide of device management"**
- Y.oneM2M.DG.SEM **"oneM2M-Developer Guide of Implementing semantics"**

17 draft Recommendations consented during WP1/20 meeting in January 2018

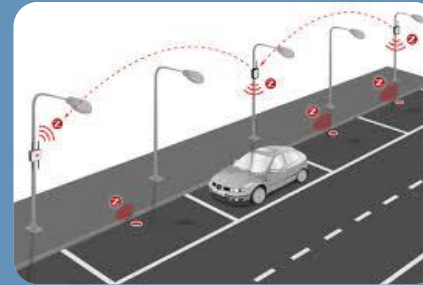
- Y.4118 (Y.IoT-AC-reqts) **"Internet of Things requirements and technical capabilities for support of accounting and charging"**
- **Y.4119** (ex. Y.AERS-reqts) **"Requirements and capability framework for IoT-based automotive emergency response system"**
- Y.4456 (ex. Y.SPL) **"Requirements and Functional Architecture for Smart Parking Lot in Smart City"**
- Y.4500.4 (ex Y.oneM2M.SLCP) **"oneM2M Service Layer Core Protocol Specification"**
- Y.4500.6 (ex Y.oneM2M.DM.BBF) **"oneM2M Management enablement (BBF)"**
- Y.4500.15 (ex Y.oneM2M.TF) **"oneM2M- Testing framework"**
- Y.4500.10 (ex Y.oneM2M.PB.MQTT) **"oneM2M- MQTT Protocol Binding"**
- Y.4500.14 (ex Y.oneM2M.IWK.LwM2M) **"oneM2M- LwM2M Interworking"**
- Y.4500.13 (ex Y.oneM2M.InteropTest) **"oneM2M- Interoperability Testing"**
- Y.4500.22 (ex Y.oneM2M.FDC) **"oneM2M- Field Device Configuration"**
- Y.4500.5 (ex Y.oneM2M.DM.OMA) **"oneM2M- Management enablement (OMA)"**
- Y.4500.11 (ex Y.oneM2M.CT) **"oneM2M- Common Terminology"**
- Y.4500.9 (ex Y.oneM2M.PB.HTTP) **"oneM2M- HTTP Protocol Binding"**
- Y.4500.8 (ex Y.oneM2M.PB.CoAP) **"oneM2M- CoAP Protocol Binding"**
- Y.4500.23 (ex Y.oneM2M.HAIM) **"oneM2M-Home Appliances Information Model and Mapping"**
- Y.4500.12 (ex Y.oneM2M.BO) **"oneM2M Base Ontology"**
- Y.4500.20 (ex Y.oneM2M.PB.WebSocket) **"oneM2M- WebSocket Protocol Binding"**

Some examples of SG20 achievements on IoT and SC&C:



ITU-T Y.4200 “Requirements for interoperability of smart city platforms”

This Recommendation defines the requirements for interoperability of a **Smart City Platform (SCP)** and reference points in order to ensure the correct functioning of the city services.



ITU-T Y.4456 “Requirements and Functional Architecture for Smart Parking Lot in Smart City”

Smart Parking Lot can provide various parking services for different scenarios of parking lots. The typical services include parking guidance, parking space reservation, vehicle reverse search, vehicle automatic access control and self-service payment. This Recommendation specifies requirements and functional architecture for Smart Parking Lot.

Smart Sustainable city definition

“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”.



What will future cities look like?



Strengthening Regional & International Collaboration

Regional Groups

- SG20RG-LATAM
- SG20RG-ARB
- SG20RG-AFR
- SG20RG-EECAT

JCA-IoT and SC&C

- Collaboration and coordination with other SDOs on topics on IoT and SC&C
- IoT and SC&C online standards roadmap

FG-DPM



SDOs







United for Smart Sustainable Cities (U4SSC) initiative



U4SSC is a UN initiative which serves as the global platform to advocate for public policy and to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities.



U4SSC current work:

-  Guidelines on tools and mechanisms to finance SSC projects
-  Guidelines on strategies for circular cities
-  City science application framework
-  Blockchain 4 cities



U4SSC Annual Meeting, 26 April 2018, Malaga, Spain



KPIs Project for Smart Sustainable Cities to Reach SDGs



- To support cities in the implementation and use of the SSC KPIs
- To test and verify the applicability of SSC-KPIs in several cities of the world.
- To develop a global **Smart Sustainable Cities (SSC) Index**.

More than **50 cities** are participating in the project

Dubai

Maldonado

Singapore

Manizales

Valencia

Pully

Wuxi

Guangshan

Foshan

Moscow

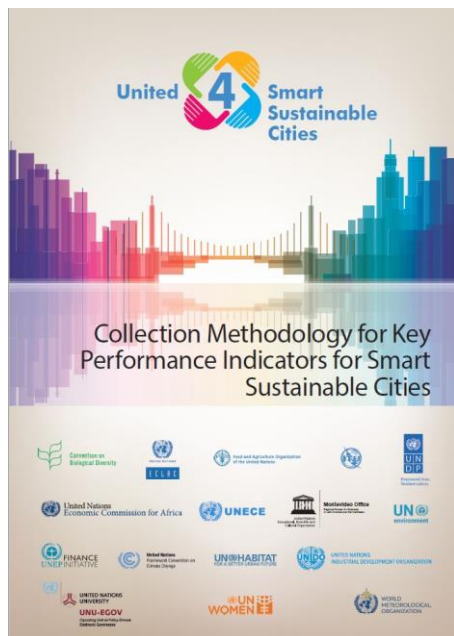
Kairouan

Bizerte






and many others...

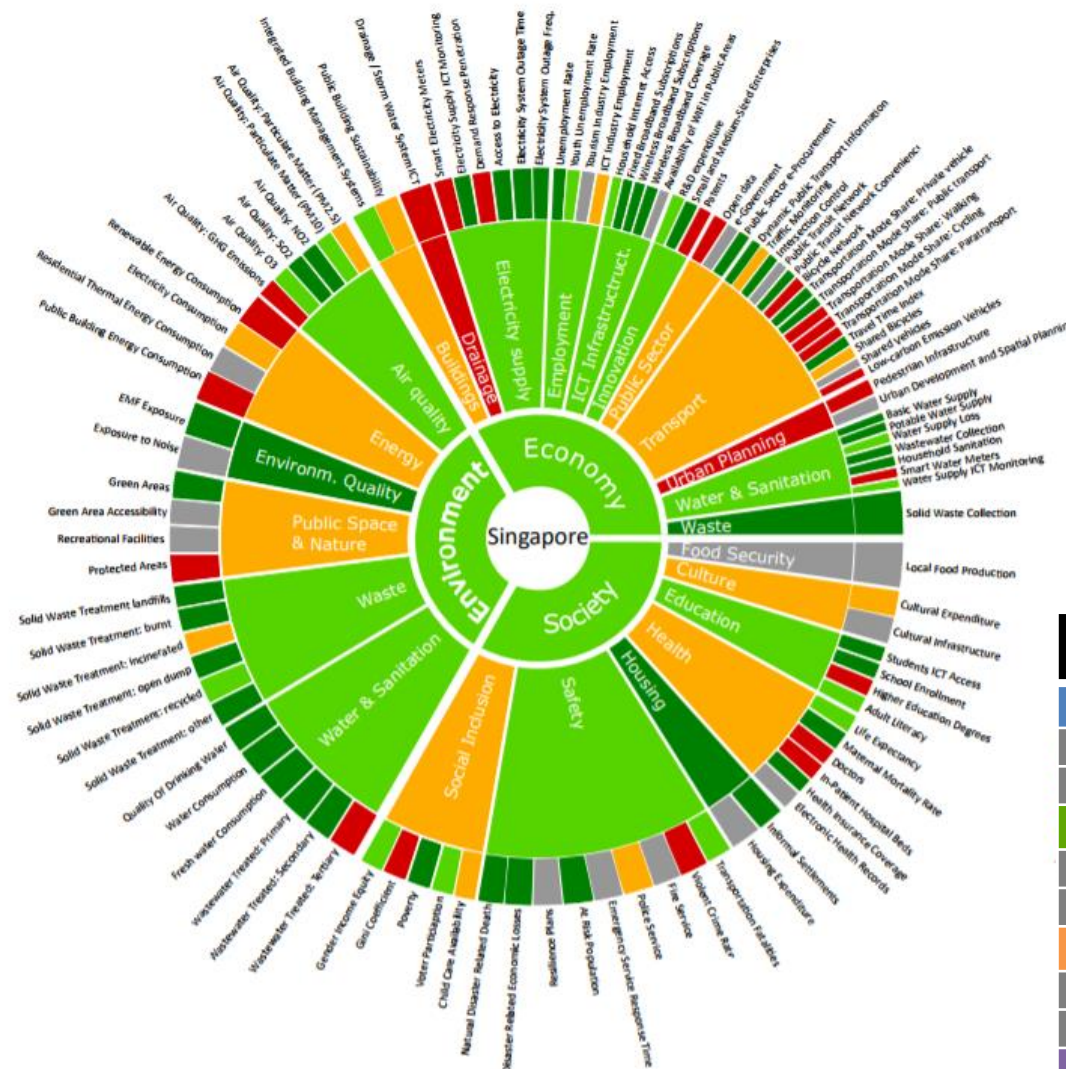


KPIs Project for Smart Sustainable Cities to Reach SDGs



Target(s) has (have) been reached

- | | |
|---|--|
|  | completely (+/- 5%) |
|  | by more than two thirds |
|  | between one and two thirds |
|  | by one third or less |
|  | no target found
(i.e. no score available) |

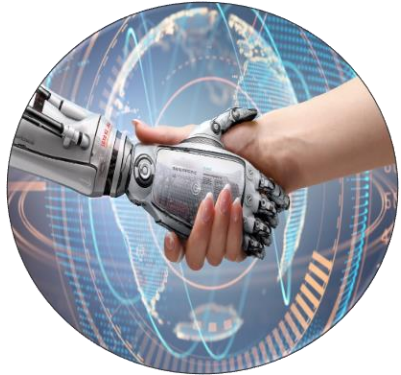


The Case of Singapore

87%
of the KPIs verified

	Total	% KPIs Verified of Total KPIs
Economy		
Core KPIs	23	100%
Advanced KPIs	22	82%
Environment		
Core KPIs	12	100%
Advanced KPIs	5	60%
Society & Culture		
Core KPIs	20	90%
Advanced KPIs	9	56%
Overall		
Core KPIs	55	96%
Advanced KPIs	36	72%
Total	91	87%

Publications on IoT and Smart Sustainable Cities



Flipbook on Unleashing the potential of the Internet of Things



Flipbook on Shaping smarter and more sustainable cities: Striving for Sustainable Development Goals



Flipbook on Implementing ITU-T International Standards to Shape Smart Sustainable Cities: The Case of Dubai



- Flipbook on "Connecting cities and communities with the SDGs"
- Flipbook on "Enhancing innovation and participation in smart sustainable cities"
- Flipbook on "Implementing SDG11 by connecting sustainability policies and urban planning practices through ICTs"

Available on ITU website for free!

Raising awareness on IoT and SC&C

Over 15 events
organized on IoT
and smart cities
and communities

- **U4SSC Annual Meeting**, Malaga, Spain, 26 April 2018
- **ITU-T SG20 meeting**, Cairo, Egypt, 6-16 May 2018.
 - **Forum on Exploring the Potential of Artificial Intelligence and Internet of Things & Training on IoT**, 6 May 2018, Cairo, Egypt
 - **Showcase on IoT solutions**, 6-8 May 2018, Cairo Egypt
 - **Interop testing event on IoT**, 8-9 May 2018, Cairo, Egypt
 - **JCA-IoT and SC&C**, 10 May 2018, Cairo, Egypt
- **1st Forum on Artificial Intelligence and the Internet of things in Smart Sustainable Cities in Latin America**, Buenos Aires, Argentina, 29-30 May 2018
 - Information Session on "Exploring the Role of Small Medium Enterprises (SMEs) in Linking AI and IoT in Smart Cities", 30 May 2018 (09.30 to 11.30 a.m.), Buenos Aires, Argentina
- **IoT Week**, Bilbao, Portugal, 4-7 June 2018
- **Meeting of ITU-T SG20 Regional Group for Eastern Europe, Central Asia and Transcaucasia (SG20 RG-EECAT)**, Saint Petersburg, Russian Federation, 4-6 June 2018.
 - **ITU Regional Conference on "Internet of Things, Telecommunication Networks and Big Data as Basic Infrastructure for Digital Economy"**, 4-6 June 2018 (mornings)
- International Workshop on Smart City and e-Government, Vietnam, 4-6 July 2018



Thank you

**ITU-T, IoT and smart
cities & communities**

<http://itu.int/go/tsg20>

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