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Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information

Villes et communautés territoriales durables — Cadre d'évaluation pour les jeux de données et les méthodes de traitement des données qui génèrent des informations de gestion urbaine

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Foreword

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This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*.

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Introduction

Sustainable cities and communities rely on management information to support their decision-making on cross-sectoral issues. Urban management information can be created with data obtained from various sources – such as statistics, surveys, measurements, observations, data sharing based on API, and data aggregation through machine learning (ML), where raw data is collected and processed – and expressed in a summarized form for statistical analysis.

Sustainable cities and communities can be efficient by understanding:

— the value of data in improving city governance;

— the rationale and purpose of urban management information and its intended use;

— the algorithms and processing methods used for creating urban management information;

— the raw data obtained from multiple sources that combine to create urban management information.

The complexity of these four topics is increasing due to the growing demand for standardized urban management information and the continuous generation of diverse data. As a result, organizations need a common appraisal framework to support decision-making, without requiring deep knowledge of data techniques and to enable effective dialogue with stakeholders.

The need for urban management information in sustainable development is clearly shown through the creation of indicators. These indicators aggregate and process data, serving as a key metric for evaluating the performance of sustainable cities and communities. They support both policy making and communication. However, the use of indicators is limited by the availability of data, data processing methods, and the lack of standardized metadata. For example:

— the same indicator can have different results using apparently similar data: datasets with the same parameters can produce different indicator results due to different measurement or observation methods used to create the data;

— comparable indicators can be created from different data: equivalent datasets are not available at all locations, but by using suitable processing techniques, comparable indicators can be created;

— the suitability of a given indicator can vary from time to time: the impact can be variable purposes, public policies, data-collection methods, data processing methods and scientific advancements;

— lack of metadata standards can also hamper collaboration and information sharing among analysts: a city manager usually gathers data from various sources, including documents, open data portals, smart city systems, statistics, or surveys. All the data is collected in different formats by different organizations or individuals. Without a unified metadata standard, this data can result in duplicates, inaccuracies, undetected bad data, or incomplete conclusions.

Organizations need to have a shared understanding of how indicators are created or selected. This helps them use indicators effectively when making decisions. It also ensures flexibility and agility in cities or communities by applying the right indicators at the right time. Meanwhile, the growing variety of data sources and processing methods adds complexity to the process.

To address the complexity outlined above, organizations can adopt a consistent and structural approach to manage the urban management information they use. This approach should be sufficiently agile and flexible to integrate the strategic, operational, scientific and technology viewpoints that all impact how urban management information is created and used.

As elaborated in Figure 1, the integration of strategic, operational, technical and scientific viewpoints is a prerequisite for creating urban management information. At the strategic level, organizations need to set sustainability aims and plan to monitor the sustainability process. At the operational level, organizations need to define roles and responsibilities, and develop data supply agreements with stakeholders. At the technical level, cities and communities need to have data processing technology and data storage, and stakeholders need to communicate with each other. At the scientific level, organizations and stakeholders

should have scientific understanding and promote its practical implementation as well environmental observation. After these four aspects are well grounded, the involvement of users should be considered, with the smart city system principles defined in ISO 37106 serving as a guide for the appraisal framework. Then, the appraisal framework for datasets and data processing methods that create urban-management information can be established and used.

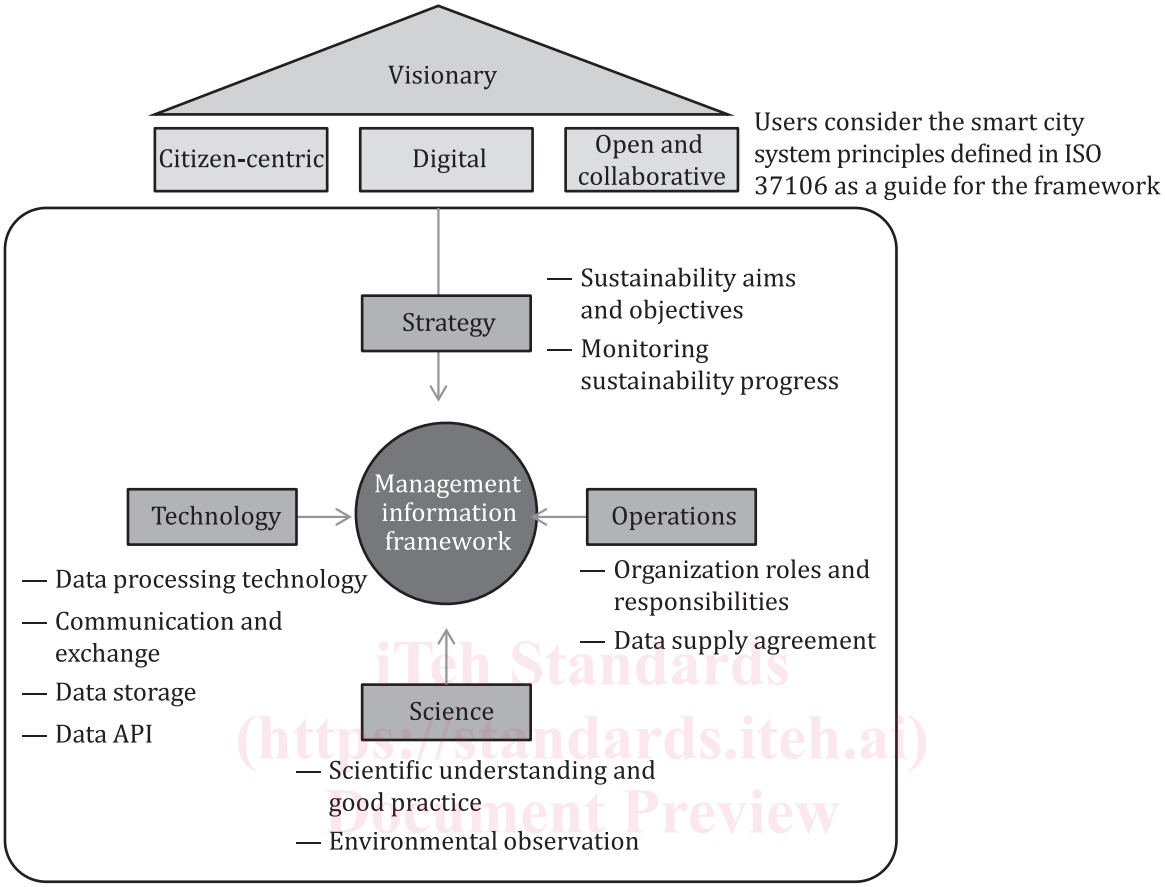

Figure 1 — Management information conceptual model

This document sets out a conceptual model that allows different ways of implementation with spreadsheets and databases, installed or web-based. This document facilitates communication among various stakeholders including top management, data ownership holders, data possession rights holders, data management rights holders, property owners, facilities management (including asset management), statistical agencies, and others. The methodology is also technologically neutral, allowing organizations to adopt different technical solutions for generating and using data in accordance with the UN SDGs.

This document also provides a reference for various other interested parties, including building owners, facilities companies, statistical agencies, smart city service providers, software vendors and even financial institutions that offer financing services for the development of the data services industry. This support encourages their participation in the sustainable management of cities and communities. It can support global comparison for smart and sustainable development, and is an extension to other International Standards developed by ISO/TC 268, such as ISO 37101 and ISO 37104. Accordingly, the data in this document is organized in response to the six purposes of a sustainable city or community elaborated in ISO 37101.