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|  | **International Telecommunication Union** |
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| **ITU-T** | **FG-SSC** |
| TELECOMMUNICATIONSTANDARDIZATION SECTOROF ITU | (05/2015)  |
|  | ITU-T Focus Group on Smart Sustainable Cities |
|  | **Smart sustainable cities: a guide for city leaders** |
|  | Focus Group Technical Report |



FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of tele­com­mu­ni­ca­tions, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The procedures for establishment of focus groups are defined in Recommendation ITU-T A.7. ITU-T Study Group 5 set up the ITU-T Focus Group on Smart Sustainable Cities (FG-SSC) at its meeting in February 2013. ITU-T Study Group 5 is the parent group of FG-SSC.

Deliverables of focus groups can take the form of technical reports, specifications, etc., and aim to provide material for consideration by the parent group in its standardization activities. Deliverables of focus groups are not ITU-T Recommendations.

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| **SERIES OF FG-SSC TECHNICAL REPORTS/SPECIFICATIONS**Technical Report on "Smart sustainable cities: a guide for city leaders"Technical Report on "Master plan for smart sustainable cities" Technical Report on "An overview of smart sustainable cities and the role of information and communication technologies"Technical Report on "Smart sustainable cities: an analysis of definitions"Technical Report on "Smart water management in cities"Technical Report on "Electromagnetic field (EMF) considerations in smart sustainable cities"Technical Specifications on "Overview of key performance indicators in smart sustainable cities"Technical Report on "Information and communication technologies for climate change adaptation in cities"Technical Report on "Cybersecurity, data protection and cyber resilience in smart sustainable cities" Technical Report on "Integrated management for smart sustainable cities" Technical Report on "Key performance indicators definitions for smart sustainable cities"Technical Specifications on "Key performance indicators related to the use of information and communication technology in smart sustainable cities"Technical Specifications on "Key performance indicators related to the sustainability impacts of information and communication technology in smart sustainable cities"Technical Report on "Standardization roadmap for smart sustainable cities"Technical Report on "Setting the stage for stakeholders’ engagement in smart sustainable cities"Technical Report on "Overview of smart sustainable cities infrastructure" Technical Specifications on "Setting the framework for an ICT architecture of a smart sustainable city"Technical Specifications on "Multi-service infrastructure for smart sustainable cities in new-development areas" Technical Report on "Intelligent sustainable buildings for smart sustainable cities" Technical Report on "Anonymization infrastructure and open data in smart sustainable cities"Technical Report on "Standardization activities for smart sustainable cities" |

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**Smart sustainable cities: a guide for city leaders**

About this Report

This Technical Report was researched and written by Silvia Guzmán Araña (Spain) and Mythili Menon (University of Geneva), as a contribution to ITU-T Focus Group on Smart Sustainable Cities (FG-SSC).

Special thanks to Angelica Ospina (University of Manchester), Juan Manuel Sabio Morchio (University of KwaZulu-Natal, South Africa), Mike Wood (Telstra), Paolo Gemma (Huawei), Sang Ziqin (Fiber Home Technologies), Guilherme Canela (UNESCO) for their helpful review and contribution.

Additional information and materials relating to this report can be found at: [www.itu.int/itu-t/climatechange](http://www.itu.int/itu-t/climatechange). If you would like to provide any additional information, please contact Cristina Bueti at tsbsg5@itu.int.

Smart sustainable cities: a guide for city leaders

**Table of Contents**

 Page

1 Introduction 1

2 Smart sustainable cities: the urban future we want! 1

3 Starting your SSC journey 2

4 Cities are our best future! 4

Annex 1 – Overview of the Focus Group on Smart sustainable Cities (FG-SSC) 6

Bibliography 8

1 Introduction

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| *“It is a truth universally acknowledged that a (smart) city in possession of a good ICT infrastructure must also be sustainable”* |

Modern cities have experienced unprecedented socio-economic growth and environmental crises since the latter half of the 20th century and the beginning of the 21st century. In 2014, there were 28 mega cities, home to 453 million people.[[1]](#footnote-1) With 54% of the world’s population living in urban areas, cities are confronted with contemporary problems, ranging from rapid urbanization, rising pollution levels and an ever increasing rural to urban migration, all of which have exerted pressure on an ageing city infrastructure. Projections indicate that the percentage of the global population living in cities is expected to rise to 66% by 2050.[[2]](#footnote-2) Globally, cities also account for 75-80% of a country’s GDP and are considered the main engines of global economic growth.[[3]](#footnote-3) On the flip side, cities also produce 50% of the global waste[[4]](#footnote-4) along with 60% of the global greenhouse gas (GHG) emissions.[[5]](#footnote-5)

As a result, there is increasing pressure on existing natural resources such as water, land and fossil fuels.[[6]](#footnote-6) Additionally, there are growing concerns regarding existing transportation infrastructure, provision of adequate healthcare, access to education and overall safety for the growing population of urban residents.[[7]](#footnote-7)

2 Smart sustainable cities: the urban future we want!

In light of the above facts, urban planners are faced with daunting questions as to whether to promote cities as drivers of economic growth or pay heed to issues such as increasing population, resource overuse and dependence in cities. Understanding this dilemma, ITU’s Focus Group on Smart Sustainable Cities (FG-SSC) set the path for cities to become smart and sustainable. Smart Sustainable Cities (SSC) is a concept developed by the FG-SSC which intends to leverage the potential of Information and Communication Technology (ICT) in urban governance systems to create cities which are not only economically and socially advanced but are also designed to achieve environmental sustainability.

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| *“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 and environmental aspects”.*Source: FG-SSC (2014) |

This document is intended for city decision makers and strategists, whose decisions have a significant impact on the way their city functions and its future development trajectory. Accordingly, this high level policy document helps identify practical steps based on which urban decision makers can envisage and build their very own Smart Sustainable City!

3 Starting your SSC journey

For cities wishing to go the SSC way, each city has to start from a different baseline for their transition to a Smart Sustainable City. However, it is important to understand that SSC means embracing a journey and cannot be considered the final destination.

Through its research work on SSC, FG-SSC intended to assist city decision makers (including municipal and government representatives) by re-defining the way in which the city’s infrastructure is built, services are offered, citizens are engaged and systems linked, with the aim of transforming cities into more sustainable, smart, resilient and robust living environments.

Realizing that the establishment of SSC is a long term process and cannot be achieved overnight, it is essential that a series of generic steps are defined that would not only allow for comparability but would also promote sustainable development along with each city being able to quantify improvements as time passes.

In keeping with this thought, the FG-SSC has developed some basic steps for SSC transformation. Each of the steps described in this document are required when making transition to a Smart Sustainable City. These steps can help formulate an action strategy oriented to: (i) consensus building among varied stakeholders, (ii) governance mechanisms, (iii) citizen engagement, (iv) ICT infrastructure, (iv) monitoring mechanisms and (v) learning among SSC stakeholders.

Figure 1 gives an overview of the steps to becoming a Smart Sustainable City.



Figure 1 – SSC 6-step Transition cycle

(adapted from on ICLEI’s ‘Sustainability Cycle’)

Step (1) Set the vision for your SSC venture

Local Governments should increasingly take on a more central role in such development initiatives. They should assist in identifying a specific SSC vision and assessing the city’s existing situation in order to establish the relevance and feasibility of becoming a Smart Sustainable City. This step includes the following aspects:

a) Identifying a SSC vision that is in line with the city’s identity, political priorities and long-term development strategy;

b) Gathering relevant data on the status of ICT infrastructure and its usage at the city-level, including the status of the city in regards to the widely used FG-SSC Technical Specifications ad Reports;

c) Identifying the SSC stakeholders;

d) Identifying the existing governance and organisational mechanisms that would allow an efficient and effective management of SSC solutions;

e) Identifying mechanisms for multi-stakeholder involvement, citizen engagement, communication and information sharing throughout the SSC process.

This step can be facilitated through a basic SSC SWOT analysis (Strengths, Weaknesses, Opportunities and Threats for each city). This will assist in framing a city specific strategy and goals.

Step (2) Identify your SSC targets

Local governments should work in close collaboration with the various SSC stakeholders to design the overall master plan for the SSC’s implementation. This should include broad agreement on objectives, priorities, initiatives and actions needed in the short, medium and long term. Consideration should be accorded to setting measurable SSC targets and timeframes for their achievement. This step involves, among others, the identification of SSC targets in regards to:

a) Developing SSC infrastructure and integrated platform for example using Internet of Things (IoT);

b) Identifying and developing SSC services;

c) Defining SSC Key Performance Indicators (KPIs);

d) Educating the stakeholders on the advantages of SSC.

Step (3) Achieve political commitment

Engagement with political leadership is imperative. Local governments should obtain the necessary political approval and backing to ensure that the SSC strategic programme is pursued. This includes the adoption of the SSC programme/targets through consensus. This will provide the basis for an agreed document that has widespread support, and will serve as a reference for the strategic planning by the local authority.

Step (4) Build your SSC

Using the political backing gained in Step 3 and support from other SSC stakeholders, local governments should lead the way to actually initiating the establishment of their smart sustainable city. For this step, the existing traditional infrastructure may be significantly improved on by integrating the required ICT applications for the upgrade to SSC. The stakeholders may also choose to build a new infrastructure from scratch.

For either of the aforementioned scenarios, the following features are pertinent:

a) Making of a feasible master plan for your SSC journey;

b) Conforming to appropriate construction models (e.g. Public Private Partnerships in various SSC programmes);

c) Ensuring long term services via good operation and maintenance after the infrastructure is in place.

Step (5) Measure your city progress

The fifth step consists of monitoring and evaluating a work programme required to achieve the targets. This stage involves close coordination and collaboration among SSC stakeholders, as well as an assessment on the basis of relevant Key Performance Indicators (KPIs). The FG-SSC has developed a useful set of KPIs for SSC, which can be utilized for this specific step. These KPIs form an excellent baseline for city decision makers, as they map their city’s progress of their overall SSC journey.

Step (6) Ensure Accountability and Responsibility

The last step is focused on evaluating, reporting and learning from the SSC process and related experiences. This involves an assessment of the implementation of the work programme, and an analysis of reflections about strengths and shortcomings. Such an evaluation contributes to informing the decision making process of the local council, as well as to inform the preparation of future baseline reviews to deepen SSC master plans, among others.

Better decisions are reached if they emerge out of a process of knowledge sharing and dialogue between stakeholders. The reflective process of evaluation will feed into a process of continuous learning, which in turn will influence and inform the development of the future vision and strategy for SSC.

Cities must be capable of applying lessons learned and instituting best practices concerning SSC. Consequently, cities must be accountable for continuous improvement to strengthen the effectiveness of future SSC strategies. For this city leaders must be flexible and able to adapt to the dynamic, evolving and complex nature of SSC and be able to continuously update the vision as required.

4 Cities are our best future!

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| *“To be…. or not to be a Smart Sustainable City. That is no longer the question”.* |

While sustainability challenges of cities are significant, urban areas also hold the key to achieving many global sustainability goals. Cities are home to the majority of humanity, and sustainable development cannot be achieved without significantly transforming the way we build and manage our urban spaces.

The infusion of ICT into key processes is pertinent to achieving sustainability. ICTs can assist with the establishment of SSCs through innovation, redesign of existing processes. This can include new applications, technologies and systems for smart energy, smart transportation, smart buildings, smart water management and smart Government.

As ICTs provide an integrated strategic approach to sustainability in SSC, they are key enablers of urban development, making ICT integration also vital to the achievement of the post-2015 Sustainable Development Goals (SDGs).

Cities do not have the option to continue functioning as they have done in the past. Hence city decision makers have to see the writing on the wall, and decide on a maintainable urban process, which promotes economic progress as well as environmental protection. Here, the SSC vision not only provides the benefit for sustained economic growth but also ensures a high quality of life for the citizens along with environmental sustainability.

Annex 1

Overview of the Focus Group on Smart sustainable Cities (FG-SSC)

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FG-SSC has been established in February 2013 to assess the standardization requirements of cities aiming to boost their social, economic and environmental sustainability through the integration of information and communication technologies (ICTs) in their infrastructures and operations. FG-SSC acts as an open platform for smart-city stakeholders - such as municipalities; academic and research institutes; non-governmental organizations (NGOs); and ICT organizations, industry forums and consortia - to exchange knowledge in the interests of identifying the standardized frameworks needed to support the integration of ICT services in smart cities.

FG-SSC held 8 physical meetings and over 70 virtual meetings from May 2013 to May 2015.

The development of its documents was overseen primarily by FG-SSC Working Groups (WGs), including: WG1 on ICT Role and Roadmap for Smart Sustainable Cities; WG2 on Smart Sustainable Cities Infrastructure; WG3 on Key Performance Indicators (KPIs), and Metrics for Smart Sustainable Cities; and WG4 on Policy and Positioning (communications, liaisons, and members).

FG-SSC finalized the following Technical Reports and Specifications:

1. Technical Report on Smart sustainable cities: a guide for city leaders

2. Technical Report on Master plan for smart sustainable cities

3. Technical Report on An overview of smart sustainable cities and the role of information and communication technologies

4. Technical Report on Smart sustainable cities: an analysis of definitions

5. Technical Report on Smart water management in cities

6. Technical Report on Electromagnetic field (EMF) considerations in smart sustainable cities

7. Technical Specifications on Overview of key performance indicators in smart sustainable cities

8. Technical Report on Information and communication technologies for climate change adaptation in cities

9. Technical Report on Cybersecurity, data protection and cyber resilience in smart sustainable cities

10. Technical Report on Integrated management for smart sustainable cities

11. Technical Report on Key performance indicators definitions for smart sustainable cities

12. Technical Specifications on Key performance indicators related to the use of information and communication technology in smart sustainable cities

13. Technical Specifications on Key performance indicators related to the sustainability impacts of information and communication technology in smart sustainable cities

14. Technical Report on Standardization roadmap for smart sustainable cities

15. Technical Report on Setting the stage for stakeholders’ engagement in smart sustainable cities

16. Technical Report on Overview of smart sustainable cities infrastructure

17. Technical Specifications on Setting the framework for an ICT architecture of a smart sustainable city

18. Technical Specifications on Multi-service infrastructure for smart sustainable cities in new-development areas

19. Technical Report on Intelligent sustainable buildings for smart sustainable cities

20. Technical Report on Anonymization infrastructure and open data in smart sustainable cities

21. Technical Report on Standardization activities for smart sustainable cities

For additional information, please visit the FG-SSC website at <http://www.itu.int/go/fgssc>.

Bibliography

Anthopoulos, Leonidas, Fitsilis, Panos. *Evolution Roadmaps for Smart Cities: Determining Viable*.

Paths. Proceedings of the European Conference on e-governance.

Cities and Buildings. United Nations Environment Programme (UNEP).

Cities and Climate Change Mitigation. UN-Habitat - <http://unhabitat.org/climate-change/>.

How can cities decouple economic growth from resource use and its environmental impacts and find a balance between social, environmental and economic goals? United Nations Environment Programme (UNEP). 2013.

Naphde. M, Banavar. G, Harrison. C, Paraszczak. J., *Smarter Cities and Their Innovation Challenges*. 2011.

Sustainability Cycle, ICLEI, 2014, <http://www.sustainablecities.eu/pathways/integratedmanagement/sustainability-cycle/>

World Urbanization Prospects: Revision 2014, United Nations.

World Habitat Day: Voice from Slums. UN-Habitat. 2012.

Focus Group on Smart Sustainable Cities (FG-SSC), ITU, 2015

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1. World Habitat Day: Voice from Slums. UN-Habitat [↑](#footnote-ref-1)
2. World Habitat Day: Voice from Slums. UN-Habitat [↑](#footnote-ref-2)
3. How can Cities decouple economic growth from resource use and its environmental impacts and find a balance between social, environmental and economic goals?. United Nations Environment Programme [↑](#footnote-ref-3)
4. Cities and Buildings. United Nations Environment Programme [↑](#footnote-ref-4)
5. Cities and Climate Change Mitigation: UN-Habitat [↑](#footnote-ref-5)
6. Smarter Cities and Their Innovation Challenges [↑](#footnote-ref-6)
7. Evolution Roadmaps for Smart Cities: Determining Viable Paths [↑](#footnote-ref-7)