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Date: 21 April 2025

Origin: International

Latest date for receipt of comments: 14 June 2025

Project No. 2023/01536

Responsible committee: SDS/2 Smart and sustainable cities and communities.Sustainable Communities

Interested committees:

Title: Draft BS ISO 37187 Smart community infrastructures. Guidelines on data exchange and sharing of city information modelling platform.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 37187

Smart community infrastructures — Guidelines on data exchange and sharing of city information modelling platform

ICS: 91.020; 35.240.99

ISO/TC 268/SC 1

Secretariat: JISC

Voting begins on:
2025-04-21

Voting terminates on:
2025-07-14

This document is circulated as received from the committee secretariat.

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Reference number
ISO/DIS 37187:2025(en)

Full document details: 25/30476849 DC

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC 1, *Smart community infrastructures*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Under the impetus of global urbanization, smart cities are increasingly becoming a new paradigm for urban development. Through the deep integration of advanced Information and Communication Technologies (ICT), empowering city management, services, and sustainable development is the inevitable direction of urban development to enhance urban operational efficiency and quality of life. The system of smart cities is complicated, and it is not easy to understand the whole picture. Ensuring the maximization of the interests of numerous stakeholders in the process of achieving sustainable development, efficiency, resilience, and security goals of urban development is also a challenge.

The City Information Modelling (CIM) platform, based on the basic geographic information of cities, collects information models of buildings and infrastructures at different stages. It serves as an integrated platform for the basic operational and information resources for urban planning, construction, management, and operation, and is the fundamental, critical, and substantive information infrastructure of smart cities. As the core carrier of smart city construction, its importance is self-evident and crucial for achieving intelligent and refined urban management.

The data framework of the CIM platform integrates data resources from various departments and systems. It enables information sharing and collaboration between different departments, establishes digital models of various aspects of the city, and provides important support for the planning, construction, management, operation, and development of smart cities. It also provides support for the survival foundation of smart city infrastructure in various fields such as energy, water resources, transportation, and waste. At the same time, specifying the functions and applications of the CIM platform can optimize urban services, contribute to achieving sustainable urban development, improve the quality of life for citizens, and promote urban economic prosperity.

ISO/IEC 30182:2017 focuses on the Smart City Conceptual Model (SCCM), which is used to describe data from any department in the city, to discuss how to achieve interoperability between data and addressing the lack of data interoperability. ISO 37156:2022 focuses on the data exchange and sharing of smart city infrastructure, offers a reference for governments, enterprises, organizations, and individuals to share urban infrastructure data. At the same time, it also provides a set of methods for governing urban infrastructure data, gives a unified framework for data exchange and sharing following privacy and security principles. After the data can be exchanged and shared under ISO 37156, the city data can be integrated through the city-level platform, CIM, which can utilize the data value. However, there are also data exchange and sharing when data flows in the CIM platform. This document, through specifying the data, modelling, basic functions, platform construction, and operation of the CIM platform, allows data to play a greater role in the development of smart cities in aspects such as urban planning, construction, management, operation, based on existing data and ensuring data exchange and sharing.

Smart community infrastructures — Guidelines on data exchange and sharing of city information modelling platform

1 Scope

This document specifies the requirements of the City Information Modelling (CIM) platform for the information modelling process of smart city construction, operation and maintenance.

This document applies to both building and infrastructure assets and management of the CIM platform and its related applications and scenarios, including community infrastructures such as transportation, communication, energy, roads, logistics, and the activities of stakeholders both organizations and citizens, apply for governments, enterprises, schools, health care, and families, etc.

NOTE [Annex A](#) outlines case studies of data exchange and sharing of CIM platform in smart community.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 37156:2020, *Smart community infrastructures — Guidelines on data exchange and sharing for smart community infrastructures*

3 Terms and definitions

For this document, the following terms and definitions given in ISO 19650-1:2018, ISO/IEC 20924:2021, ISO 19101-1:2014 and the following apply.

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 <https://www.electropedia.org/>

3.1 Application Programming Interface API

collection of invocation methods and associated parameters used by one piece of software to request actions from another piece of software

[SOURCE: ISO/IEC 18012-1:2004, 3.1.1]

3.2 Building Information Modelling BIM

use of a shared digital representation of an asset to facilitate design, construction, and operation processes to form a reliable basis for decisions

[SOURCE: ISO 19650-1:2018, 3.3.14, modified — The wording "a built asset" has been changed to "an asset"; Note 1 to entry has been removed.]

3.3

City Information Modelling

CIM

development of digital representations and simulations of a city made up of large quantities of geospatial data, often including real-time data, which enable better city planning and management

Note 1 to entry: The geospatial data is provided using an integration of Building information Modelling (BIM) and Geographic Information Systems (GIS).

Note 2 to entry: The real-time data is obtained through extensive use of IoT sensors within the city.

Note 3 to entry: City information Modelling involves handling large amounts of big data, which is generally brought together using cloud computing.

Note 4 to entry: Artificial intelligence is often used to generate and evaluate different scenarios using City information Modelling data to help manage the city better.

[SOURCE: IEC 63273-1:2023, 3.1.1]

3.4

digital twin

DT_w

digital representation of a target entity with data connections that enable convergence between the physical and digital states at an appropriate rate of synchronization

Note 1 to entry: Digital twin has some or all of the capabilities of connection, integration, analysis, simulation, visualization, optimization, collaboration, etc.

Note 2 to entry: Digital twin can provide an integrated view throughout the life cycle of the target entity.

[SOURCE: ISO/IEC 30173:2023, 3.1.1]

3.5

external information infrastructure

infrastructure of systems, technologies, and frameworks that support integrating and interacting a city's data with external data sources and services

3.6

Geographic Information System

GIS

information system dealing with information concerning phenomena associated with location relative to the Earth

[SOURCE: ISO 19101-1, 4.1.20]

3.7

Internet of Things

IoT

infrastructure of interconnected entities, people, systems and information resources together with services which processes and reacts to information from the physical world and virtual world

[SOURCE: ISO/IEC 20924:2024, 3.2.8]

3.8

lightweight model

suitable rendering dataset after simplifying, compressing, and processing of the synthetic model's data on geometry, texture, attributes based on lightweighting, visual effect enhancement, and other technologies to optimize model's memory usage, computation and power consumption for running on resource-constrained devices

3.9 Machine Learning ML

process of optimizing model parameters through computational techniques, such that the model's behaviour reflects the data or experience

[SOURCE: ISO/IEC 22989:2022, 3.3.5]

3.10 open data platform

a digital infrastructure of enabling the collection, storage, sharing, and analysis of publicly accessible urban data

3.11 synthetic model

outcome dataset based on format conversion, model classification and grading, data fusion, automated modelling, semantic processing, and other technologies, containing clear semantic composition, geometric form, attribute information, and relationship information

4 Overview of CIM platform

4.1 General

The CIM platform is a comprehensive platform that integrates multidimensional data and information of cities, aiming to provide decision support for urban planning, construction, management, and services. The CIM platform achieves efficient management and application of data by integrating various urban data resources, thus facilitating sustainable urban development.

The CIM platform centralizes the management of CIM data, providing access interfaces for data and services. The CIM platform's service scope includes but not limited to urban planning and design, infrastructure construction, environmental protection, public services, and emergency management. By offering data support and analysis tools, the CIM platform assists relevant departments and enterprises in optimizing resource allocation, enhancing urban management efficiency, and improving service quality.

The target scope of CIM platform services encompasses cities, industrial parks, parks, communities, clusters of buildings, and individual buildings. For government and urban management departments, the CIM platform objects may also include various smart facilities and systems such as railways, emergency response, drainage, streets, parking, utilities, facilities, fire protection, communities, and industrial parks based on the actual conditions of smart city applications.

4.2 Platform architecture

4.2.1 Introduction

The CIM platform comprises five layers (device layer, data layer, service layer, application layer, and user layer) and three supporting systems (standards and specifications system, information security system, and operation and maintenance guarantee system). There are dependencies between the upper and lower layers horizontally, such as dependencies of basic resource, data, service, and function among different layers. Vertically, there are constraints between vertical systems and related layers, such as interface constraints, security constraints, resource constraints, performance constraints, and compatibility constraints. Each layer carries out specific functions and tasks, and through dependency and constraint relationships, the integrity and collaboration of the platform are ensured.

4.2.2 Device layer

The device layer serves as the physical foundation of the CIM platform, encompassing various hardware devices such as sensors, monitoring devices, computing equipment, communication facilities, and other hardware components.

The device layer includes IoT sensor devices, open data platform, as well as information infrastructure such as cloud computing, cloud storage, cloud transmission, blockchain, and other related components.

The primary function of the device layer is to collect, store, and transmit various data related to urban operations, providing raw data sources and computing services for the data layer above.

4.2.3 Data Layer

The data layer is the core of the CIM platform, responsible for storing, processing, and managing the data within the CIM.

The data layer includes spatiotemporal fundamental data, resource survey data, IoT sensory data, public thematic data, engineering construction project data, planning control data, outcome data, and other datasets.

Constructing the CIM platform data resource system ensures the accuracy, completeness, and availability of data, providing data support for the services in the upper layers.

4.2.4 Service Layer

The service layer provides various data processing and analysis services, serving as the middleware of the CIM platform.

The service layer provides various common foundational computations and services including AI-based digital twin (DT_w), simulation, and Machine Learning (ML).

The service layer provides functionalities and services such as basic functions, data ingestion, data processing, data fusion, data storage, model management, IoT supervision, Application Programming Interface (API), visualization, dashboard, and simulation.

4.2.5 Application Layer

The application layer refers to a series of applications and service components built on top of the basic functionalities and services of the CIM platform, catering to specific urban management and decision support needs. It serves as the implementation layer for concrete business functionalities, such as smart government services, smart healthcare, and smart buildings applications.

The application layer can be divided into several categories, including urban planning and design applications, construction management and engineering collaboration applications, urban management and operation applications, public service and public participation applications, data analysis and decision support applications, etc. These applications leverage the data and service resources provided by the CIM platform and are extended through secondary development to establish smart applications on desktop, web, and mobile platforms.

The application layer serves as the crucial bridge connecting the core technology of the platform with the final user demands. By constructing specialized, customized, and user-friendly application software, general tools, and standardized interfaces, it transforms the powerful functionalities of the CIM platform into effective means to solve real urban problems. This fosters the scientific, refined, and intelligent management of cities, providing application services in areas such as urban planning, construction, management, services, and operations according to user needs.

4.2.6 User Layer

The user layer represents the ultimate service recipients of the CIM platform, including government entities, enterprises, and the general public.

The user layer includes both mobile users and static users.

The function of the user layer is to interact with the CIM platform through user interfaces to obtain the required information and services. Users can communicate with the middleware layer via wired or wireless

networks to complete necessary tasks. The platform provides personalized tools and services tailored to the roles of government entities, enterprises, and the general public. Additionally, it adapts to various terminals such as large screens, PCs, and mobile devices to meet users' needs for visual effects and interaction methods.

4.2.7 Supporting systems

Supporting systems ensure that the CIM platform adheres to essential standards and fulfills fundamental requirements concerning its architecture, operation, and maintenance. These supporting systems comprise three key components: the standards and specifications system, the information security system, and the operation and maintenance guarantee system.

- Standards and specifications system: This system specifies data standards, business standards, and technical management to ensure the standardized operation of the CIM platform and alignment with national and industry data standards and technical specifications.
- Information security system: This system safeguards the data security and privacy protection of the CIM platform, mitigating various security threats in accordance with relevant policies and national network security level protection standards,
- Operation and maintenance guarantee system: This system ensures the stable operation of the CIM platform's network, data, applications, and business processes, necessary technical support and maintenance services are provided, along with the establishment of operation, update, and security assurance systems.

The overall architecture of the CIM platform with five layers and three supporting systems is illustrated in [Figure 1](#).

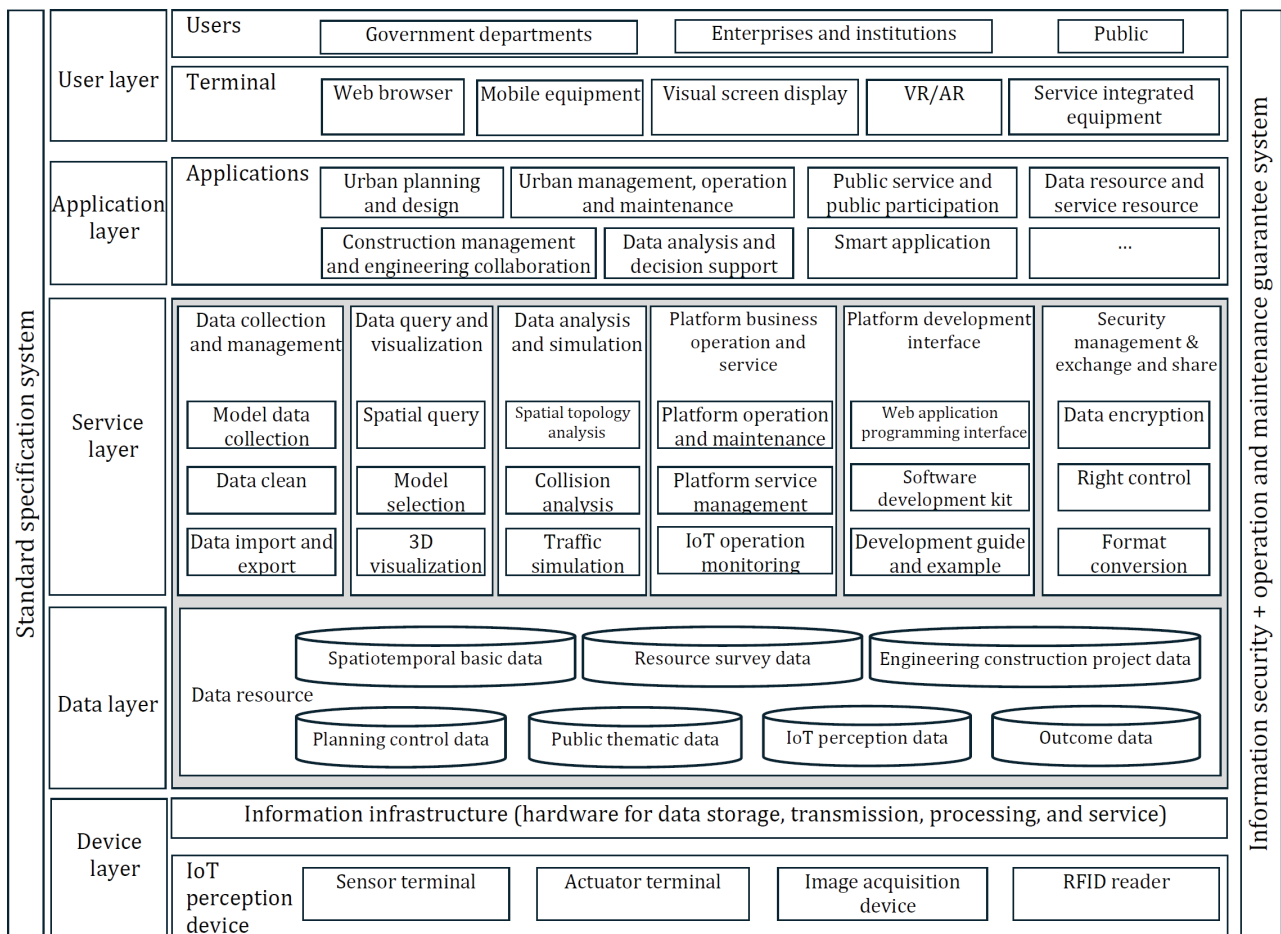


Figure 1 — Architecture of city Information modelling platform (the shaped box refers to the foundational part of CIM platform)