Driving Internet of Things (IoT) standardization to build smart sustainable cities

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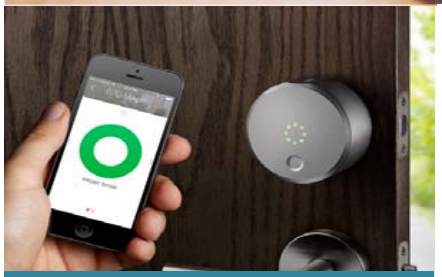
ITU-TSB

Mobile-broadband penetration globally is reaching 47% in 2015, a value that increased 12-fold since 2007.

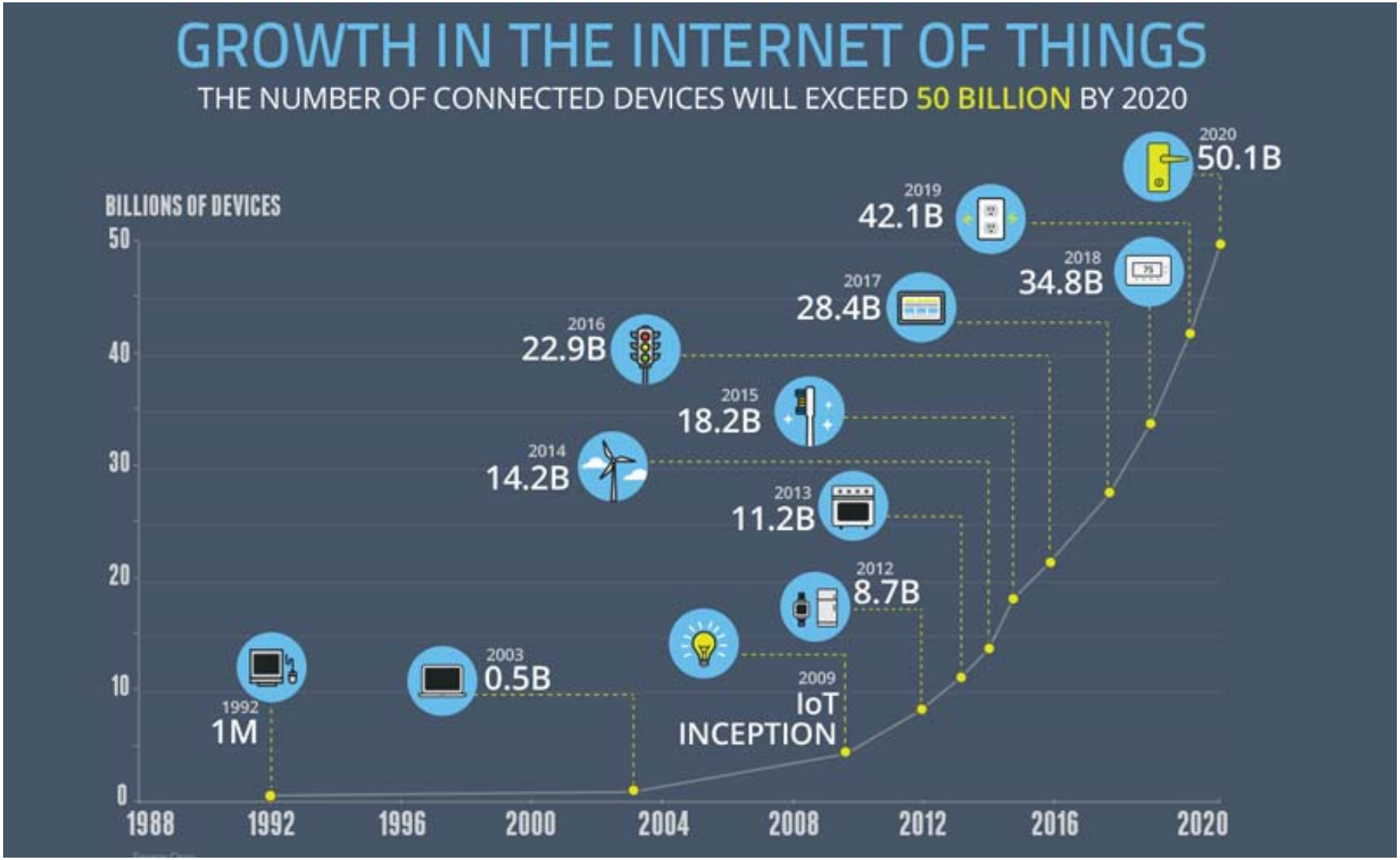


By end 2015, there are more than 7 billion mobile cellular subscriptions.

The world is changing!

Globally 3.2 billion people are using the Internet by end 2015, of which 2 billion are from developing countries.

- Network, connectivity, functionality are increasing



Source: Cisco (March, 2015)

ITU: Connecting the unconnected

Intelligent -> KNOW

An intelligent device is any type of equipment, instrument, or machine that **has its own computing capability**.

(source: technopedia)

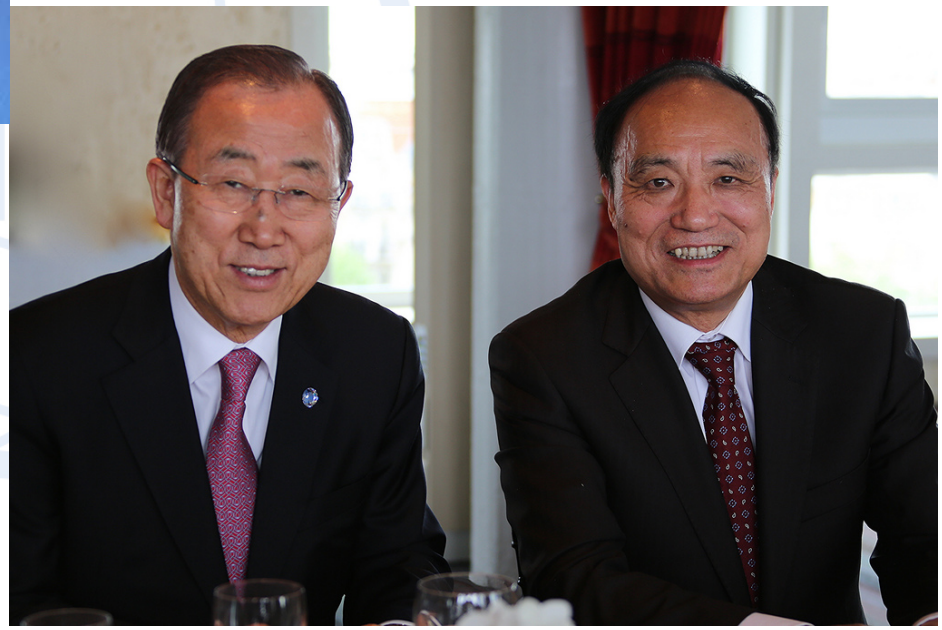
Smart -> SHARE

A smart device is an electronic device, generally **connected to other devices** or networks via different protocols.

(source: Wikipedia)

ITU

- UN specialized agency for ICTs
- Also a standards-developing-organization – ITU-T
- unique public/private partnership

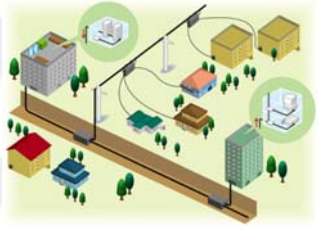


Members:

- 193 Member States (Governments and regulatory bodies)
- Over 700 Private Sector (Sector Members and Associates)
- Over 90 Academia

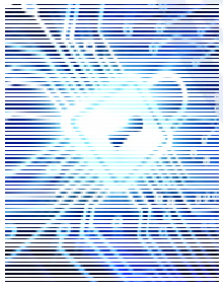
ITU-T develops international standards









Director, Telecommunication Standardization Bureau (TSB), ITU

International standards are cornerstones of a connected world

WORK WITH US

- Encourage competitive advanced technologies
- Lower prices
- Reduce technical barriers for global trade
- Foster interoperability
- Avoid 'locked-in' by vendors
- Reduce negative impacts on environment.

IoT and ITU-T

2005: Seminal report published by ITU

2007~2012: Tags and USN standardization

2011: Coordination activity on IoT; Global Standards Initiative

2012: Foundational standard ITU-T Y.2060 – definition, reference model

2012 – 2015: Dozens of IoT application related standards approved

2012 – 2013: Focus Group on M2M Service Layer produces five deliverables, including e-health vertical

2013, 2015: series of Continua e-health wearables / personal health device specifications become ITU standard – ITU-T H.810

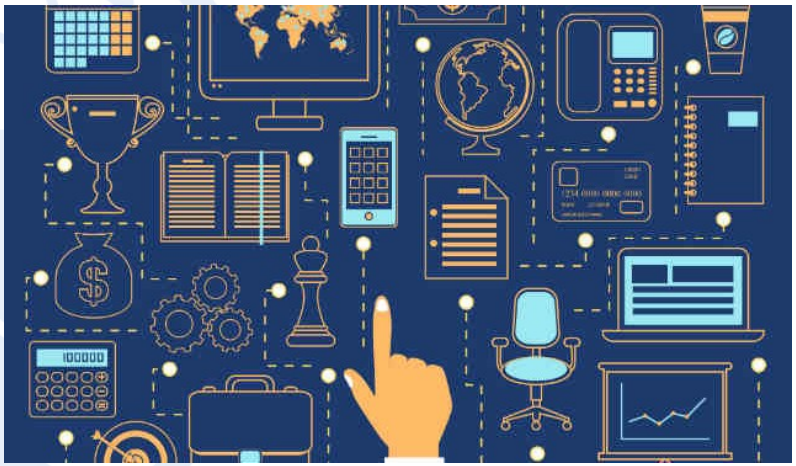
2015: New Study Group 20 created "IoT and smart cities and communities"

Building Smart Cities & IoT

- Cities are powerful engines of economic growth
- Global urbanization rate: 54% (2014), will reach 70% (2050)
- Urbanization faces significant sustainability challenges
  - over 70% of GHG emissions
  - 60-80% of global energy consumption
- ICTs have a crucial role to play
  - increasing environmental efficiency across industry sectors
  - intelligent transport systems (ITS)
  - "smarter" water, energy and waste management.

ITU-T Study Group 20 (SG20) on "Internet of Things and its applications, including smart cities and communities"

- ITU-T Focus Group on Smart Sustainable Cities (FG-SSC) concluded its activities in 2013-2015 with the release of 21 technical reports and specifications
- ITU-T SG20 was established in June 2015 to make international standards on IoT technologies, including machine-to-machine communications and ubiquitous sensor networks.
  - First meeting: 19-23 October 2015, Geneva, Switzerland



SG20 management team

SG20 Chairman

- Nasser Saleh AL MARZOUQI (United Arab Emirates)

SG20 Vice Chairmen

- Fabio BIGI (Italy)
- Silvia GUZMÁN ARAÑA (Spain)
- Takafumi HASHITANI (Japan)
- Hyoung Jun KIM (Republic of Korea)
- Abdulrahman M. AL HASSAN (Saudi Arabia)
- Ziqin SANG (China)
- Sergio TRABUCHI (Argentina)
- Sergey ZHDANOV (Russian Federation)

SG20 Structure

	Title
PLEN	
Question 1/20	Research and emerging technologies including terminology and definitions
Working Party 1	**Internet of Things (IoT)**
Question 2/20	Requirements and use cases for IoT
Question 3/20	IoT functional architecture including signalling requirements and protocols
Question 4/20	IoT applications and services including end user networks and interworking
Working Party 2	**Smart cities and Communities (SC&C)**
Question 5/20	SC&C requirements, applications and services
Question 6/20	SC&C infrastructure and framework

- See: http://www.itu.int/en/ITU-T/studygroups/2013-2016/20/Pages/structure.aspx
- List of Questions: http://www.itu.int/en/ITU-T/studygroups/2013-2016/20/Pages/questions.aspx

SG20 areas of work

SG20 will develop standards and guidelines that leverage IoT technologies to address urban-development challenges.

Key standardization work will include, *inter alia*:

- end-to-end architectures for IoT
- mechanisms for the interoperability of IoT applications
- datasets employed by various vertically oriented industry sectors.

Photo credit: custominfographics.org

What is IoT

A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable ICTs.

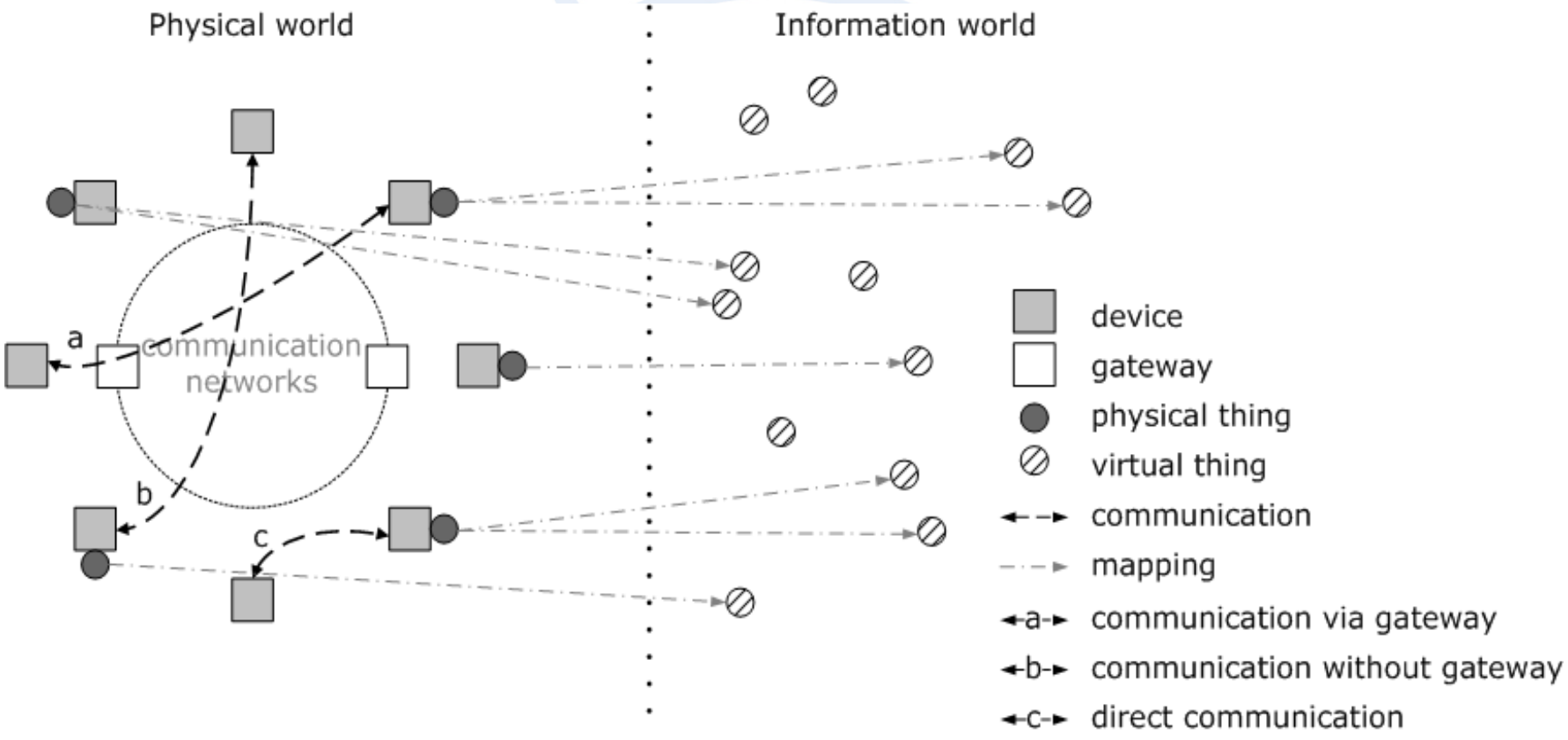
Characteristics:

- Interconnectivity
- Things-related services
- Heterogeneity
- Dynamic changes
- Enormous scale

Source: Recommendation ITU-T Y.2060

How IoT works

Technical overview of IoT



Source: Recommendation ITU-T Y.2060

How IoT works

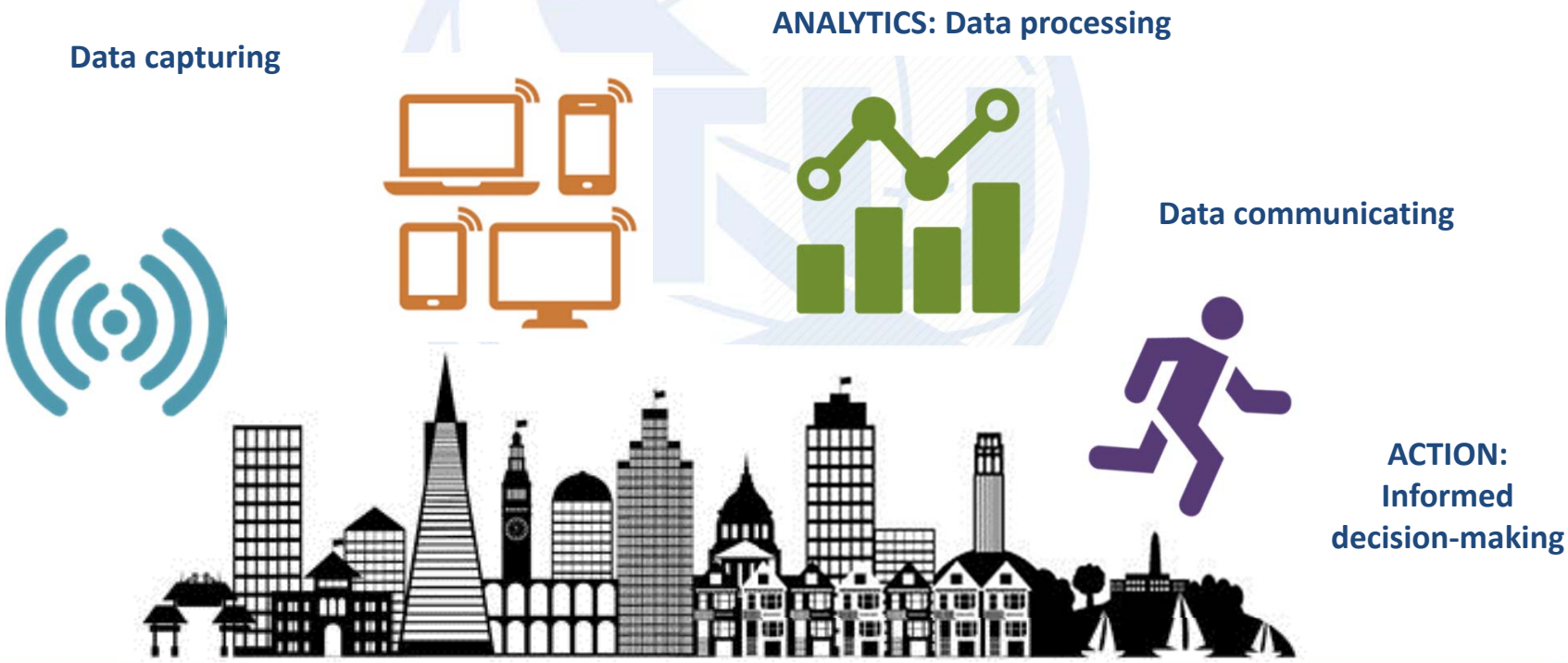
Technical overview of IoT

- Identification-based connectivity
- Interoperability
- Autonomic networking
- Autonomic service provisioning
- Location based capabilities
- Security
- Privacy protection
- High quality and highly secure human body related services
- Plug and play
- Manageability

Source: Recommendation ITU-T Y.2060

What IoT can do

Through the exploitation of identification, data capture, processing and communication capabilities, IoT makes full use of “things" to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled.



Source: Recommendation ITU-T Y.2060

IoT applications for smart sustainable cities and citizens

- Smart cities are projected to use 2.7 billion connected things in 2017

Source: Gartner (data in millions)

Building smart sustainable cities

IoT-enabled services and infrastructure to improve and manage power, resources and urban planning.

First internationally agreed 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"*

UNECE

ITU-T Focus Group on Smart Sustainable Cities

Mandate and achievements

- Established in February 2013 and concluded in May 2015
- As an open platform for smart-city stakeholders
- Over 150 participants/collaborators from different stakeholders
- Liaison with other SDOs (ETSI, ISO, IEC etc) & IGOs (UNFCCC, UN-Habitat, etc)
- 21 technical specifications and reports approved

Working groups

WG1. ICT role and roadmap for SSC

WG2. SSC infrastructure

WG3. Standardization gaps, KPIs and metrics

WG4.Policy and positioning

1. TR on "An overview of smart sustainable cities and the role of ICTs"
2. TR on "Smart sustainable cities: an analysis of definitions"
3. TR on "Key performance indicators (KPI) definitions for smart sustainable cities"
4. TS on "Overview of KPI in smart sustainable cities"
5. TS on “KPIs related to the use of ICT in smart sustainable cities"
6. TS on "KPIs related to the sustainability impacts of ICT in smart sustainable cities"
7. TR on "Electromagnetic field (EMF) considerations in smart sustainable cities"
8. TR on "Smart water management in cities"
9. TR on "ICTs for climate change adaptation in cities"
10. TR on "Cybersecurity, data protection and cyber resilience in smart sustainable cities"
11. TR on "Integrated management for smart sustainable cities"
12. TR on "Standardization roadmap for smart sustainable cities"
13. TR on "Setting the stage for stakeholders’ engagement in smart sustainable cities"
14. TR on "Master plan for smart sustainable cities"
15. TR on "Smart sustainable cities: a guide for city leaders"
16. TR on "Overview of smart sustainable cities infrastructure"
17. TS on "Setting the framework for an ICT architecture of a smart sustainable city"
18. TS on "Multi-service infrastructure for smart sustainable cities in new-development areas"
19. TR on "Intelligent sustainable buildings for smart sustainable cities"
20. TR on "Anonymization infrastructure and open data in smart sustainable cities"
21. TR on "Standardization activities for smart sustainable cities"

Core Pillars of a Smart Sustainable City

Economy	Governance	Environment	Society
•Employment •GDP •Market – Global / Local •Viability •Investment •PPP •Value Chain •Risk •Productivity •Innovation •Compensation	•Regulatory •Compliance •Processes •Structure •Authority •Transparency •Communication •Dialog •Policies •Standards •Citizen Services	•Sustainable •Renewable •Land Use •Bio-Diversity •Water / Air •Waste •Workplace	•People •Culture •Social Networks •Tech Savvy •Demographics •Quality of Life •User Experiences •Equal Access •End Consumers •Community Needs •The City as a Database

KPIs for smart sustainable cities

dimension	indicators
ICT	14, covering Network facilities, Information facilities
Environmental sustainability	14, covering Environment, Energy and natural resources
Productivity	12, covering Innovation, Economy sustainability
Quality of life	22, covering Convenience and comfort, Security and safety, Healthcare, Education and training
Equity and social inclusion	11, covering Openness and public participation, Social sustainability, Governance sustainability
Non-ICT infrastructure development	15, covering Building, Transport, Sanitation, Municipal pipe network

Smart sustainable cities: a six step transition cycle

Six step transition cycle in details (1)

1. Set the vision

- Political priorities of the city
- Long-term development strategies
- Identify the relevant SSC stakeholders

2. Identify targets

- Development of an appropriate SSC infrastructure
- Development of SSC service by integrating ICT into existing urban services

3. Political commitment

- Achievement of consensus and support for the implementation of the SSC vision and targets

Six step transition cycle in details (2)

4. Build your SSC

- Establishment of a feasible master plan for the SSC transition
- Ensure good operation and maintenance

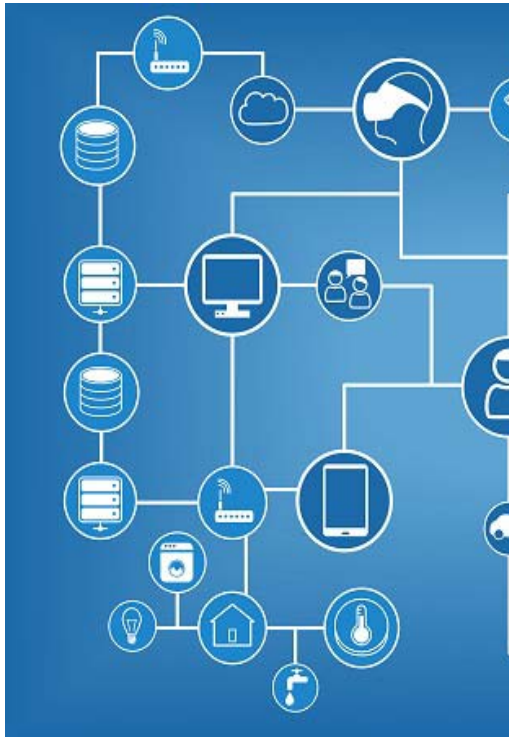
5. Measure success

- Monitor, evaluation and assessment of the implementation of the master plan
- *Use the FG-SSC KPIs as baseline*

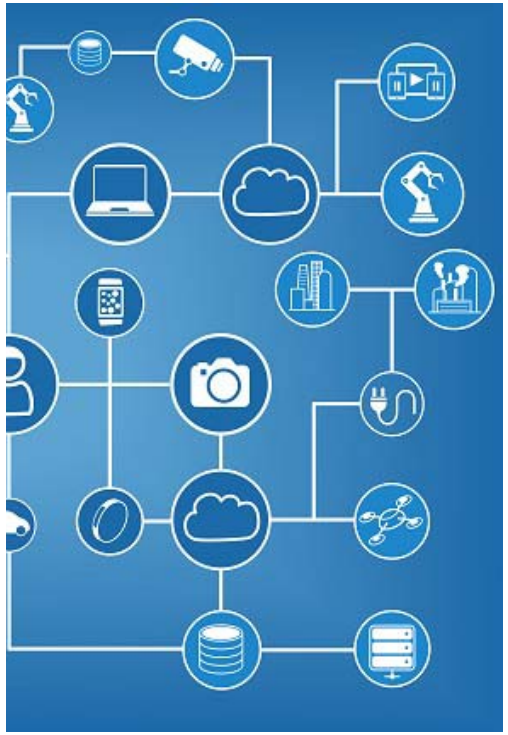
6. Ensure accountability

- Analysis and reporting of the progress achieved
- Identification and preparation of future plans

Joint Coordination Activity on Internet of Things and Smart Cities & Communities



- coordinate across ITU
- contact point to cooperate with all
- Maintain a list of IoT & SCC standardization items and associated roadmap cross-SDOs.



http://itu.int/en/ITU-T/jca/iot/Pages/default.aspx

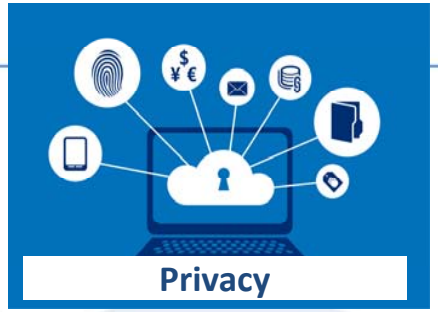
A win-win way forward for the future of IoT

IoT involves many stakeholders, spans multiple industries, and differs widely in application scenarios, user requirements hence respective policy/regulation.

Standardization can create the necessary framework for any large-scale IoT deployment and ensure commercial revenues in future.

Building trust


Openness


Privacy


Scalability


Resilience

Data protection


Flexibility


Security


Cultural and age adaptation


Reliability

Overview

- **14 December:** 10th ITU Symposium on ICTs, Environment & Climate Change - From the New Climate Agreement to the New Urban Agenda, jointly organized with UN-Habitat.
- **15 December:** Forum on "Turning the E-waste Challenge into an Opportunity", jointly organized by BCRC-Caribbean, CRBAS, ECLAC, ITU, UNESCO, UNIDO and UNU.
- **16 December:** Training on “Green ICT Policies and Standards”, jointly organized by CRBAS, ECLAC and ITU. (morning)
- **16 December:** Forum on "Driving the Connect 2020 Agenda". (afternoon)
- **17- 18 December:** Forum on "Powering Smart Sustainable Cities With the Internet of Things", jointly organized by ITU, UN-Habitat and UNESCO.

BASEL CONVENTION · CRBAS Centro Regional Basilea para América del Sur · UN-HABITAT FOR A BETTER URBAN FUTURE · ECLAC · UNESCO · UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION · UNU-IAS UNITED NATIONS UNIVERSITY · URCA

Next SG20 Meeting

- **Next SG20 Meeting:** 18-26 January 2016, Singapore

Forum on “Internet of Things in Smart Sustainable Cities: A New Age of Smarter Living”

This forum will provide a platform to discuss why the Internet of things will be at the heart of smart city transformation.

When: 18 January 2016
Where: Suntec Singapore Convention & Exhibition Centre, Singapore

Pilot the ITU's SSC-KPIs in your city

Background

- A global project launched by ITU in cooperation with other UN agencies to support cities in the implementation and use of the ITU's SSC-KPIs developed by FG-SSC.

Objectives

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

بلدية دبي
DUBAI MUNICIPALITY

Dubai first city to trial ITU key performance indicators for smart sustainable cities

Pilot project to assess city progress and inform urban-development policies

First pilot project, May 2015

Pilot the ITU's SSC-KPIs in your city

Benefits

- Cities will get a certificate from ITU
- Cities will be able to **measure** current **performance** and identify opportunities to **improve** city services towards sustainability and operational eco-efficiency.

Join ITU' Smart Sustainable Cities Initiative!

Smart Nation SINGAPORE
Many Smart Ideas • One Smart Nation

Singapore joins trial of ITU key performance indicators for smart sustainable cities

Trial of indicators to assist development of global smart sustainable city index

Future is about **people**

- IoT, cloud computing, big data, mobile technologies, …
- ICTs are to enable people to make **informed actions**
- ITU facilitate by setting standards, raising awareness and direct assistance
- ***Let's act together*** to realize this future!

THANK YOU

- **ITU-T SG20 "IoT and its applications including smart cities and communities (SC&C)"**
  itu.int/go/tsg20
- **Contact:** tsbsg20@itu.int