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Information technology — Smart City ICT reference framework —

Part 1: Smart city business process framework

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

A list of all parts in the ISO/IEC 30145 series can be found on the ISO and IEC websites.

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Introduction

0.1 General

The purpose of the ISO/IEC 30145 series is to assist city chief information officers (CIO) and other stakeholders in planning and implementing a smart city. It comprises the following three parts:

— Part 1: Smart city business process framework (this document)

— Part 2: Smart city knowledge management framework

— Part 3: Smart city engineering framework

Each of the three parts are aimed at a different role or viewpoint within the city and thus separate focus needs to be maintained. The "separation of concerns" is a principle for the development of a city as it uses ICT to deliver the vision and objectives for the city. The value of using the separation of concerns is to simplify development and maintenance of the architecture as the city both develops and delivers improved outcomes for the city stakeholders.

Figure 1 shows the components of the smart city ICT reference framework, which consist of 5 components: stakeholders, vision and outcomes, the business process framework, the knowledge management framework, and the engineering framework. This document describes stakeholders, vision and outcomes, and the business process framework. The knowledge management framework and engineering framework are described in ISO/IEC 30145-2 and ISO/IEC 30145-3 respectively.

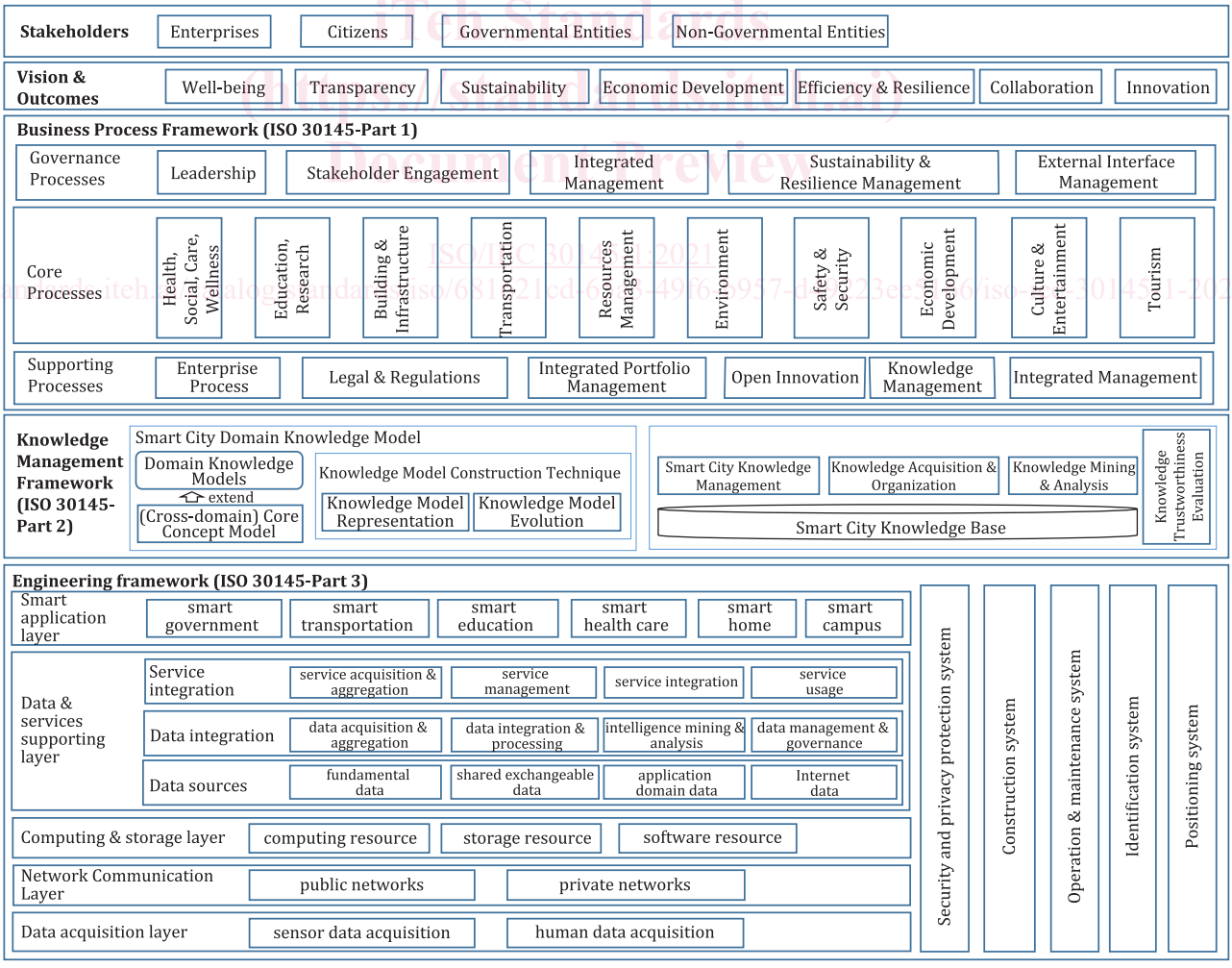

Figure 1 — Smart city ICT reference framework

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0.2 Stakeholders

The stakeholders served by the smart city ICT reference framework are enterprises, citizens, government entities and non-government entities. This stakeholder list is not exhaustive but defines the key stakeholders in a smart city and the user for the smart city ICT reference framework.

0.3 Vision and outcomes

The motivation for making a city smart is a result of a shared vision and a set of agreed outcomes from all the city stakeholders. The vision and outcomes of the smart city ICT reference framework are well-being, transparency, sustainability, economic development, efficiency and resilience, collaboration and innovation. This vision and outcomes list is not exhaustive, but defines the key vision and outcomes of a smart city. The smart city ICT reference framework articulates a vision that the Smart City will be transparent in the delivery of city services that meet city sustainability ambitions. This vision uses collaboration and innovation approaches to deliver desired city outcomes. City outcomes are expected to improve the efficiency and resilience of city services and promote economic development activities that enhance the well-being of citizens.

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Part 1:
Smart city business process framework

1 Scope

This document specifies a generic business process framework for a smart city focusing solely on smart city-specific processes. Generic business processes common between smart cities and commercial organizations are be identified but not detailed.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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4 Smart city business process overview

The objectives of a business process framework (adapted from the TM Forum 2015[8]) are to:

— create a common language for use across departments, systems, external partners and suppliers, reducing cost and risk of system implementation, integration and procurement; and

— adopt a standard structure, terminology and classification scheme for business processes to simplify internal operations and maximize opportunities to partner within and across industries.

The aim of the smart city business process framework is to identify and describe the key business processes required in a smart city and to provide a framework for individual cities to describe how those processes are being carried out within their city.

This will:

— allow cities to review how well their existing processes are designed to deliver the smart city outcomes for which they are aiming;

— allow business processes in different cities to be compared to enable the determination of best practices; and

— provide a foundation to enable more detailed work to be undertaken on these business processes in the future.

The business processes in this document are only a fraction of all the business processes found in a smart city. Only the most significant processes that make a city ‘smart’ have been included.

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Given the complexity and considerable number of smart city business processes, this framework:

— Focuses on what makes a city ‘smart’.

— Uses a simple single layer architecture.

— Uses an outcome-based approach to characterize business processes.

An attempt has been made to use terminology that is standard in the Enterprise Architecture, Business Process analysis and Systems Engineering domains.

A smart city is an IT-intensive System of Systems (SoS). At a very high level, it can be viewed as a set of business processes that are integrated through the judicious use of sophisticated IT capabilities to realize outcomes.

This document describes 21 smart city business processes, divided into three types, as illustrated in Figure 2.

Governance processes: This document describes five “horizontal” business processes that are the driving force that govern and manage the capabilities of a smart city to produce the desired outcomes.

Core processes: This document describes ten business processes used to manage the city systems in an integrated way to deliver a smart city.

Supporting processes: This document describes six business processes required to enable the city systems to be properly integrated. One of these, the knowledge management process, describes the business processes required to deliver the knowledge management framework detailed in ISO/IEC 30145-2. Another, the integrated engineering process, describes the business processes required to deliver the engineering framework detailed in ISO/IEC 30145-3. The business processes mapping onto ISO 37106 is described in Annex A.

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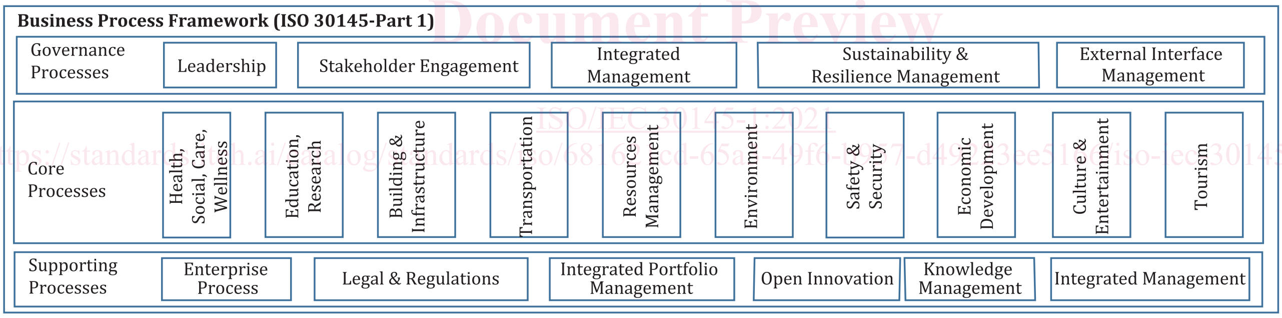

Figure 2 — Smart city business process framework

5 Smart city governance processes

5.1 General

As mentioned in Clause 4, there are five processes under this category:

G1. Leadership

G2. Stakeholder Engagement and Citizen Focus

G3. Integrated Management

G4. Sustainability and Resilience Management

G5. External Interface Management

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5.2 Leadership

Process ID	G1
Process name	Leadership
Brief description	The Smart City Leadership process provides a high-level overall view of a city. Taking advantage of the ability to collect and analyse big data, it provides the city leaders with a clearer overall, longer-term view of the city, which they can use to provide better management and governance of the city as a whole.
Extended description	This enables the smart city leadership to bring together the work of different government departments by using ICT technologies such as system engineering, big data analysis, IOT technologies and systems, etc. By doing so, the smart city leadership will be able to achieve the following: — Effective strategic planning for the city as a whole. — Cooperation and collaboration across government departments. — Improved and more efficient business processes.
Process purpose	The purpose of the Leadership process is to provide strategic direction and vision to the city, ensure the buy in by all stakeholders, allocate resources, monitor the implementation of the vision, set policies and manage risks.
Process outcomes	As a result of successful implementation of this process: 1) The city has a clear smart city vision. 2) This vision has been communicated to all city stakeholders. 3) Implementation of the vision is tracked and regularly assessed. 4) ICT related risks are assessed and managed. 5) Policies pertinent to ICT, including IoT and ICT-enabled services, are elaborated and deployed. 6) Improvement programmes are endorsed and funded.
Base practices	There is an overall appointed transformation leader, working with a broad-based team representing all stakeholders, driving the implementation of the smart city vision. The city has set up a cross-silo funding and budget process to address collaborative initiatives.
Relationship notes	G2. Stakeholder Engagement and Citizen Focus G3. Integrated Management G4. Sustainability and Resilience Management G5. External Interface Management

Selected work products	
Inputs	**Outputs**
Requirements analysis SWOT analysis Technology trends analysis	Smart city strategic plan Smart city implementation project portfolio
Assessment of technology requirements	Smart city technology architecture guidelines
Budget allocation	Funding requirements secured

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5.3 Stakeholder Engagement and Citizen Focus

Process ID	G2
Process name	Stakeholder Engagement and Citizen Focus
Brief description	The Stakeholder Engagement and Citizen Focus process provides a platform for the exchange of ideas and for the sharing of information to make sure that the demands and ideas of citizens and other stakeholders are fully socialized, considered and discussed.
Extended description	The Stakeholder Engagement and Citizen Focus process enables the management and future plans for city development to be focused around the citizen, taking into account their requirements for city design, city functions, city services, etc., to make sure smart city projects fulfil the demands of citizens. By using system engineering and system thinking, this process ensures smart city stakeholders are fully involved to minimize conflicts and unfulfilled requirements. Enabling platforms such as electronic bulletin boards, e-voting systems, or feedback/monitoring systems using social media are used to enhance the stakeholder and citizen engagement.
Process purpose	The purpose of the Stakeholder Engagement and Citizen Focus process is to engage the citizens, community organizations and businesses in the process of making the city smarter and in fulfilling its vision.
Process Outcomes	As a result of successful implementation of this process: — Citizens and stakeholders are easily able to find out about city plans and provide their input and see evidence that their input affects the way the plans are carried out. — Additional Funding for smart city project is available from partners. — Smart city projects are properly prioritized from the citizen perspective. — Smart city projects are implemented with the right functionality to meet the needs of citizens. — Service processes are successfully re-engineered to ensure citizen-centric outcomes.
Base practices	1) Stakeholders, such as citizens, enterprises and non-governmental entities, are consulted and involved in the development of the city strategy. 2) There are effective mechanisms in place to capture citizen and customer input and to provide feedback as to the actions taken in response. 3) Smart city services are designed around the identified needs of citizens and how they wish to interact with the city. 4) The city has collaboration and formalized partnerships with third parties, such as universities, businesses and community organizations, to tackle city problems.
Relationship notes	G1. Leadership G3. Integrated Management G4. Sustainability and Resilience Management G5. External Interface Management

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Selected work products	
Inputs	**Outputs**
Online consultation systems and voting systems Online discussion lists Citizen satisfaction surveys	City services feedback acted upon Citizen satisfaction feedback acted upon

5.4 Integrated Management

Process ID	G3
Process name	Integrated Management
Brief description	By applying technologies such as big data analysis and data mining, etc. this process provides a smart city with harmonious and holistic city management, which improves efficiency and provides significant added value.
Extended description	By analysing a city's existing management processes, and by taking advantage of system engineering, the city management functions and processes can be analysed and optimized to improve city functions or services. This will break the silos and provide added value through the analysis of big data, data mining and other ICT technologies.
Process purpose	The purpose of the Integrated Management process is to create value by enabling cross-functional activities and promoting a holistic approach to city management.
Process outcomes	As a result of successful implementation of this process: — The City managers and employees have access, in real time, to the data required for their activities. — Value is created by implementing ICT enabled applications that use data from multiple domains. — Cross-functional services are deployed. — There is no 'silo' culture in the city.
Base practices	1. Sharing of data across functional boundaries and domains. 2. Democratization of data access within the city management and administration. 3. Deployment of big data city analytics solutions.
Relationship notes	G1. Leadership G2. Stakeholder Engagement and Citizen Focus G4. Sustainability and Resilience Management G5. External Interface Management

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Selected work products	
Inputs	**Outputs**
Data sharing policies	Re-engineered and integrated business process

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5.5 Sustainability and Resilience Management

Process ID	G4
Process name	Sustainability and Resilience Management
Brief description	Introducing and implementing effective plans to ensure the sustainability and resilience of the city.
Extended description	This ensures that the city's carbon footprint and vulnerabilities to major disasters are thoroughly audited and that comprehensive, multi-stakeholder plans are put in place to address these. This will include the identification and constant monitoring of KPIs related to sustainability and resilience and the review of all plans in the light of the results. New technologies and big data analysis are used to better assess and predict risk and to suggest effective ways of responding and recovering when disaster occurs.
Process purpose	To ensure that the city plays its role in preserving a planet that provides for the needs of future generations and that safeguards the city in the event of disaster.
Process outcomes	— Rapid progress towards the city becoming carbon neutral. — Clear behaviour changes by citizens and businesses to make their city more sustainable. — Rapid and effective response to emergencies by all agencies and residents. — Availability targets are defined for all critical and non-critical services of the city and these services are engineered accordingly. — The city has an ICT enabled disaster recovery plan that is regularly tested.
Base practices	1) The identification and monitoring of relevant KPIs. 2) Regular, cross agency reviews of progress with full citizen participation. 3) Inclusion of key sustainability and resilience goals within all city plans.
Relationship notes	G1. Leadership G2. Stakeholder Engagement and Citizen Focus G3. Integrated Management G5. External Interface Management

Principal work products	
Inputs	**Outputs**
Sustainability and city carbon footprint audit	City sustainability strategy
Sustainability and city carbon footprint targets set	City resilience strategy
Resilience audit	Planning guidelines for sustainability and resilience
Resilience targets set	Implementation of a system of relevant KPI measurement and evaluation
	Emergency response plan
	Emergency response system implemented

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