

**Dr. Ramy Ahmed Fathy, PhD**

**Director, Digital Services Planning and Risk Assessment, NTRA, Cairo, Egypt**

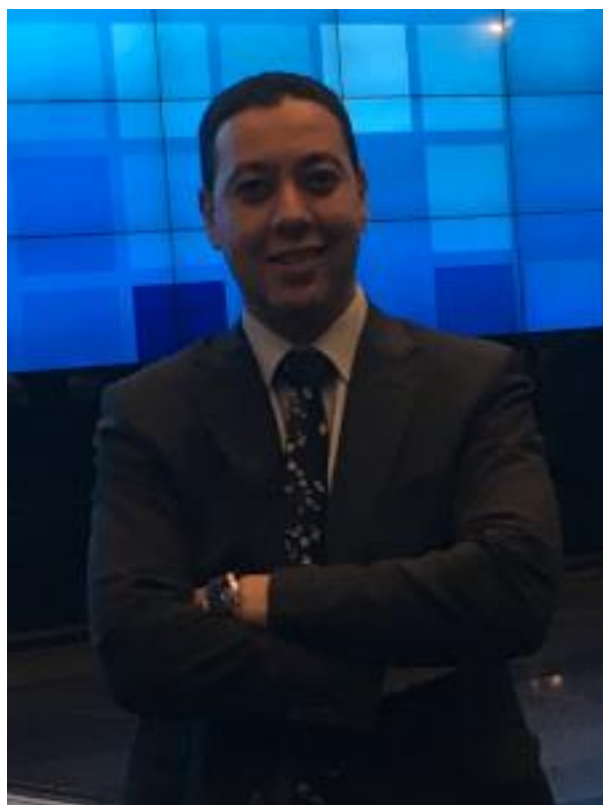
**Vice Chairman of ITU-T SG20 on IoT and its Applications including Smart Cities and Communities, Geneva, Switzerland**

Ramy Ahmed Fathy is the Director of Digital Services Planning and Risk Assessment at the Egyptian National Telecom Regulatory Authority (NTRA). As the Director of Digital Services, he seeks the development and implementation of sustainable and effective digital services in the Egyptian market. His role at NTRA includes the development of guidelines, regulatory frameworks, viable business models, and effective specifications & technical operating parameters, which ensure efficient and effective services' operation. He is leading the design, and specifications development of intelligent and digital services; addressing interoperability, risk, regulatory impact assessment and services' market adoption while employing a wide set of tools related to radio network planning, transport design, market modeling, and optimization.

Fathy has been actively involved at the different stages of development of various intelligent ICT systems and services, in addition to numerous ICT-for-development and digital transformation initiatives including national broadband networks, smart cities, m2m and IoT enabling regulatory frameworks, smart utilities, eGov, water management, and next generation access planning. His 15 years of experience include projects design, budgeting, and planning of smart cities, enterprise automation, DTV transformation, and Intelligent Transportation Systems (ITS).

Over the past 10 years, Fathy has served in key roles in the international standardization arena. In 2012, he served as the Vice-Chairman of the ITU-T Focus Group of Bridging the Gap between Innovations and Standardization (Focus Group Innovation). One year later, he was elected as the Chairman of the ITU-T Focus Group on Smart Water Management for a period of two years. Currently he is serving as the Vice Chairman of the ITU-T Study Group 20 (SG20) on IoT and its applications including smart cities and communities since late 2015 where he is leading activities related to the standardization of end-to-end architectures for IoT and smart cities, intelligence, mechanisms for the interoperability of IoT applications, security, and identification aspects of IoT systems.

Fathy has a PhD in electronics and communications. He has led R&D projects in radio network planning and optimization, cognitive radio systems, video coding, cryptography, DSP/FPGA/GPP based implementations of consumer electronics products and satellite communication systems. He has numerous publications in esteemed journals and conferences, and he's the author of one book in electronics.





# IoT Standardization Landscape and Opportunities

Bahrain 01 October 2018  
AREGNET Workshop on  
IoT & M2M

Ramy A. Fathy  
SG20 Vice chairman



# MENA region is facing challenges on the horizon!



**646 Million**  
residents will be  
living in Arab  
World by 2050



**1.8 % Growth**  
weighted  
average growth  
of real GDP in  
2017 instead of  
5% in 2016

Oil importers

Oil exporters

2015

2016

2017



**1.5 million**

people are added to the  
global urban population  
every week<sup>7</sup>

By 2025, there could be  
nearly 40 cities with a  
population of over 10  
million<sup>8</sup>



**50%**  
of global GDP is generated  
by the 300 largest  
metropolitan areas<sup>3</sup>

The number of people living  
in urban slums since 1990  
has increased by

**33%**<sup>5</sup>



Income inequality in the 50  
biggest cities in the US is  
20% higher than the US  
average<sup>6</sup>



You need a new Industry  
Ecosystem  
Market



# \$10+ trillion per year in 2025 for some IoT applications !

- ❑ Interoperability for capturing value
  - 40-60 percent of potential value across IoT
- ❑ Data that are used today are mostly for anomaly detection and control
  - Optimization and prediction on the other hand provide the greatest value
- ❑ Amount of IoT value that can be realized in developing economies is comparable to that of advanced economies
  - 40% in developing versus 60% in developed

# The question is how?.. How value can be achieved?..

## View #1: Open Up

□ Operational Savings? → implement and deploy IoT.. → Consume technology as fast and as wide as you can → open up and embrace new technology

- Is that premise correct?

Did OTT enhance our economy? Any figures?

Did BB enhance our GDP? Every 10% increase in BB increases GDP by 1%.. ?

Do regulations and policies have an impact?

Ecosystem development (academia, manufacturers, developers, SMEs...etc.), is it key for success?



# The question is how?.. How value can be achieved?..

## View #2: Compete

□ Value proposition..? → Technology Development Focused → Higher quality? Lower price? Fill a gap (complement)? → Develop technology.. Design → R&D → Budget Allocation → IPR Protection → Standardize → Produce and Export .. technology to a wider market

- Is that premise correct?

The market is very dynamic.. How agile is your industry to face changing market requirements and evolving dynamics?

Time to market is very critical.. How fast are you to penetrate local and international markets?



# The question is how?.. How value can be achieved?..

## View #3: Collaborate (by any means possible)

□ Value proposition..? → Business Focused → If you can't compete in technology, create an attractive market/hub? → Lower barrier to entry/incentives to entry → Financial Schemes, Competition, and Regulatory Frameworks → Level Playing Field + Investors Protection → Consumers' Awareness Programs

- Is that premise correct?

Tendering policies have a major impact on the profitability of new entrants.. and hence on the economic impact expected..

e.g. requirements of PoC, conditions of prior experience, min investments, ...etc.





# With Standards, you can

- ❑ address the implementation, developmental, and collaboration views respectively, by:
  - Channeling in your local and regional requirements,
  - Achieving interoperability and interworking with competing standards and specifications
  - Serving as a venue for knowledge sharing, requirements gathering and analysis, and synergies creation

But, you need to have a wide lens for the standardization landscape



# ITU-T Activities on IoT & Smart Sustainable Cities



Development and  
implementation of standards

ITU-T Study Group 20



Research &  
pre-standardization work

Focus Group on  
**Data Processing  
Management (FG-DPM)**



Resolution 98

Enhancing the standardization of IoT and  
Smart Cities and Communities for global  
development

**IoT4SDGs:** Considers the importance of  
IoT to contribute to achieving the 2030  
Agenda for Sustainable Development.



Open platform for  
knowledge sharing &  
Forward looking research

United for Smart  
Sustainable Cities (U4SSC)



# ITU-T Study Group 20: Internet of things (IoT) and smart cities and communities (SC&C)

## Lead study group on

Responsible for studies relating to IoT and its applications, and smart cities and communities (SC&C).

It includes studies relating to Big data aspects of IoT and SC&C, e-services and smart services for SC&C

Internet of things (IoT) and its applications

Smart Cities and Communities (SC&C), including its e-services and smart services

IoT identification



**Last meeting: 06-16 May 2018 Cairo**

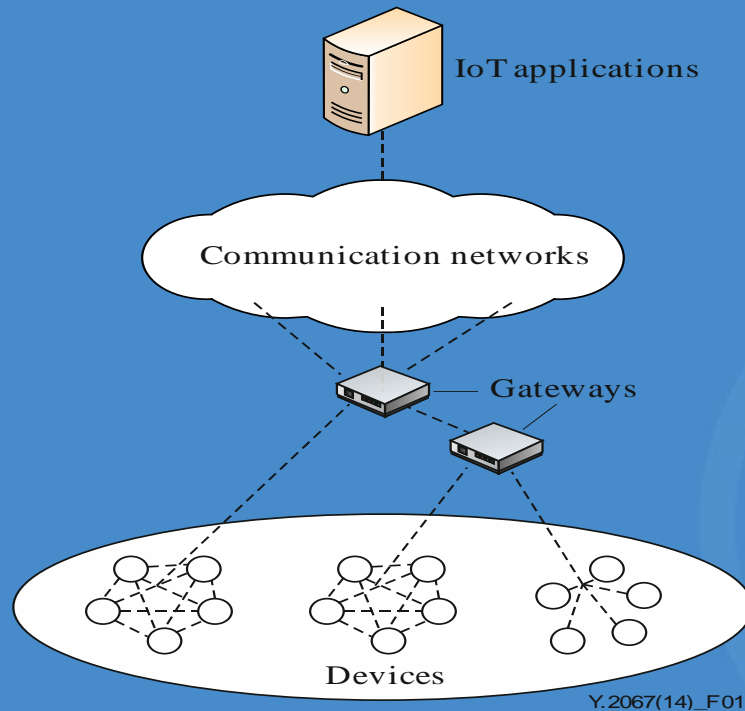
**2** Working Parties

**7** Questions

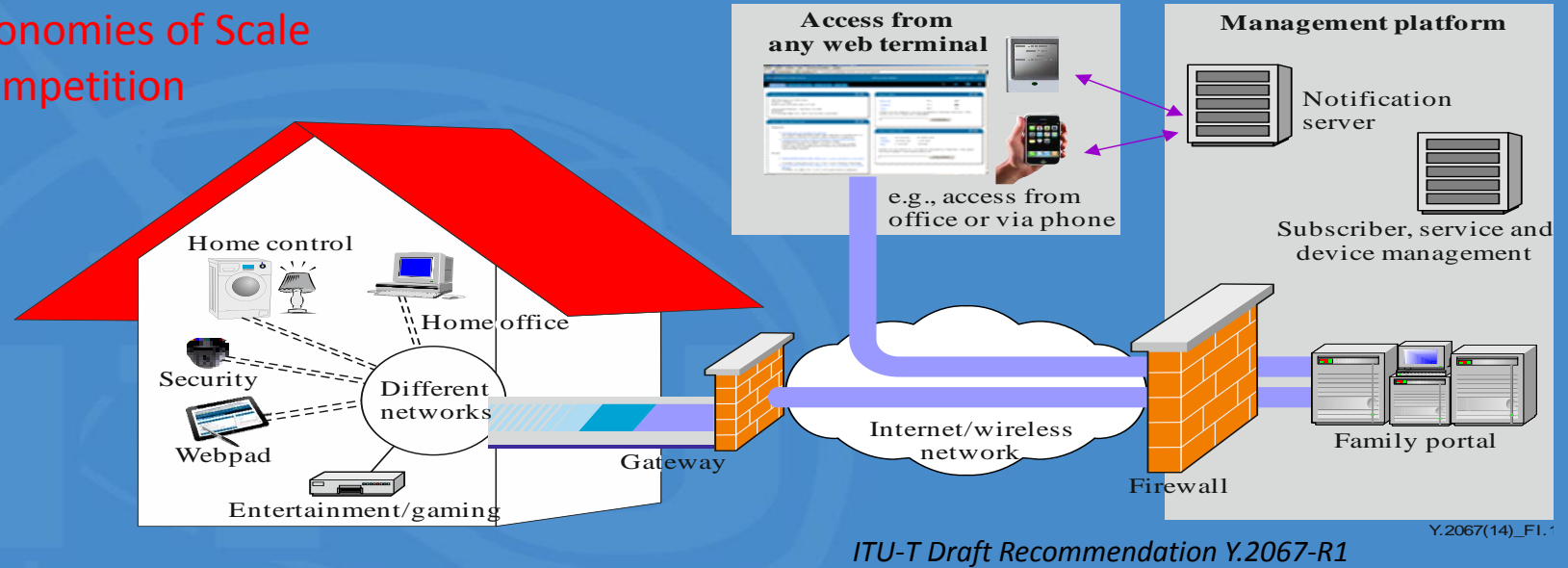
**4** Regional Groups

**Over 100** International experts

# Basic IoT Elements



Interoperability  
Economies of Scale  
Competition



# Key issues addressed in ITU-T SG20

- Research and emerging technologies, terminology, and definitions
- Evaluation and assessment of Smart Sustainable Cities and Communities
- Requirements, capabilities, and use cases across verticals
- Architectures, management, protocols, and Quality of Service
- e/Smart services, applications and supporting platforms
- Security, privacy, trust and identification
- End to end connectivity, networks, interoperability, infrastructures and Big Data aspects related to IoT and SC&C



## Some Relevant Ongoing Work Items :

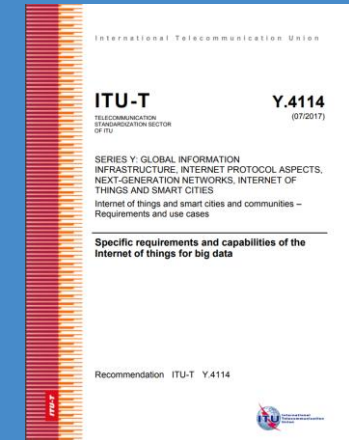
- Framework of Open Data in Smart Cities
- Functional architecture of service discovery for interworking between heterogeneous IoT platforms
- Open data application programming interface (API) for IoT data in smart cities and communities
- Framework of IoT-devices authentication in smart city
- Requirements and reference architecture of smart street light service



# Recently approved ITU-T Recommendations

## Recommendation ITU-T Y.4114 "Specific requirements and capabilities of the IoT for Big Data".

This Recommendation complements the developments on common requirements of the IoT [ITU-T Y.2066] and functional framework of the IoT [ITU-T Y.2068] in terms of the specific requirements and capabilities that the IoT is expected to support in order to address the challenges related to Big Data.

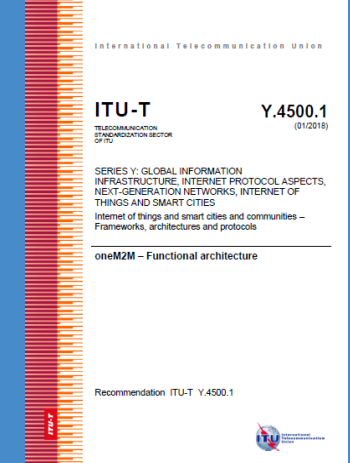


## Recommendation ITU-T Y.4500.1 "oneM2M – Functional architecture"

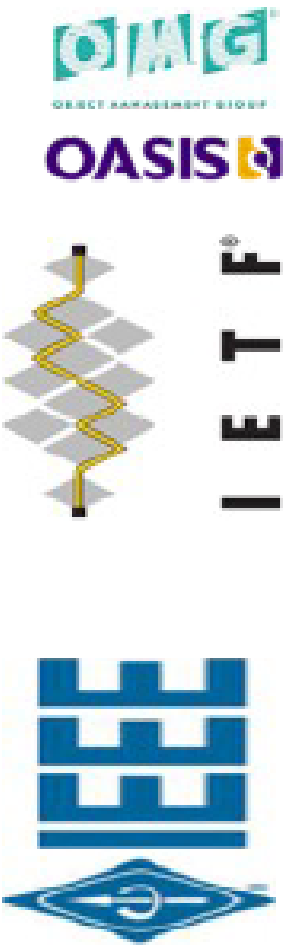
This Recommendation describes the end-to-end oneM2M functional architecture, including the description of the functional entities and associated reference points. oneM2M functional architecture focuses on the service layer aspects and takes underlying network-independent view of the end-to-end services. The underlying network is used for the transport of data and potentially for other services.

## Recommendation ITU-T Y.4201 "High-level requirements and reference framework of smart city platforms".

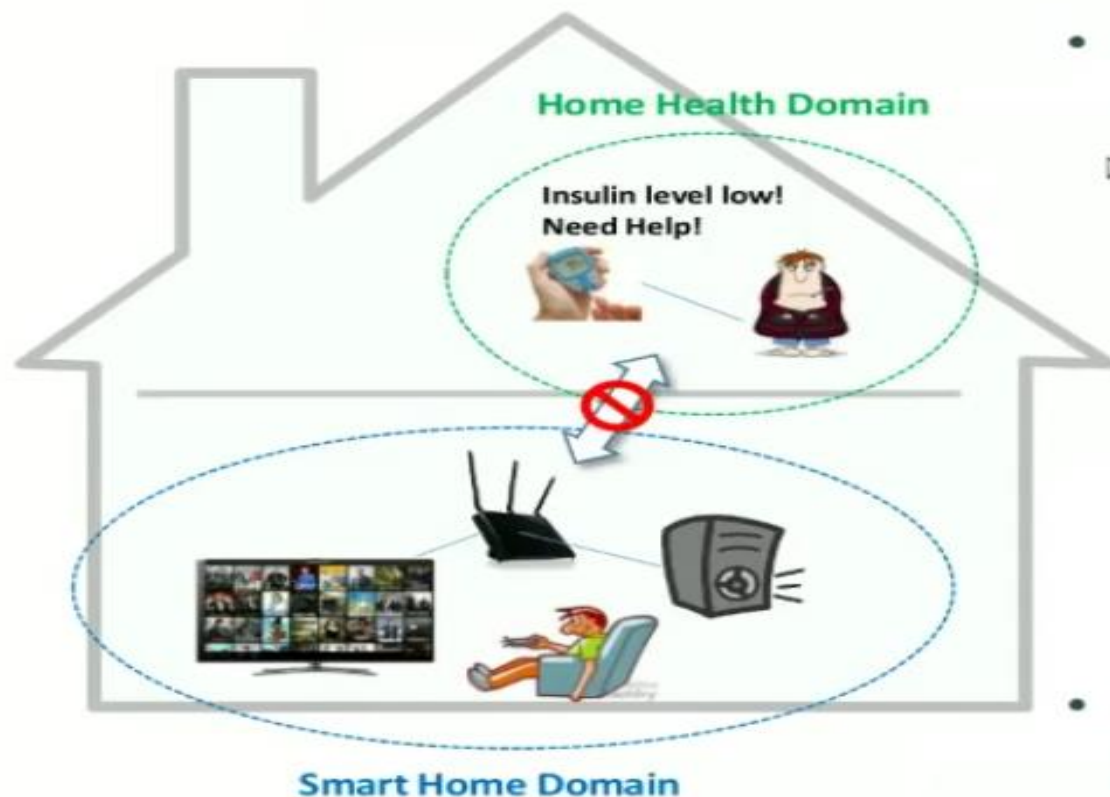
Recommendation ITU-T Y.4201 presents the high-level requirements and reference framework of smart city platforms (SCPs). The SCP is a fundamental platform supporting all the services and applications of a smart city, with the objective to improve quality of life, provide urban operation and services for the benefit of citizens while ensuring city sustainability.



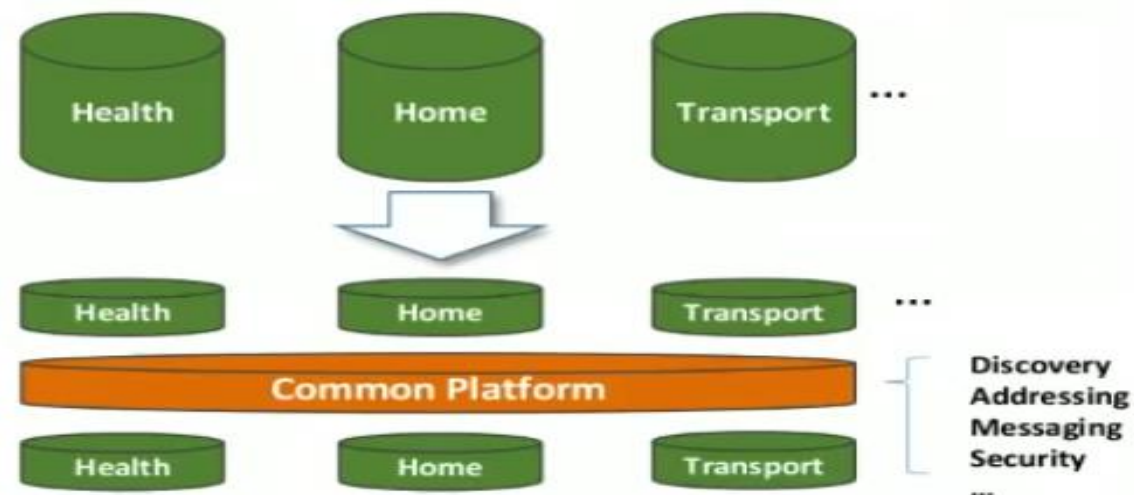
Let us have a lens view at the standardization ecosystem..  
ITU, ISO, IEC, IEEE, IETF, OASIS, OMG, 3GPP,...etc.

	Session	MQTT, SMQTT, CoRE, DDS, AMQP, XMPP, CoAP, IEC,...
	Network	<b>Encapsulation</b> 6LowPAN, 6TiSCH, 6Lo, Thread... <b>Routing</b> RPL, CORPL, CARP
	Datalink	WiFi, Bluetooth Low Energy, Z-Wave, ZigBee Smart, DECT/ULE, 3G/LTE, NFC, Weightless, HomePlug GP, 802.11ah, 802.15.4e, G.9959, WirelessHART, DASH7, ANT+, LTE-A, LoRaWAN, ISA100.11a, DigiMesh, WiMAX, ...

# IoTivity to solve IoT Vertical Silos

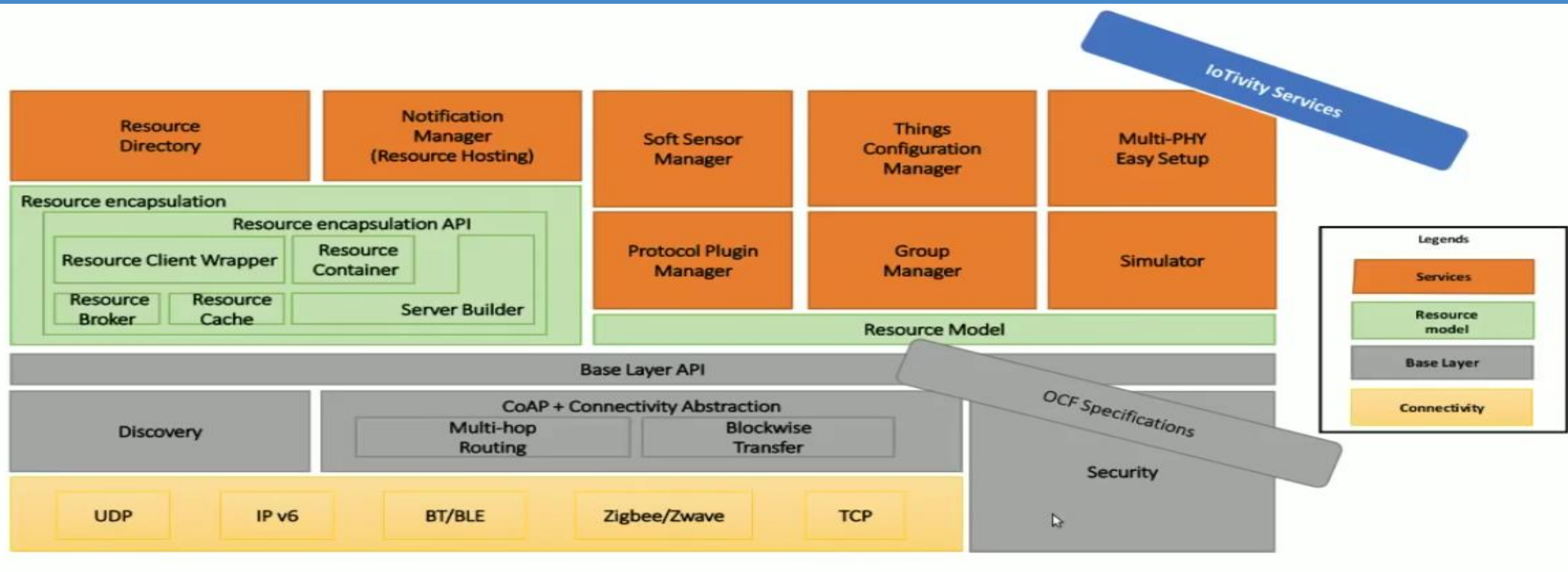


- Legacy vertical services usually designed as silos  
→ No common way to communicate among them



- A common platform provides a foundation for vertical services to collaborate and interoperate by providing common services and data models

# IoTivity Stack /OCF Building Blocks



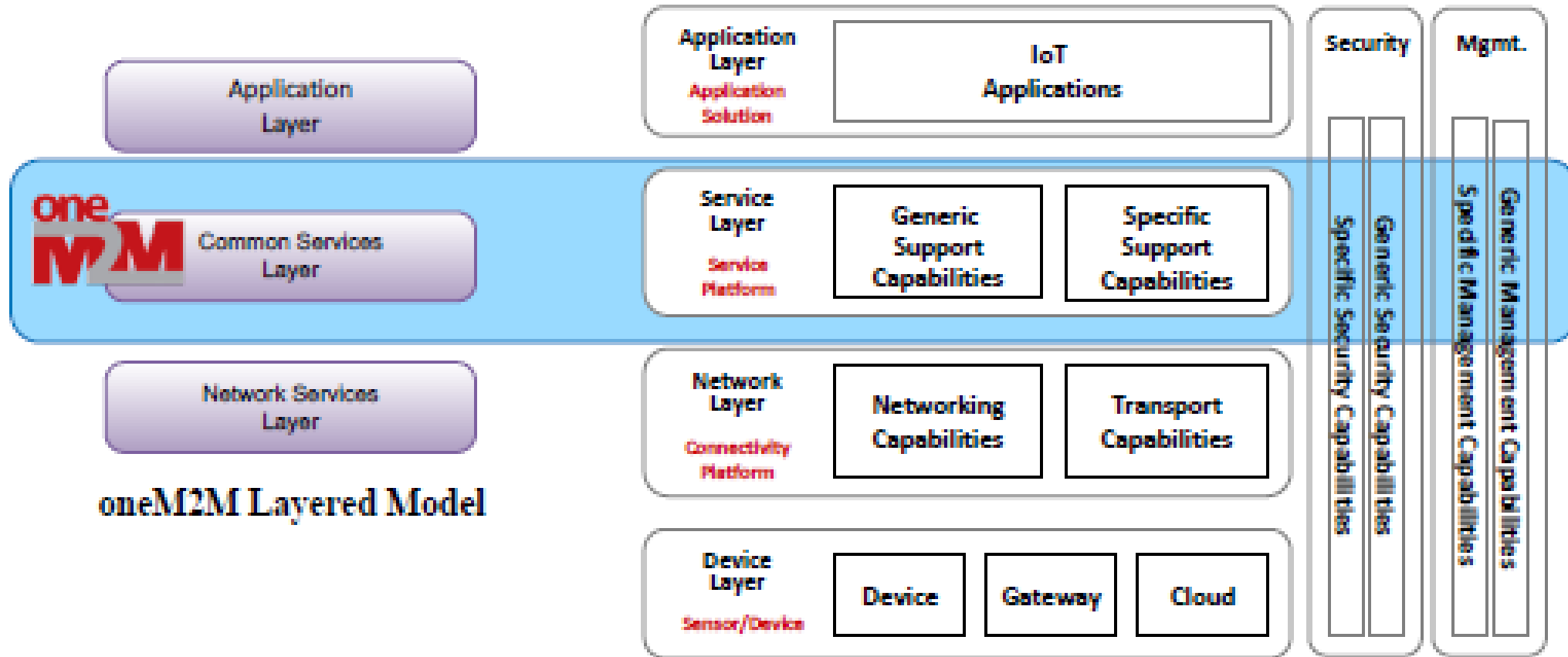
## January 2017

The Open Connectivity Foundation was approved as a Recognized JTC1 Publicly Available Specification JTC1 PAS Submitter. This allows OCF to submit its specifications for transposition into ISO/IEC International Standards.

## June 2017

The Open Connectivity Foundation submitted six (6) IoT specifications to JTC 1 for publication as International Standards by the International Standards Organization (ISO) and International Electrotechnical Commission (IEC). These documents are currently under vote by JTC 1.

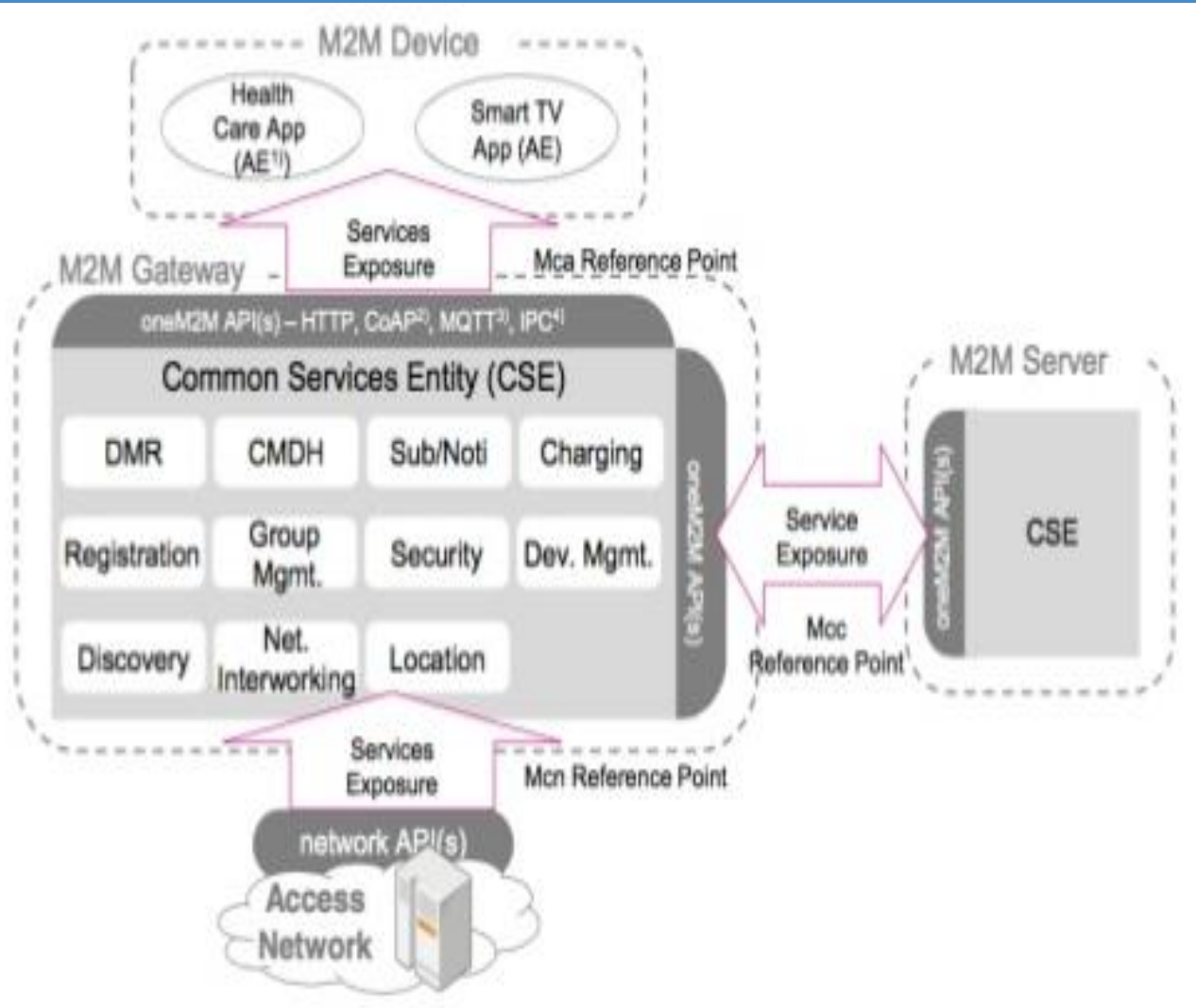
# OneM2M – a common service layer..



ITU-T Y.4000 IoT Reference Model



# OneM2M – a common service layer..



## Collaboration with ITU July 2015

ITU hosted the oneM2M Steering Committee Meeting (SC) in Geneva.. closer collaboration..

## September 2017 Modality of joint collaboration approved..

## January 2018 13-01-2018 Y.4500.1 approved by ITU-T SG20..

# Looking for the next gap? Or better want to collaborate @ a global scale?..

- Security?
- Data Models?
- Semantics?
- And many others ... (Join us 😊 )

**Thank you**

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

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

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# **Additional slides**

# Why you should join ITU?

United Nations specialized Agency  
for ICTs

Share your knowledge with **193**  
Member States, **700** Private Sectors  
and over **90** Academia



Address broad market needs



Embody diverse  
perspectives



Leverage expert  
knowledge



Serve as building blocks  
for innovation



Open new markets  
and applications



Encourage market  
competition



Drive global innovation  
and advancement



Streamline development  
and implementation



Reduce cost



Drive interoperability  
and scalability







# Focus Group on Data Processing and Management to support IoT and Smart Cities & Communities (FG-DPM)

## 5 Working Groups

WG1 - Use Cases, Requirements and Applications/ Services

WG2 - DPM Framework, Architectures and Core Components

WG3 - Data sharing, Interoperability and Blockchain

WG4 - Security, Privacy and Trust including Governance

WG5 - Data Economy, commercialization and monetization

## Key priorities:

To propose mechanisms , frameworks and guidelines for supporting the security, privacy and interoperability of datasets and data-management systems within the IoT and smart city domain.

**Fifth meeting:**  
Tunis, Tunisia, 17-20 Sept 2018

# JCA – IoT and SC&C



- To co-ordinate the activity on IoT & SCC across ITU-T Study Groups and to coordinate with ITU-R and ITU-D.
- To provide a visible contact point IoT and SC&C activities in ITU-T, to seek co-operation from external bodies working in the field of IoT & SCC and enable effective two-way communication with these bodies.
- Maintenance of a list of cross-SDO IoT & SCC standardization items and associated roadmap.
- Last meeting took place in Cairo, Egypt, 10 May 2018.
- Next meeting will be held in with SG20 meeting



## Co-Conveners:

- Hyoung Jun Kim (ETRI, Korea)
- Fabio Bigi (Italy)

## Secretariat:

Contact: [tsbjcaiot@itu.int](mailto:tsbjcaiot@itu.int)

**D.2r16** - IoT and SC&C standards roadmap  
([free download](#)) – **Send us your inputs!**








# United for Smart Sustainable Cities – (U4SSC)



U4SSC is a global platform for smart city stakeholders which advocates for public policy to encourage the use of ICTs to facilitate the transition to smart sustainable cities.

**JOIN us for the work on :**

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





# United for Smart Sustainable Cities – (U4SSC)

## 4 New publications!



Collection Methodology for  
Key Performance Indicators  
for Smart Sustainable Cities

Enhancing innovation and  
Participation in Smart  
Sustainable Cities

Connecting cities and  
communities with the  
Sustainable Development  
Goals

Implementing SDG11 by  
connecting sustainability  
policies and urban-planning  
practices through ICTs

**Available for FREE at:**

<http://itu.int/go/U4SSC>





# Implementing KPIs for Smart Sustainable Cities Worldwide



The U4SSC welcome  
all cities that would  
like to start their SSC  
journey!

54 Core Indicators + 37 advanced Indicators



# ITU-T SG20 Structure

WP1/20	Questions
<a href="#"><u>Q1/20</u></a>	End to end connectivity, networks, interoperability, infrastructures and Big Data aspects related to IoT and SC&C
<a href="#"><u>Q2/20</u></a>	Requirements, capabilities, and use cases across verticals
<a href="#"><u>Q3/20</u></a>	Architectures, management, protocols and Quality of Service
<a href="#"><u>Q4/20</u></a>	e/Smart services, applications and supporting platforms
WP2/20	
<a href="#"><u>Q5/20</u></a>	Research and emerging technologies, terminology and definitions
<a href="#"><u>Q6/20</u></a>	Security, privacy, trust and identification
<a href="#"><u>Q7/20</u></a>	Evaluation and assessment of Smart Sustainable Cities and Communities

# ITU-T SG20 Regional Groups

A world map with a blue background and white landmasses. Four semi-transparent blue callout boxes are positioned over different regions of the world, each containing text about an ITU-T SG20 Regional Group. The callouts are for Latin America, Eastern Europe/Central Asia/Transcaucasia, the Arab Region, and the Africa Region. The map also features a faint, stylized globe graphic in the background.

**SG20 RG-LATAM - ITU-T SG20 Regional Group for the Latin American Region**

**SG20 RG-EECAT - ITU-T SG20 Regional Group for Eastern Europe, Central Asia and Transcaucasia**

**SG20 RG-ARB - ITU-T SG20 Regional Group for the Arab Region**

**SG20 RG-AFR - ITU-T SG20 Regional Group for the Africa Region**

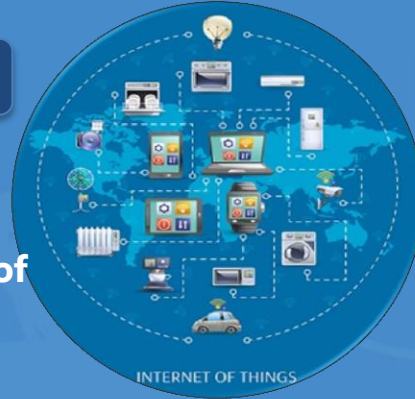


# ITU-T SG20 main results

October 2015 – August 2017

## 9 New Recommendations approved

- ITU-T Y.4113 **"Requirements of the network for the Internet of Things"**
- 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.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.4805 **"Identifier service requirements for the interoperability of Smart City applications"**.



## 9 New Supplements agreed

- 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".**



# Some ongoing work items under study



- Y.Accessibility-IoT - Accessibility requirements for the Internet of things applications and services
- Y.del-fw - Framework of delegation service for the IoT devices
- Y.IoT-DA-Counterfeit - Information Management Digital Architecture to combat counterfeiting in IoT
- Y.IoT-Interop - An Interoperability framework for IoT
- Y.IoT-IoD-PT - Identity of IoT devices based on secure procedures and ensures privacy and trust of IoT systems
- Y.ODI - Open Data Indicator in smart cities
- Y.smartport – Requirement of smart managements of supply services in smart port
- Y.frame-scc - Framework and high-level requirements of smart cities and communities
- Y.fsn - Framework and Service scenarios for Smartwork

Measure your  
city's  
progress

# KPIs structure

54 Core Indicators + 37 advanced Indicators

20 Smart + 32 Structural + 39 Sustainable

Dimension	Economy	Environment	Society and culture
Category	<ul style="list-style-type: none"><li>▪ ICT Infrastructure</li><li>▪ Water and sanitation</li><li>▪ Drainage</li><li>▪ Electricity supply</li><li>▪ Transport</li><li>▪ Public sector</li><li>▪ Employment</li><li>▪ Innovation</li><li>▪ Urban Planning</li><li>▪ Buildings</li></ul>	<ul style="list-style-type: none"><li>▪ Air quality</li><li>▪ Energy</li><li>▪ Environmental quality</li><li>▪ Infrastructure</li><li>▪ Public space and nature</li><li>▪ Waste</li><li>▪ Water and sanitation</li></ul>	<ul style="list-style-type: none"><li>▪ Culture</li><li>▪ Education</li><li>▪ Health</li><li>▪ Housing</li><li>▪ Safety</li><li>▪ Social inclusion</li><li>▪ Food security</li></ul>



