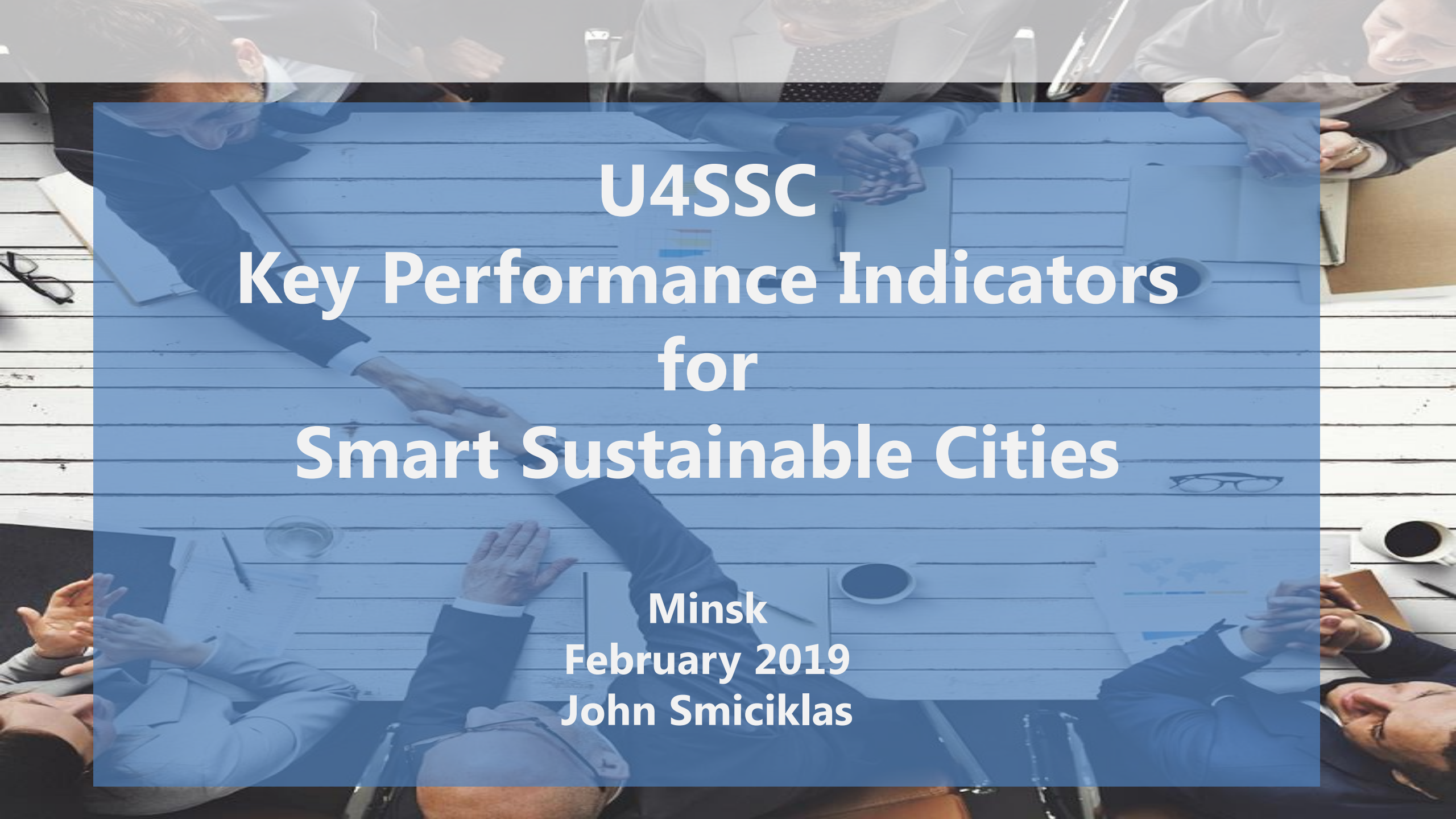


U4SSC
Key Performance Indicators for Smart Sustainable Cities

Minsk
February 2019
John Smiciklas

Content

- Overview - United for Smart Sustainable Cities Initiative (U4SSC)
- Key Performance Indicators for Smart Sustainable Cities
- How to Become Involved

United 4 Smart Sustainable Cities (U4SSC)

United 4 Smart Sustainable Cities (U4SSC)

U4SSC is a United Nations Initiative coordinated by ITU and UNECE and supported by other 14 UN agencies to respond to the **Sustainable Development Goal 11: "Make cities and human settlements inclusive, safe, resilient and sustainable.**

It advocates for public policy to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities.

Supported by:

Convention on Biological Diversity

United Nations ECLAC

FAO

ITU

United Nations Economic Commission for Africa

UNDP
Empowered lives.
Resilient nations.

UNECE

UNESCO
United Nations Educational, Scientific and Cultural Organization
Montevideo Office
Regional Bureau for Sciences in Latin America and the Caribbean

UN environment
United Nations Environment Programme

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

UN-HABITAT
FOR A BETTER URBAN FUTURE

UNIDO

UNITED NATIONS UNIVERSITY
UNU-EGOV
Operating Unit on Policy-Driven Electronic Governance

UN WOMEN

World Meteorological Organisation

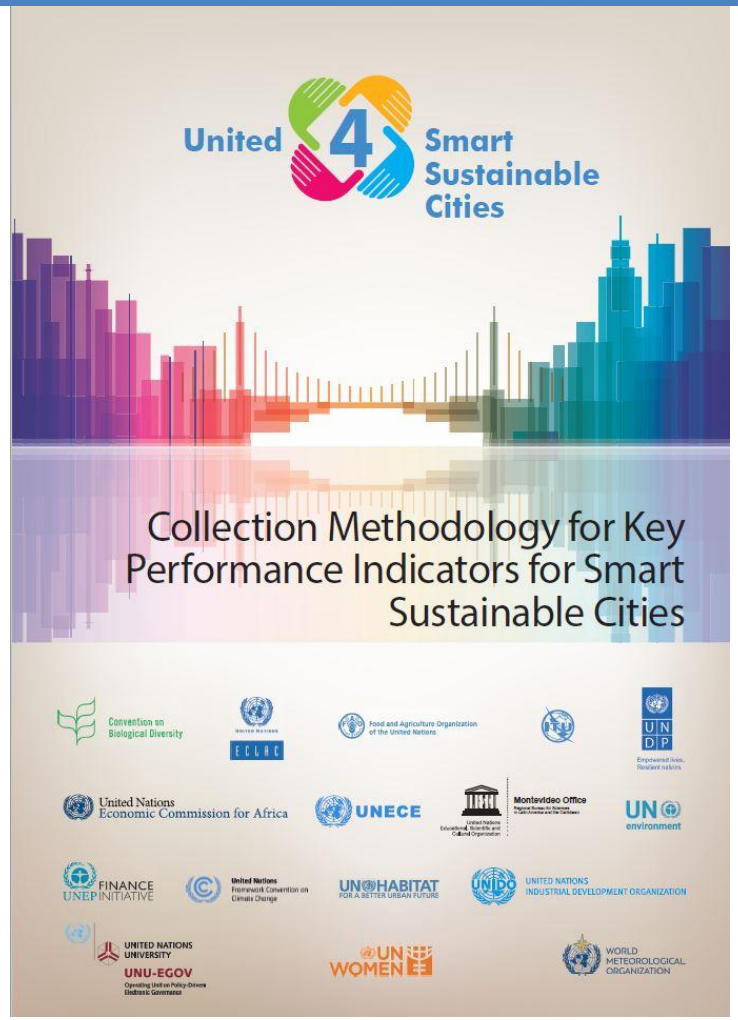
U4SSC publications

Available for free on the U4SSC website:
http://itu.int/go/U4SSC

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
- Guiding principles for artificial intelligence in cities - New
- The impact of Artificial Intelligence and cognitive computing in Cities - New
- The impact of data processing and computation in cities - New
- The impact of sensing technologies and IoT in cities - New

U4SSC Key Performance Indicators for Smart Sustainable Cities



U4SSC Key Performance Indicators for Smart Sustainable Cities

The U4SSC Initiative has developed a set of international **key performance indicators (KPIs) for Smart sustainable cities (SSC)** to establish the criteria to evaluate ICT´s contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments.

Over 50 cities worldwide are already implementing these KPIs

Convention on Biological Diversity

United Nations ECLAC

FAO Fiat Panis

ITU

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UNDP Empowered lives. Resilient nations.

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UNESCO United Nations Educational, Scientific and Cultural Organization — Montevideo Office Regional Bureau for Sciences in Latin America and the Caribbean

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World Meteorological Organisation

Implementing Key Performance Indicators for Smart Sustainable Cities Worldwide

Over 50 cities are implementing these KPIs

Objectives

These indicators have been developed to provide cities with a consistent and standardized method to collect data and measure performance and progress to:

- Achieving the Sustainable Development Goals
- Becoming a smarter city
- Becoming a more sustainable city

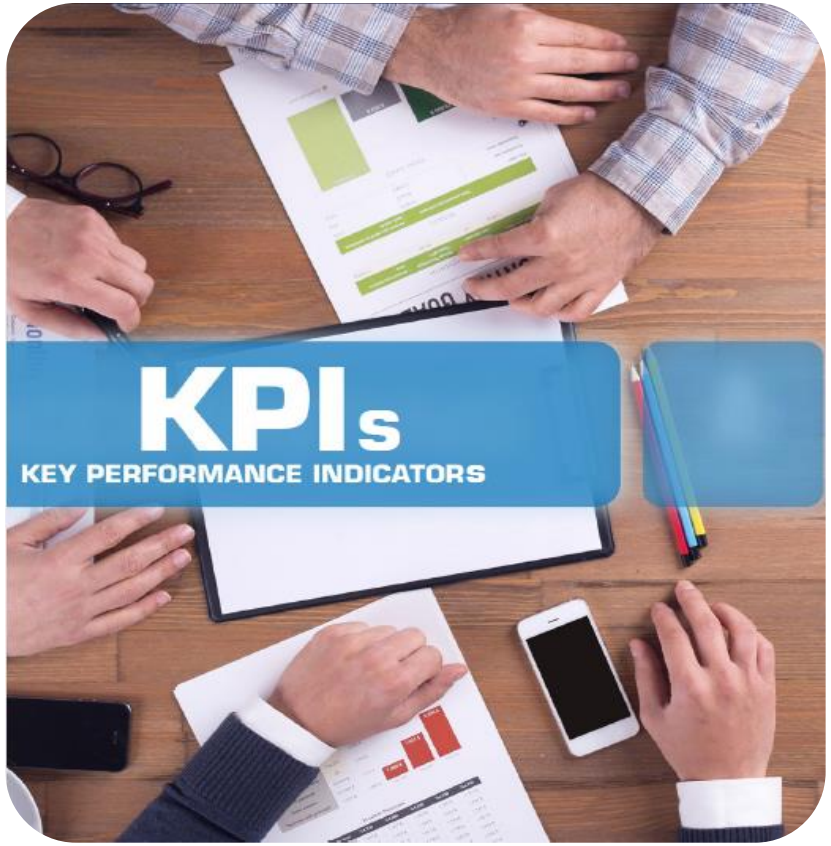
Cities will be able to:

- Compare their progress over time
- Compare their performance to other cities
- Through analysis and sharing allow for the dissemination of best practices
- Set standards for progress in meeting the SDGs

KPI Principles

- **Comprehensiveness:** The set of indicators should cover all the aspects of SSC.
- **Availability:** The KPIs should be quantitative and the historic and current data should be either available or easy to collect.
- **Simplicity:** The concept of each indicator should be simple and easy to understand for the urban stakeholders.
- **Timeliness:** This refers to the ability to produce KPIs with respect to emerging issues in SSC construction.

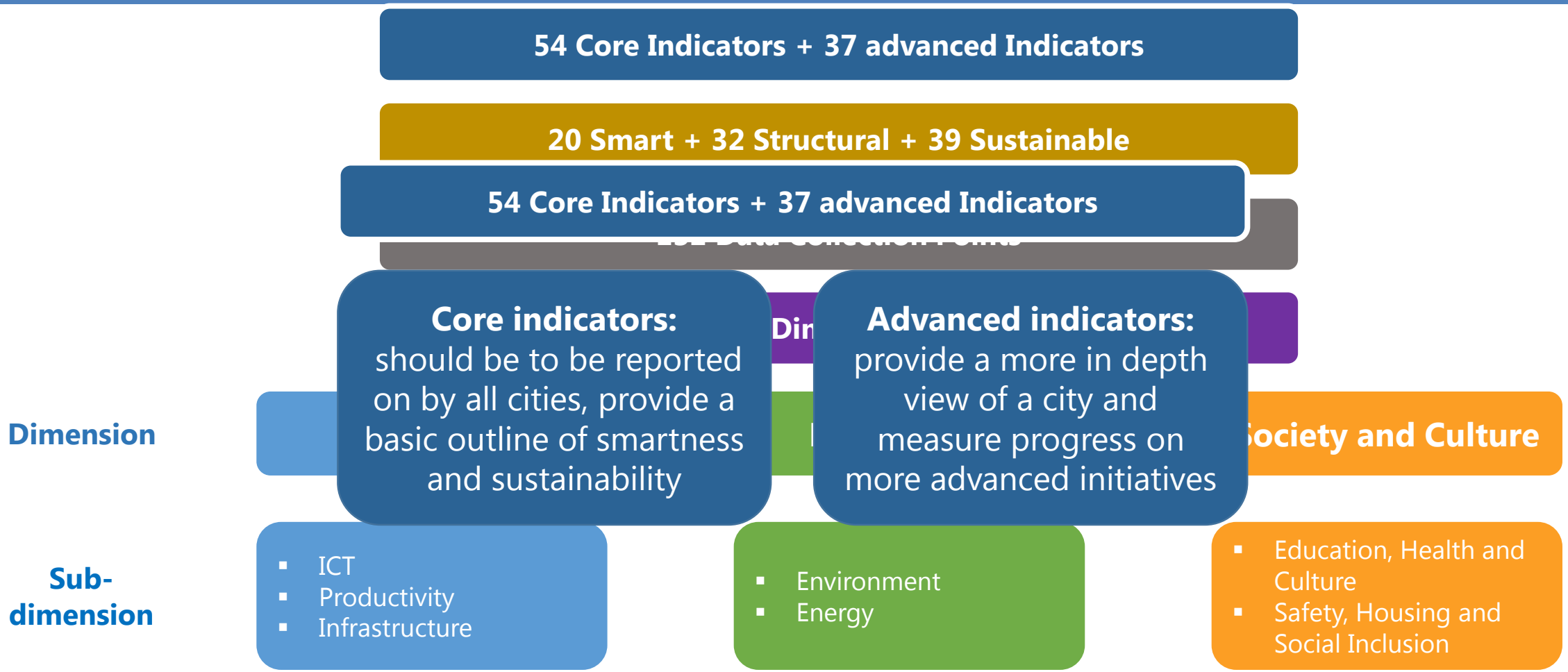
KPI Description



Each indicator has a description for:

- the rationale for choosing the indictor;
- how the indicator should be interpreted;
- what benchmarking trends are considered desirable;
- the methodology for calculating the value to be reported; and
- potential sources of data.

KPI Structure



KPI Structure (2)

Dimension	Economy	Environment	Society and Culture
Sub-Dimension	▪ ICT ▪ Productivity ▪ Infrastructure	▪ Environment ▪ Energy	▪ Education, Health and Culture ▪ Safety, Housing and Social Inclusion
Category	▪ ICT Infrastructure ▪ Water and Sanitation ▪ Drainage ▪ Electricity Supply ▪ Transport ▪ Public Sector ▪ Innovation ▪ Employment ▪ Waste ▪ Buildings ▪ Urban Planning	▪ Air Quality ▪ Water and Sanitation ▪ Waste ▪ Environmental Quality ▪ Public Space and Nature ▪ Energy	▪ Education ▪ Health ▪ Culture ▪ Housing ▪ Social Inclusion ▪ Safety ▪ Food Security

KPIs Details – Economy Dimension

ICT Sub-Dimension

8 Core Indicators
9 Advanced Indicators

Economy Dimension - ICT Sub-Dimension - Core

Household Internet Access	Percentage of households with Internet access
Fixed Broadband Subscriptions	Percentage of households with fixed (wired) broadband.
Wireless Broadband Subscriptions	Wireless broadband subscriptions per 100 000 inhabitants.
Wireless Broadband Coverage	Percentage of the city served by wireless broadband - 3G
Wireless Broadband Coverage	Percentage of the city served by wireless broadband - 4G
Smart Water Meters	Percentage implementation of smart water meters.
Smart Electricity Meters	Percentage implementation of smart electricity meters.
Dynamic Public Transport Information	Percentage of urban public transport stops for which traveller information is dynamically available to the public in real time
Traffic Monitoring	Percentage of major streets monitored by ICT

Economy Dimension - ICT Sub-Dimension - Advanced

Availability of WIFI in Public Areas	Number of public WIFI hotspots in the city
Water Supply ICT Monitoring	Percentage of the water distribution system monitored by ICT
Drainage / Storm Water System ICT Monitoring	Percentage of drainage / storm water system monitored by ICT
Electricity Supply ICT Monitoring	Percentage of electricity supply system monitored by ICT
Demand Response Penetration	Percentage of electricity customers with demand response capabilities
Intersection Control	Percentage of road intersections using adaptive traffic control or prioritization measures
Open data	Percentage and number of inventoried open datasets that are published
e- Government	Number of public services delivered through electronic means
Public Sector e-procurement	Percentage of public sector procurement activities that are conducted electronically

KPIs Details – Economy Dimension

Infrastructure Sub-Dimension

11 Core Indicators
10 Advanced Indicators

Economy Dimension - Infrastructure Sub-Dimension - Core

Basic Water Supply	Percentage of households with access to a basic water supply
Potable Water Supply	Percentage of households with a safely managed drinking water service
Water Supply Loss	Percentage of water loss in the water distribution system.
Wastewater Collection	Percentage of households served by wastewater collection
Household Sanitation	Percentage of households with access to basic sanitation facilities
Solid Waste Collection	Percentage of households with regular solid waste collection.
Electricity System Outage Frequency	Average number of electrical interruptions per customer per year
Electricity System Outage Time	Average length of electrical interruptions
Access to Electricity	Percentage of households with authorized access to electricity
Public Transport Network	Length of public transport network per 100 000 inhabitants
Bicycle Network	Length of bicycle paths and lanes per 100,000 population

Economy Dimension - Infrastructure Sub-Dimension - Advanced

Public Transport Network Convenience	Percentage of the city population that has convenient access (within 0.5 km) to public transport
Transportation Mode Share	The percentage of people using private vehicles
Transportation Mode Share	The percentage of people using public transport
Transportation Mode Share	The percentage of people walking
Transportation Mode Share	The percentage of people cycling
Transportation Mode Share	The percentage of people using para transport
Travel Time Index	Ratio of travel time during the peak periods to travel time at free flow periods.
Shared Bicycles	Number of Shared bicycles / 100 000 inhabitants
Shared Vehicles	Number of shared vehicles / 100 000 inhabitants
Low-Carbon Emission Passenger Vehicles	Percentage of low-carbon emission passenger vehicles

Economy Dimension - Infrastructure Sub-Dimension - Advanced

Public Building Sustainability	Percentage area of public buildings with recognized sustainability certifications for ongoing operations
Integrated Building Management Systems in Public Buildings	Percentage area of public buildings using integrated ICT systems to automate building management
Pedestrian infrastructure	Percentage of the city designated as a pedestrian / car free zone
Urban Development and Spatial Planning	Strategic city planning documents promoting compact development
Urban Development and Spatial Planning	Strategic city planning documents promoting connectivity
Urban Development and Spatial Planning	Strategic city planning documents promoting integration &mixed urban land use
Urban Development and Spatial Planning	Strategic city planning documents promoting social inclusion
Urban Development and Spatial Planning	Strategic city planning documents resilience to climate change

KPIs Details – Economy Dimension

Productivity Sub-Dimension

4 Core Indicators
3 Advanced Indicators

Economy Dimension - Productivity Sub-Dimension - Core

R&D expenditure	Research and Development expenditure as a percentage of city GDP
Patents	Number of new patents granted per 100 000 inhabitants per year
Unemployment Rate	Percentage of the total city labour force that is unemployed
Youth Unemployment Rate	Percentage of the city youth labour force that is unemployed

Economy Dimension - Productivity Sub-Dimension - Advanced

Small and Medium-Sized Enterprises	Percentage of small and medium-sized enterprises (SMEs)
Tourism Sector Employment	Percentage of the city labour force working in the tourism sector
ICT Sector Employment	Percentage of the city labour force working in the ICT sector

KPI Details - Environment Dimension

Environment Sub-Dimension

9 Core Indicators
4 Advanced Indicators

Environment Dimension - Environment Sub-Dimension - Core

Air pollution	Air quality index (AQI) based on reported value for : Particulate matter (PM2.5)
Air pollution	Air quality index (AQI) based on reported value for : Particulate matter (PM10),
Air pollution	Air quality index (AQI) based on reported value for : NO2 (nitrogen dioxide)
Air pollution	Air quality index (AQI) based on reported value for : SO2 (sulphur dioxide)
Air pollution	Air quality index (AQI) based on reported value for : O3 (ozone)
GHG Emissions	Greenhouse gas (GHG) emissions per capita.
Drinking Water Quality	Percentage of households covered by an audited Water Safety Plan
Water Consumption	Water consumption per capita
Freshwater Consumption	Freshwater consumption

Environment Dimension - Environment Sub-Dimension - Advanced

Wastewater Treatment	Percentage of wastewater receiving treatment. (Primary)
Wastewater Treatment	Percentage of wastewater receiving treatment. (Secondary)
Wastewater Treatment	Percentage of wastewater receiving treatment. (Tertiary)
Solid Waste Treatment	Percentage of solid waste a) disposed to sanitary landfills
Solid Waste Treatment	Percentage of solid waste b) burnt in an open area
Solid Waste Treatment	Percentage of solid waste c) incinerated
Solid Waste Treatment	Percentage of solid waste d) disposed to an open dump;
Solid Waste Treatment	Percentage of solid waste e) recycled
Solid Waste Treatment	Percentage of solid waste f) other with regard to total amount of solid waste produced
EMF Exposure	Percentage of mobile network antenna sites in compliance with EMF exposure guidelines.
Green Areas	Green areas per 100 000 inhabitants.

KPI Details - Environment Dimension

Energy Sub-Dimension

4 Core Indicators

Environment Dimension - Energy Sub-Dimension - Core

Renewable Energy Consumption	Percentage of renewable energy consumed in the city.
Electricity Consumption	Electricity consumption per capita
Residential Thermal Energy Consumption	Residential thermal energy consumption per capita
Public Building Energy Consumption	Energy consumption of public buildings

KPI Details - Environment Dimension

Environment Sub-Dimension

9 Core Indicators
4 Advanced Indicators

KPI Details – Society and Culture Dimension

Education, Health and Culture Sub-Dimension

8 Core Indicators
4 Advanced Indicators

KPI Details – Education, Health and Culture Sub-Dimension - Core

Student ICT Access	Percentage of students with classroom access to ICT facilities
School Enrollment	Percentage of school-aged population enrolled in schools
Higher Education Degrees	Higher level education degrees per 100 000 inhabitants
Adult Literacy	Adult literacy rate
Life Expectancy	Average life expectancy.
Maternal Mortality Rate	Maternal deaths per 100 000 live births
Physicians	Number of physicians per 100 000 inhabitants.
Cultural Expenditure	Percentage expenditure on cultural heritage

KPI Details – Education, Health and Culture Sub-Dimension - Advanced

Electronic Health Records	Percentage of city inhabitants with electronic health records.
In-Patient Hospital Beds	Number of in-patient public hospital beds per 100 000 inhabitants
Health Insurance/ Public Health Coverage	Percentage of inhabitants covered by basic health insurance or a public health system
Cultural Infrastructure	Number of the cultural institutions per 100 000 inhabitants
Electronic Health Records	Percentage of city inhabitants with electronic health records.

KPI Details – Society and Culture Dimension

Safety, Housing and Social Inclusion Sub-Dimension

11 Core Indicators
6 Advanced Indicators

KPI Details – Education, Health and Culture Sub-Dimension - Core

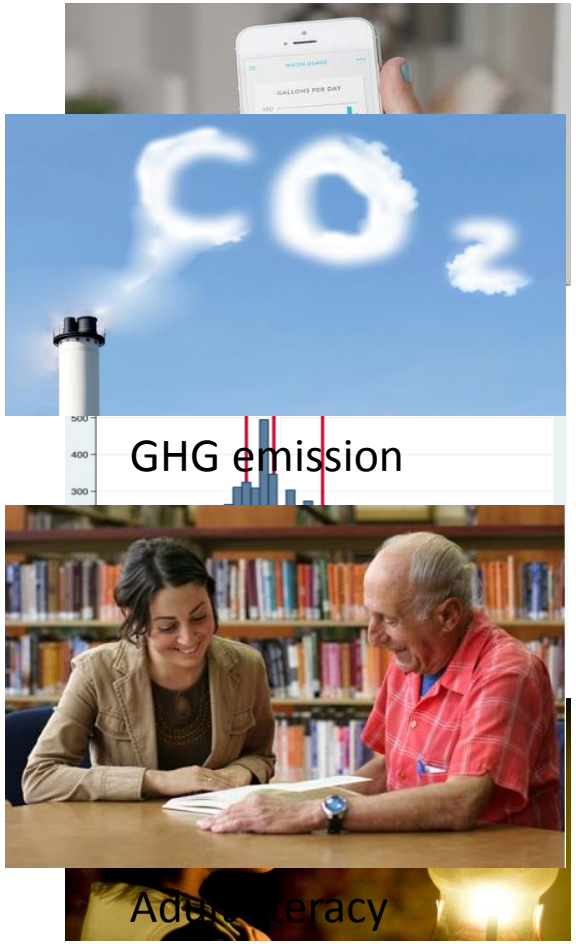
Informal Settlements	Percentage of inhabitants living in slums, informal settlements or inadequate housing
Gender Income Equity	Ratio of average hourly earnings of female to male workers
Gini Coefficient	Income distribution in accordance with Gini coefficient.
Poverty	Percentage of inhabitants living in poverty
Voter Participation	Percentage of the eligible population that voted during the last municipal election
Natural Disaster Related Deaths	Number of natural disaster related deaths per 100 000 inhabitants.
Disaster Related Economic Losses	Natural disaster related economic losses as a percentage of the city’s GDP
Police Service	Number of police officers per 100 000 inhabitants
Fire Service	Number of firefighters per 100 000 inhabitants
Violent Crime Rate	Violent crime rate per 100 000 inhabitants
Traffic Fatalities	Traffic fatalities per 100 000 inhabitants

KPI Details – Education, Health and Culture Sub-Dimension - Advanced

Housing Expenditure	Percentage expenditure of income for housing
Child Care Availability	Percentage of pre-school age children (0-3) covered by (public and private) day-care centres
Resilience Plans	Implementation of risk and vulnerability assessments for disaster mitigation
Population Living in Disaster Prone Areas	Percentage of inhabitants living in a zone subject to natural hazards
Emergency Services Response Time	Average response time for Emergency Services
Local Food Production	Percentage of local food supplied from within 100 km of the urban area

KPI Examples

- Environment
- ICT
- Environment
- Productivity
- Society and Culture
- Infrastructure



KPI Examples

Description and Categorization of the KPI

Rationale – why we included it
Benchmarking – what are good trends

Sources – where we found it

How to calculate and units

Sources and SDG

Dimension	Society and Culture				
Sub-Dimension	**Safety, Housing and Social Inclusion**				
Category	**Safety**				
KPI Name	**Traffic Fatalities**				
KPI No.	**SC: SH: SA: 9C**	**Type:**	**Core**	**Type:**	**Structural**
Definition / Description	Traffic fatalities per 100,000 inhabitants.				
Rationale / Interpretation / Benchmarking	Road traffic injuries claim more than 1.2 million lives each year and have a huge impact on health development and overall quality of life. They are the leading cause of death among the youth (15 -29 years), and cost governments approximately 3% of overall national GDP. Despite this massive and largely preventable human and economic toll, action to combat this global challenge has been insufficient. The definition of a road traffic fatality for harmonization of surveillance is "any person killed immediately or dying within 30 days as a result of a road traffic injury accident". (WHO, 2015) The choice of 30 days is based on research which shows that most people who die as a result of a crash succumb to their injuries within 30 days of sustaining them. A declining trend should be pursued with lower percentages indicating better road safety.				
Source(s)	WHO Global status report on road safety 2015. Retrieved from <http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/> WHO Global status report on road safety 2009. Retrieved from <http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/>				
Methodology	Calculate as: Numerator: Number of traffic fatalities. Denominator: One 100,000th of the city's population.				
Unit	Number / 100,000 inhabitants				
Data Sources / Relevant Databases	Data can be collected from local transportation and emergency departments and local hospitals. The World Health Organization can also provide adequate data on traffic fatalities.				
SDG Reference(s)	SDG Indicator 3.6.1: Death rate due to road traffic injuries.				

U4SSC KPIs advantages

- The **first and only** International Standard supported by **16 United Nations Agencies and Programmes**;
- **Policy tool;**
- **General screening** of the city that allows to identify the **areas of improvement** and give cities the opportunity to **assess its own progress**;
- Allows cities to develop **better strategies** for the management of the city;
- Provide cities with the possibility to compare itself with other cities allowing an **International Collaboration;**
- Help cities to **achieve the Sustainable Development Goals.**

Implement these KPIs now and measure the smartness and sustainability of your city

"You cannot manage what you cannot measure"

-Peter Drucker

Therefore……

You cannot improve it!

Implementing ITU-T International Standards to Shape Smart Sustainable Cities

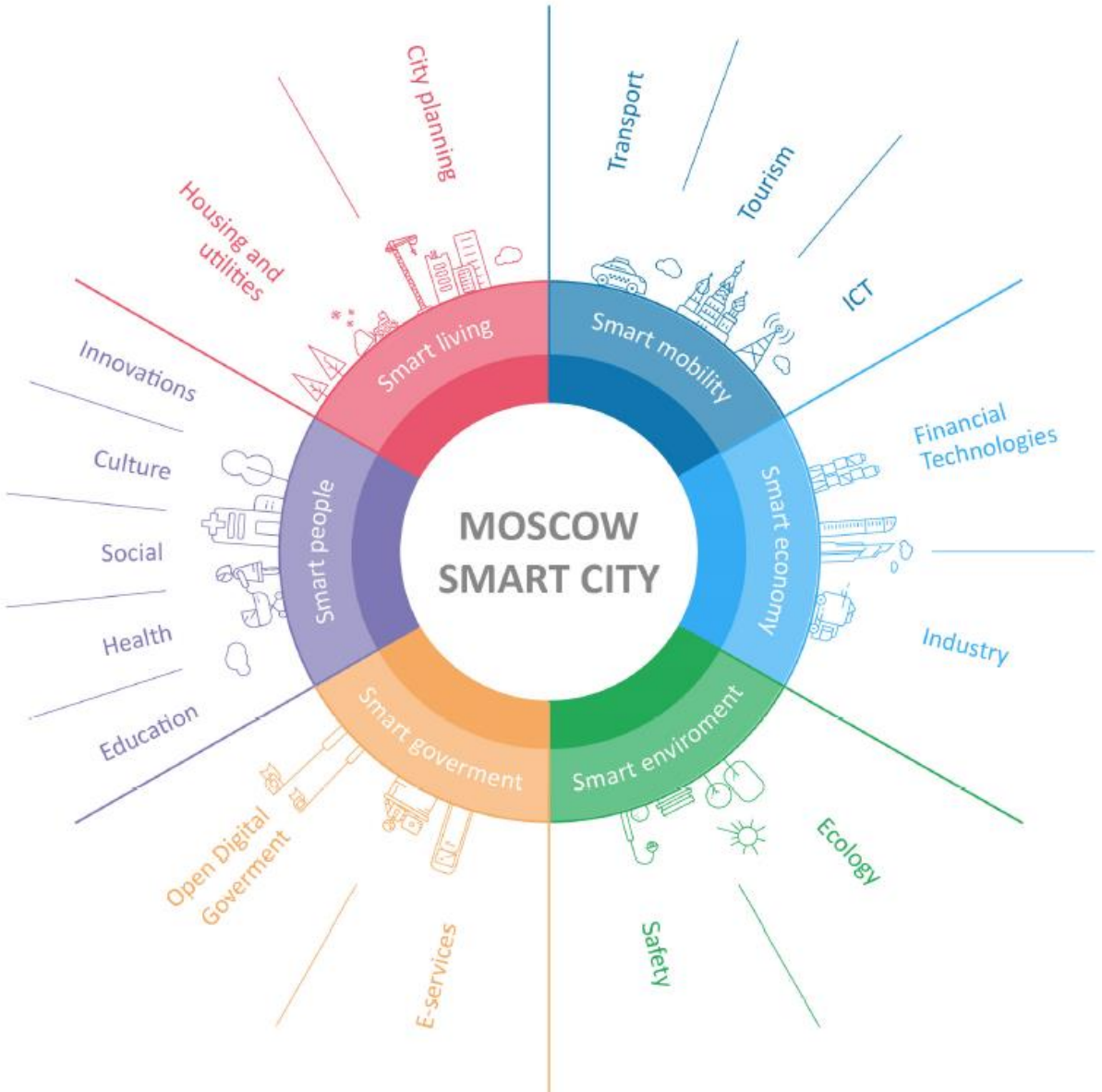
Case Study – Moscow

ITU-T

Implementing ITU-T International Standards to Shape Smart Sustainable Cities:

The Case of Moscow

mos.ru



How to Get Involved

U4SSC Call for Experts

- The impact of Artificial Intelligence and Cognitive Computing in Cities
- The impact of Data Processing and Computation in Cities
- The impact of Sensing Technologies and IoT in Cities
- Blockchain 4 cities
- https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx

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**.

Add your city!

Dubai

Singapore

Valencia

Wuxi

Montevideo

Maldonado

Manizales

Pully

Foshan

Guangshan

Kairouan

Bizerte

Moscow

and many others…

Thank you!

More information can be found at:

https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx

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