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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Internet of things and smart cities and communities –
Evaluation and assessment

Smart sustainable city impact assessment

Recommendation ITU-T Y.4905

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Recommendation ITU-T Y.4905

Smart sustainable city impact assessment

Summary

Recommendation ITU-T Y.4905 is a holistic impact framework for the assessment of smart and sustainable cities to address the effects of digital innovation on social, economic and environmental issues. Smart sustainable city (SSC) initiatives have been proposed as potential solutions to economic, social and environmental challenges and pressures encountered by cities. Advances in information and communication technologies (ICTs) enable significant transformation potential in the way city resources, services and infrastructures are planned and managed. More specifically, ICT can play an enabling role to address the urban challenges of the twenty-first century. Smart sustainable cities harness ICTs (including various subtopics under ICT such as digital transformation, data, Internet of things (IoT), digital services, etc.) and intend to deliver city enhancements through a portfolio of action items. By their very nature, SSC initiatives impact the underlying cities. It is important to identify and assess this impact. The identification and assessment of impact will allow for better planning, the setting expectations with stakeholders, better informed budgeting, more effective public private partnerships and the promotion of alternative financing mechanisms. This will also help in communicating SSC initiatives.

History

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FOREWORD

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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Recommendation ITU-T Y.4905

Smart sustainable city impact assessment

1 Scope

This Recommendation formulates a holistic smart sustainable city (SSC) impact assessment framework.

Specifically, it covers the impact of digital innovation on:

- social;
- economic; and
- environmental aspects of SSC initiatives and projects.

Since SSC initiatives impact cities, it is important to take a broad perspective and assess the impact of these initiatives. International Association for Impact Assessment (IAIA) defines impact assessment as "the process of identifying the future consequences of a current or proposed action". Impact assessment can help city administrators as well as their stakeholders understand to what extent their SSC initiatives impact their cities.

It can be utilized by:

- cities and municipal administrations, including the SSC-relevant policy-making organizations, and government sectors, enabling them to understand the direct and indirect impacts of their SSC initiatives;
- city residents and non-profit citizen organizations, enabling them to understand the far-reaching consequences of their SSC initiatives and project;
- city administrators to determine appropriate trade-off between different options and also for decision making;
- private sector organizations to align with SSC initiatives' intended consequences and impacts and to contribute to them in terms of implementation and/or financing where possible.

This impact assessment can be used by city planners as a forward-looking tool to evaluate what might happen in the future with respect to their planned initiative(s). It is essential to consider both positive as well as adverse impacts during such an assessment. By its very definition, it can be seen that this impact assessment can be used to balance current and future sustainability of cities with respect to conceived SSC initiatives. Sustainability is often stated as a goal by various entities including city planners, yet it is not easy to measure or assess. The intention of identifying impact is to be equipped with a well-informed and more holistic perspective of the SSC initiatives and projects. An impact assessment can be used as a high-level tool for city administrators.

Impact can be assessed:

- for an entire city, or alternatively for a geographically well-defined subset of it;
- either for the entire set of SSC initiatives (consisting of a large portfolio of city projects) or alternatively it can also be conducted for one or more city projects;
- for all impact types, namely: social, economic and environmental, or a subset of them.

Finally, impact mitigation measures are included to evaluate impacts for cities.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T L.1400] Recommendation ITU-T L.1400 (2011), *Overview and general principles of methodologies for assessing the environmental impact of information and communication technologies*.
- [ITU-T L.1450] Recommendation ITU-T L.1450 (2018), *Methodologies for the assessment of the environmental impact of the information and communication technology sector*.
- [ITU-T Y.4900] Recommendation ITU-T Y.4900/L.1600 (2016), *Overview of key performance indicators in smart sustainable cities*.
- [ITU-T Y.4901] Recommendation ITU-T Y.4901/L.1601 (2016), *Key performance indicators related to the use of information and communication technology in smart sustainable cities*.
- [ISO 14064-1] ISO 14064-1:2018, *Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*.
- [ISO 14064-2] ISO 14064-2:2019, *Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*.
- [ISO 14064-3] ISO 14064-3:2019, *Greenhouse gases – Part 3: Specification with guidance for the verification and validation of greenhouse gas statements*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

The following terms are defined in [ISO 14064-1]:

- 3.1.1 GHG project**
- 3.1.2 greenhouse gas (GHG)**
- 3.1.3 greenhouse gas emission**
- 3.1.4 greenhouse gas removal**
- 3.1.5 organization**

The following terms are defined in [ITU-T L.1400]:

- 3.1.6 ICT goods**
- 3.1.7 ICT networks**
- 3.1.8 ICT services**
- 3.1.9 ICT sector**

The following term is defined in [ITU-T Y.4901]:

3.1.10 ICT companies

The following terms are defined in [ITU Y.4900]:

3.1.11 city

3.1.12 smart sustainable city

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 scoping boundaries: Definition of what is to be assessed in terms of impact, taking into consideration the geography, types of impact and smart sustainable city initiative.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICT	Information and Communication Technology
IOM	Input Output Model
IoT	Internet of things
LCA	Life Cycle Assessment
NGO	Non-governmental Organization
OECD	Organisation for Economic Co-operation and Development
SCADA	Supervisory Control and Data Acquisition
SSC	Smart Sustainable City
SIA	Social Impact Assessment

5 Conventions

None.

6 General principles and impact types for SSC impact assessment

This clause defines the general principles and the impact types that should be taken into consideration when applying the SSC impact assessment.

6.1 General principles for impact assessment

SSC impact assessment should be in alignment with the following principles:

- **comprehensive:** all, or nearly all important, elements or aspects of impact which are of interest should be included during the assessment process;
- **transparent:** the impact assessment process and its outcomes should be explicit, unambiguous and easily perceivable;