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SYSTEMS REFERENCE DELIVERABLE

colour inside

Smart city use case collection and analysis – Smart urban planning for smart cities –
Part 1: High-level analysis

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SMART CITY USE CASE COLLECTION AND ANALYSIS – SMART URBAN PLANNING FOR SMART CITIES –

Part 1: High-level analysis

FOREWORD

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IEC SRD 63320-1, which is a Systems Reference Deliverable, has been prepared by IEC systems committee Smart Cities: Electrotechnical aspects of Smart Cities.

The text of this Systems Reference Deliverable is based on the following documents:

Draft	Report on voting
SyCSmartCities/286/DTS	SyCSmartCities/301/RVDTS

Full information on the voting for the approval of this systems reference document can be found in the report on voting indicated in the above table.

The language used for the development of this Systems Reference Deliverable is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC SRD 63320 series, published under the general title *Use case collection and analysis – Smart urban planning for smart cities*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

In recent years, research on the relationship between information and communication technology (ICT) and cities, focused on imagining the future of urban planning, has been one of the most interesting topics in the industry. Smart urban planning (SUP) for smart cities is a relatively new concept and has not received much attention around the world. The “smartness” of urban planning describes the intensive use of digital technologies to optimize the urban planning process. The concept of "smart city" has been implemented and developed all over the world. In order to construct a smart city successfully, knowing how to implement SUP for smart cities is essential, because it is the foundation of smart urban construction. However, at present, reaching a consensus on the overall architecture of standards of SUP for smart cities is still challenging. The direction and user requirements of standards development is not clear, which affects the development and application effectiveness of international standards of SUP for smart cities.

Aimed at addressing the above problems, a systems approach to collect and analyse SUP for smart cities use cases is put forward. The purpose of this document is to collect SUP for smart cities use cases globally, to sort out the current situation of SUP for smart cities both domestically and internationally, including methods, framework, ideas, and GAPS model, and to analyse the needs of SUP for smart cities work and its stakeholders.

Understanding the use cases makes it easier to describe SUP for smart cities clusters and highlight use cases' commonalities. All use cases that are selected have actual legitimacy. Planning requirements are extracted from the use cases, and recommendations are given for future standardization items related to SUP for smart cities. Collecting the use cases provides SUP for smart cities to validate confirm the SUP for smart cities reference model and reference architecture.

The target users for this document include the following stakeholders who have interest in SUP for smart cities:

1) smart city planners and service providers, who can learn about SUP for smart cities needs and how to implement the ideas;
2) government agencies and heads, who can use SUP for smart cities and implement in future works;

3) citizens who want to have a better understanding of SUP for smart cities;
4) SUP for smart cities operators who need to understand the requirements;
5) regulators who are responsible for developing and managing SUP for smart cities and related regulations.

SMART CITY USE CASE COLLECTION AND ANALYSIS – SMART URBAN PLANNING FOR SMART CITIES –

Part 1: High-level analysis

1 Scope

This part of IEC SRD 63320 explains the definition, development goals and theoretical models of smart urban planning use case collection and analyses. This document identifies the key application areas of smart urban planning and determines the stakeholders and the relationships among them in the guidance of use case template.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
smart urban planning
digital and intelligent urban planning system, in which advanced technologies are used in all aspects, from decision-making, compiling, reviewing to evaluation

3.1.2
use case
specification of a set of actions performed by a system, which yields an observable result that is, typically, of value for one or more actors or other stakeholders of the system

[SOURCE: ISO/IEC 19505-2:2012, 16.3.6]

3.1.3
stakeholder
interested party
individual, group or organization that has an interest in an organization or activity

Note 1 to entry: Usually a stakeholder can affect or is affected by the organization or the activity.

[SOURCE: IEC 62542:2013, 3.19, modified – "interested party" has been added as a preferred term and the corresponding note to entry deleted.]

3.1.4
domain
area of knowledge or activity characterized by a set of concepts and terminology understood by the practitioners in that area.

EXAMPLE Taken from Smart Grid/energy system area: Generation, transmission, distribution, customer.

Note 1 to entry: Major area of similar technologies and organizational background, for the energy system some domains are suggested in this document as examples throughout this document.

[SOURCE: ISO/IEC 19501:2005, Glossary]

3.1.5
functional requirement
requirement that describes what the system must do

Note 1 to entry: They are actions in response to events, or actions performed autonomously. They represent operations and features provided.

[SOURCE: IEC TR 62559-1:2019, 3.13]

3.1.6
non-functional requirement
requirement that describes what qualities the system must contain from an execution and performance perspective

Note 1 to entry: These are also known as “constraints”, “behaviour”, “criteria”, “performance targets”, etc. They set limits or controls on how well the system performs the functional requirements.

Note 2 to entry: Non-functional requirements include: reliability.

[SOURCE: IEC TR 62559-1:2019, 3.14]

3.2 Abbreviated terms

SUP	smart urban planning
ICT	information and communication technology
AI	artificial intelligence
CIM	Common Information Model
IoT	Internet of Things
LPWAN	low-power WAN
VR	virtual reality
SDG	Sustainable Development Goal
GIS	geographic information system

4 Contributing to Sustainable Development Goals

4.1 General

The United Nations published 17 Sustainable Development Goals (SDGs) with an aim to enhance world peace and prosperity, eradicate hunger and poverty, and protect people and the planet by 2030. It calls for innovation and broad collaboration between public and private society. The IEC SRD 63320 series mainly addresses Sustainable Development Goal 11 (Goal 11): sustainable cities and communities.

4.2 Application area of smart urban planning

Goal 11 aims to make cities inclusive, safe, resilient and sustainable. This goal includes 11 targets which are related to smart cities: 11.1 Safe and affordable housing; 11.2 Affordable, accessible and sustainable transport systems; 11.3 Inclusive and sustainable urbanization; 11.4 Protect and safeguard the world’s cultural and natural heritage; 11.5 Reduce the adverse effects of natural disasters; 11.6 Reduce the environmental impact of cities; 11.7 Provide universal access to safe inclusive green and public spaces; 11.a Strong national and regional development planning; 11.b Implement policies for inclusion, resource efficiency and disaster risk reduction; 11.c Support least developed countries in sustainable and resilient buildings.

The SUP application areas studied in this document address the full list of targets in Goal 11 (Table 1). One application domain can address more than one target. For example, the application area of smart community addresses 11.1 Safe and affordable housing, 11.3 Inclusive and sustainable urbanization, and 11.7 Provide universal access to safe inclusive green and public space.

Table 1 – Mapping application areas of smart urban planning and SDGs

SDG	SDG target	Smart urban planning application areas
11.1 Safe and affordable housing	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.	smart community action plan; smart land use planning; smart city security planning; smart economic planning
11.2 Affordable, accessible and sustainable transport systems	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.	smart transportation planning
11.3 Inclusive and sustainable urbanization	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.	smart community action plan; smart land use planning; smart economic planning
11.4 Protect and safeguard the world’s cultural and natural heritage	Strengthen efforts to protect and safeguard the world’s cultural and natural heritage.	smart heritage protection planning; protection planning of historical and cultural city; smart urban cultural planning
11.5 Reduce the adverse effects of natural disasters	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.	smart water management planning; smart health-care planning
11.6 Reduce the environmental impact of cities	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.	smart environmental protection planning
11.7 Provide universal access to safe inclusive green and public spaces	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.	smart community action planning; smart ecology management planning; smart urban environmental protection planning
11.a Strong national and regional development planning	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.	smart government services planning; smart urban master planning
11.b Implement policies for inclusion, resource efficiency and disaster risk reduction	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.	smart environmental monitoring
11.c Support least developed countries in sustainable and resilient buildings	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.	supervision of smart architecture

5 Approach for use case collection and analysis

The IEC SRD 63320 series adopts a top-down approach to generate and collect the use case of smart urban planning, as illustrated in Figure 1.

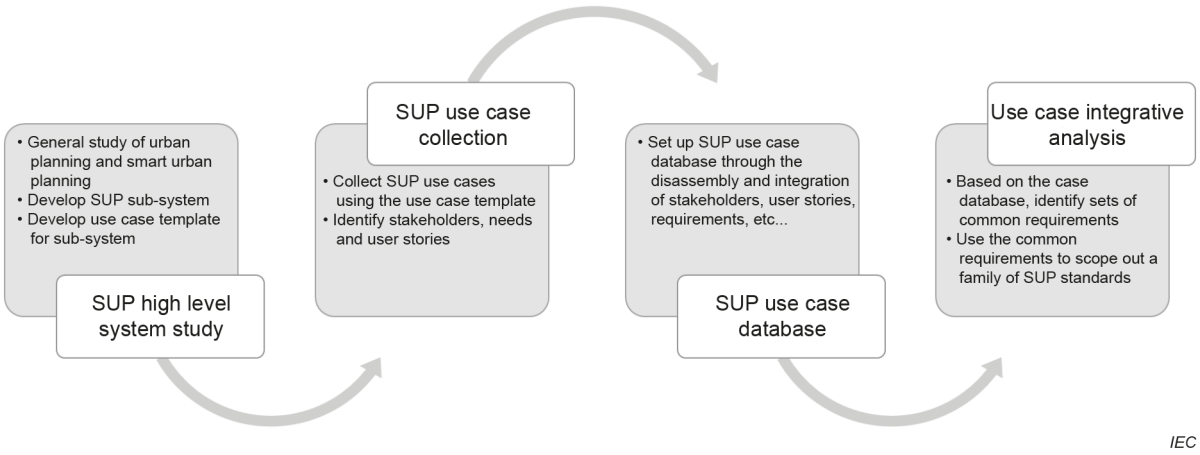

Figure 1 – Approach for use case collection and analysis

Firstly, a thorough study of smart urban planning is needed at the beginning of use case collection and analysis. The purposes of the work of SUP high-level system study include to identify sub-systems, to identify basic stakeholder needs, and to develop SUP a use case template for sub-system based on IEC TR 62559-1 and IEC 62559-2. The template of smart urban planning application area survey table is found in Annex A.

Secondly, generate and collect a list of use case about smart urban planning following the use case template. Develop a list of significant user stories based on the collected use case. In each corresponding area, one user story is generated for one specific stakeholder. Each user story follows the same template, which includes one stakeholder (as a specific type of user), a specific situation (when), a goal (I want to), and a reason (so that).

Thirdly, break down each element of the use case, including stakeholders, user stories, etc., and establish the use case database of smart urban planning.

Lastly, conduct an integrative analysis based on the use case database, and identify the standard gaps for smart urban planning and requirements for a family of smart urban planning standards.

This document focuses on the first and second steps of the work approach.

6 Use case stratification

6.1 General

IEC TR 62559-1 and IEC 62559-2 give a detailed definition and classification about business case, high-level use case and specialized use case. The IEC SRD 63320 series will consider the content and stratification of smart urban planning to correspond to three levels of use case.

6.2 Business case

A business case comes into being when something unites different actors (stakeholders) with their own business goals.

For smart urban planning, business cases can be identified according to the step of urban planning. There is a total of six business cases in smart urban planning, corresponding to the six steps of urban planning system, namely preparatory work, data collection and analysis, strategy formulation, plan review and approval, plan implementation, and monitoring and assessment.

6.3 High-level use case

High-level use case describes a general requirement, idea or concept independently from a specific technical realization like an architectural solution. High-level use cases can be derived from business cases through model transformation, in which business actors involved in business cases are transformed into logical actors that are interpreted as logical entities involved in a particular high-level use case.

For smart urban planning, the application area of smart urban planning is regarded as the high-level use case. The process of breaking down smart urban planning into different high-level use cases is a key part of high-level analysis.

6.4 Specialized use case of SUP

High-level use case usually describes an innovative, abstract function but the actual technical implementation is not dealt with. On this basis, specialized use cases can be developed and explain a tangible elaboration of the technical aspects.

7 High-level analysis of smart urban planning

7.1 General

Smart urban planning is the application of digital technology on the basis of urban planning. Therefore, model of smart urban planning is adjusted and transformed on the basis of model of urban planning.

7.2 Steps of urban planning

7.2.1 General

Urban planning is a systematic, formal, standardized work cyclic process. It includes pre-planning, planning and post-planning stages. These three stages are then further broken down into six steps, including preparatory work in the pre-planning stage, data collection and analysis, strategy formulation, and plan review and approval in the planning stage, implementation and monitoring and assessment in the post-planning stage.

1) Pre-planning stage. The first, and in some respects, the most important stage is ‘pre-planning,’ or preparing to plan. This stage diagnoses the planning area. Once local officials and the public understand the purpose, values and benefits of planning and agree on a process to prepare the plan, the following steps become much easier.
2) Planning stage. The second stage – ‘planning’ – consists of three major steps. These include data collection and analysis, strategy formulation, and plan review and approval. The planning stage in Figure 2 shows several positive feedback loops. This is meant to illustrate that planning does not always proceed in a linear fashion. At times, the planning department can need to revisit or reorder steps to respond to new data or unexpected reactions to a proposal. Some flexibility should be built into the process to accommodate these unknowns. Depending on how planners choose to organize the planning process, a given community may also have more or fewer steps than what is shown.
3) Post-planning stage. The third stage is ‘post-planning’, which consists of plan implementation, monitoring and post-implementation evaluation.

The urban planning system applies to all kinds of urban planning, including master planning, new and pre-existing land-use planning, urban revitalization, economic development planning, environmental planning, infrastructure planning, regulatory planning and so on.