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Australia



Smart city use case collection and analysis — City information modelling

Part 1: High-level analysis



AS IEC SRD 63273.1:2024

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- Australian Local Government Association (ALGA)
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Part 1: High-level analysis

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Preface

This Standard was prepared by the Standards Australia Committee IT-269, Smart Cities Systems.

The objective of this document is to scope out the requirements of city information modelling standards by collecting and analysing its use cases. Specifically, the IEC SRD 63273 series achieves the objectives of identifying the key application areas and stakeholders, developing user stories and clarifying the relationship among these stakeholders, collecting and analysing use cases of city information modelling, scoping out the requirements for city information modelling standards and providing recommendations regarding urban planning and management.

This document explains how the work of city information modelling use case collection and analysis address sustainable development goals, provides a brief overview of city information modelling, and identifies the key application areas and stakeholders of city information modelling, identifies the key application areas of city information modelling, and determines the stakeholders and the relationships among them in these application areas.

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FOREWORD

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Draft	Report on voting
SyCSmartCities/290/DTS	SyCSmartCities/299/RVDTS

Full information on the voting for its approval 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 63273 series, published under the general title *Smart city use case collection and analysis - City information modelling*, 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

The IEC SRD 63273 series aims to scope out the requirements of city information modelling standards by collecting and analysing its use cases. Specifically, the IEC SRD 63273 series achieves the objectives of:

- a) identifying the key application areas and stakeholders;
- b) developing user stories and clarifying the relationship among these stakeholders;
- c) collecting and analysing use cases of city information modelling; and
- d) scoping out the requirements for city information modelling standards and providing recommendations to IEC regarding urban planning and management.

In this document, application areas refer to the deployment-oriented categories that focus on deploying city information modelling to fulfil a particular purpose.

The IEC SRD 63273 series provides useful information on understanding of city information modelling for standardization committees in IEC and other standards development organizations ([SDOs](#)) by:

- 1) promoting the collaboration and systems thinking regarding city information modelling standards;
- 2) contributing multiple domain-specific use cases for smart cities; and
- 3) supporting IEC in fostering the development of standards in the field of electrotechnology to help with the integration, interoperability, resiliency and effectiveness of city systems.

The IEC SRD 63273 series adopts a multi-step approach to generate and collect the use case of city information modelling.

Step I - High-level analysis: The first step aims to generate the list of application areas of city information modelling for a high-level analysis. Needs statements, objectives, current practices, gaps, and scenarios (rationale for applying city information modelling in a specific application area) are investigated for the description of each application area. In addition, the ecosystem, which includes the list of stakeholders and the relationship among the stakeholders, is examined in each application area before developing user stories and use cases.

Step II - User story: The second step aims to develop a list of significant user stories based on the corresponding application area. In each corresponding area, one user story is generated for one specific stakeholder which has been identified in Step I. 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).

Step III - Use case: The third step aims to develop use cases for a specific application area according to the list of user stories that have been generated in Step II. One user story in Step II can be expanded to be at least one use case. The organization of use cases follows the IEC short use case template (IEC TR 62559-1:2019, IEC 62559-2:2015 and IEC 62559-3:2017), which includes the name of the use case, scope/objective, narrative and list of actors.

Step IV - Use case database establishment and integrative analysis: This step is to establish the use case database of city information modelling and conduct integrative analysis of these use cases.

Step V - City information modelling standard gaps and requirements: This last step is to identify the standard gaps for city information modelling and requirements of the family of city information modelling standards.

The IEC SRD 63273 series contains two parts:

- IEC SRD 63273-1, Smart city use case collection and analysis - City information modelling - Part 1: High-level analysis

- IEC SRD 63273-2, Smart city use case collection and analysis - City information modelling - Part 2: Use case analysis

The scopes of the two parts are defined below.

Part 1 explains how the work of city information modelling use case collection and analysis address sustainable development goals, provides a brief overview of city information modelling, and identifies the key application areas and stakeholders of city information modelling.

Part 2 develops the list of user stories and the database of use cases, conducts integrative analysis of the use cases, scopes out the requirements of city information modelling standards and provides recommendations for IEC and other standards development organizations ([SDOs](#)) regarding urban planning and management.

In addition, according to the up-to-date understanding, urban digital twins are also used for describing such technology and solution for smart cities. Urban digital twins indicate the digital twins at the urban scale to enable transformation in how cities are planned, built and managed to deliver better services to make the urban environment more liveable, inclusive, safe, resilient and sustainable. Therefore, the application areas, stakeholders, user stories and use cases of city information modelling, which are identified and developed in the IEC SRD 63273 series, are also applied to urban digital twins to a great extent.

Australian Standard®

Smart city use case collection and analysis — City information modelling

Part 1: High-level analysis

1 Scope

This part of IEC SRD 63273 explains how the work of city information modelling use case collection and analysis address sustainable development goals, provides a brief overview of city information modelling, identifies the key application areas of city information modelling, and determines the stakeholders and the relationships among them in these application areas.

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

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 are provided using an integration of building information modelling (*BIM*) and geographic information systems (*GIS*).

Note 2 to entry: The real-time data are 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 are 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.

3.1.2

stakeholder

individual, team, organization (IEV 831-01-14), or classes thereof, having an interest in a system (IEV 831-01-21)

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

[SOURCE: IEC 60050-741:2020, 741-01-30, modified - The original Note 1 to entry has been replaced.]

3.1.3

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]

3.1.4

geographic information system

GIS

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

[SOURCE: ISO 19101-1:2014, 4.1.20]

3.1.5

building information modelling

BIM

use of a shared digital representation of a built object (including buildings, bridges, roads, process plants, etc.) to facilitate design, construction and operation processes to form a reliable basis for decisions

Note 1 to entry: The acronym *BIM* also stands for the shared digital representation of the physical and functional characteristics of any construction works.

[SOURCE: ISO 29481-1:2016, 3.2]

3.1.6

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: IEC 60050-741:2020, 741-02-01]

3.1.7

big data

extensive datasets - primarily in the data characteristics of volume, variety, velocity, and/or variability - that require a scalable technology for efficient storage, manipulation, management, and analysis

Note 1 to entry: Big data is commonly used in many different ways, for example as the name of the scalable technology used to handle big data extensive datasets.

[SOURCE: ISO/IEC 20546:2019, 3.1.2]

3.1.8

cloud computing

paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand

Note 1 to entry: Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

[SOURCE: IEC 60050-741:2020, 741-01-07, modified - Note 1 to entry has been added.]

3.1.9

artificial intelligence

AI

(discipline) research and development of mechanisms and applications of *AI* systems

Note 1 to entry: Research and development can take place across any number of fields such as computer science, data science, humanities, mathematics and natural sciences.

[SOURCE: ISO/IEC 22989:2022, 3.1.3]

3.1.10

city model

appropriate set of data which models those physical and social aspects of the city that are relevant for its objectives

[SOURCE: ISO/IEC 30146:2019, 3.5]

3.1.11

spatiotemporal data

data representing a set of direct positions in space and time

3.1.12

application

set of technologies deployed to fulfil a particular purpose

[SOURCE: IEC 60050-741:2020, 741-01-02, modified - In the definition, "software designed" has been replaced by "set of technologies deployed".]

3.2 Abbreviated terms

2D	two dimensional
3D	three dimensional
AI	artificial intelligence
BIM	building information modelling
ANPR	automatic number-plate recognition
CIM	city information modelling
GIS	geographic information system
IoT	Internet of Things
ITS	intelligent transport system
SDGs	Sustainable Development Goals
SDOs	standards development organizations

4 Contributing to Sustainable Development Goals

4.1 General

The United Nations published 17 Sustainable Development Goals ([SDGs](#)) 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 63273 series mainly addresses SDG 11 (Goal 11): sustainable cities and communities.

4.2 Mapping application areas of city information modelling and SDG 11

Goal 11 aims to make cities and human settlements inclusive, safe, resilient and sustainable. Specifically, Goal 11 includes ten targets:

- 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 and inclusive green and public spaces;

11.a a strong national and regional development planning;

11.b implement policies for inclusion, resource efficiency and disaster risk reduction; and

11.c support least developed countries in sustainable and resilient building.

The [CIM](#) 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 new town planning addresses 11.3 inclusive and sustainable urbanization, 11.7 provide access to safe and inclusive green and public spaces, and 11.a strong national and regional development planning.

Table 1 — Mapping application areas of city information modelling and SDG 11

SDG 11 target	Contents	CIM application areas	Connections between SDG 11 and the 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.	• three dimensional visualization of property and land administration • Construction project approval management • Project management during construction • Real estate registration management • Underground pipeline management • Water management	All these CIM application areas are relevant to the whole life cycle of construction for housing, which also includes the civil services for the housing, such as underground pipeline and water management. By adopting CIM in housing constructions and management, the cities are able to manage the land use and provide more safe and affordable housing.
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.	• Transport infrastructure planning • Traffic management	These two CIM application areas provide the description of how CIM can be applied in transportation infrastructure planning and traffic management. Both of them enable the city to develop an affordable and sustainable transport system.
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.	• New town planning • Smart census project	The CIM application areas of smart census project can help us understand the population in the cities by using an efficient and low-cost approach. The data can be used for the sustainable human settlement planning through a comprehensive understanding of the different population groups in the communities. New town planning is usually triggered by the urbanization (especially rural to urban), which has become an important agenda for sustainable urban development in all countries.

Table 1 (continued)

SDG 11 target	Contents	CIM application areas	Connections between SDG 11 and the application areas
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.	Heritage preservation and revitalization	The CIM application area of heritage preservation and revitalization addresses the importance of applying digital technologies to protect and safeguard the heritages in cities.
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 the global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.	- City management using city brain - Emergency management and rescue	The CIM application area of city management using city brain provides the different scenarios of using big data, joint data hub, IoT , cloud computing to manage the city, which include natural disasters. The CIM application area of emergency management and rescue advance the understanding of applying smart technologies especially in fire emergency response and rescue.
11.6 Reduce the environmental impacts 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.	City management using city brain	The CIM application area of city management using city brain provides the different scenarios of using big data, joint data hub, IoT , cloud computing to manage the city, which include environmental impact of cities.
11.7 Provide universal access to safe and 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.	- New town planning - Smart census project	Smart census project can help the city to understand the population groups in the city, which include women, children, older persons and persons with disabilities. The CIM application area of new town planning addresses how to use CIM to have an integrated planning in the new town area to increase the green and public space especially for the special population groups.

5 City information modelling

5.1 Background

The concept of [CIM](#) was first proposed in the mid-2000s in the field of urban planning and disaster management. However, the components and technologies were developed in the 2010s. [CIM](#) received more and more attention especially from urban planners, architects and city administrators since it can provide a solution for smart city development.

The city was considered as a space carrier from building information modelling ([BIM](#)) in the 1970s to [3D](#) geographic information system ([GIS](#)) in the 1990s, and then to IBM's Smarter Planet and Smarter Cities initiatives in the early twenty-first century. Today, in order to achieve intelligent urban governance concepts and means, [BIM](#), [GIS](#), [IoT](#), big data, artificial intelligence and cloud computing technology have been used interactively to put forward the concept of [CIM](#) to better deal with the availability and

complexity of city-related information, to achieve efficient, coordinated and shared urban governance goals, urban economy and infrastructure.

Therefore, the application of [CIM](#) is usually operated as a platform, and the [CIM](#) platform is used to present the application of [CIM](#) as an integrated development of digital representations and simulations of a city.

5.2 The roles of city information modelling

5.2.1 General

The application of [CIM](#) provides a highly efficient, multi-functional and integrated management platform for all the stakeholders in cities. It corresponds to a vast spectrum of needs, values and uses in diverse areas such as urban planning, property management, maintenance of heritage and disaster management. The roles of [CIM](#) include, but are not limited to,

- a) data integration,
- b) geo-visualization,
- c) synchronization,
- d) simulation,
- e) data exchange, and
- f) data security.

5.2.2 Data integration

The first role of city information modelling is to connect, store and enable access to all information and data regarding a city, from all stakeholders in the city, in one collaborative data hub (integration).

The stakeholders refer to the stakeholders of the specific scenarios. The collaborative hub is a joint data hub that serves different stakeholders. The stakeholders are diverse in different application scenarios, but they mainly include policymakers and workers in different government departments, managers and workers in industries, professionals and the public.

[CIM](#) can connect different types of information and data and technologies to build up an intelligent platform to assist us to design and operate a smarter city. Specifically, the connection of data includes the studies of

- a) accessibility and availability of data,
- b) accuracy and consistency of data,
- c) manageability of data, and
- d) integration of data.

5.2.3 Geo-visualization

The second role of city information modelling is to visualize multisource data in the n D map (geo-visualization).

[CIM](#) supports virtual urban planning and management by transparently representing urban issues to the relative stakeholders. It provides a solution for displaying multisource data in the n D map (e.g. [2D](#), [2.5D](#), [3D](#) and [4D](#)), presenting complex urban environments in multiple ways, connecting different stakeholders through a user-friendly platform.

5.2.4 Synchronization

The third role of city information modelling is to update the data automatically in real time (synchronization).

[CIM](#) provides a method to automatically update the data via [IoT](#) and satellite telemetry data sources, which enable managing the assets of a city also in real time.

5.2.5 Simulation

The fourth scope of city information modelling is to simulate the growth of the city and test specific scenarios to proactively better understand various responses and impacts and acquire knowledge (simulation).

[CIM](#) provides real-time or near-real-time simulations of urban growth in order to explore real-world environments, which enable interactions between different users. [CIM](#) allows professional users to deploy multiple analytical functions to achieve intelligent urban design and test different design options. Moreover, [CIM](#) offers a robust user interface and tool and enables the development of tools for visualizing and evaluating policy scenarios. Therefore, [CIM](#) provides solutions for data management, data analysis, problem-solving and design, decision-making and communication activities.

5.2.6 Data exchange

The fifth scope of city information modelling is to exchange data (data exchange).

[CIM](#) is operated as a collaborative platform that enables different stakeholders, including citizens, enterprises, professionals and government agencies, to access dynamic city data and information directly. Unifying data formats and a user-friendly design should be considered when [CIM](#) is open to the public since not all users have the technical background to use these data. The public is able to ensure accepted principles of data policies, such as obtaining consent before sharing with third parties, checking the usage of data accessed, and managing one's data with necessary controls when they are using [CIM](#) for data exchange. The collaborative data hub described in [5.2.2](#) is one part of the collaborative platform.

5.2.7 Data security

Last but not least, the sixth scope of city information modelling is to protect data (data security).

[CIM](#) provides differing levels of access for different stakeholders to enable various data utilizations. It is possible that public access to aggregated data will not be allowed for personal or sensitive information. Different levels of security are implemented in [CIM](#), and access is determined subject to policy and regulatory controls with sharing allowed via data sharing and confidentiality agreements.

5.3 City information modelling and its closely related components

[CIM](#) is one of the emerging technologies and solutions for smart cities. The insights gained from [CIM](#) inform the continual improvement of the creation and operation of physical assets. Building information modelling ([BIM](#)), geographic information system ([GIS](#)), Internet of Things ([IoT](#)), cloud computing, big data and artificial intelligence ([AI](#)) are closely related components of [CIM](#) ([Figure 1](#)).

[CIM](#) also addresses the contribution to electrotechnical aspects of smart cities. First, [CIM](#) can facilitate smart electrical energy management techniques and enhance electrical safety. Second, [CIM](#) can support electrical system design. Third, [CIM](#) is important in helping design telecommunication systems for smart cities. In order for these contributions to be fully realized, [CIM](#) used for the electrotechnical aspects of smart cities needs to be abundantly compatible with the way it is used for every other aspect of the city so that, for example, city management can plan and manage all aspects of city infrastructure in an integrated way.

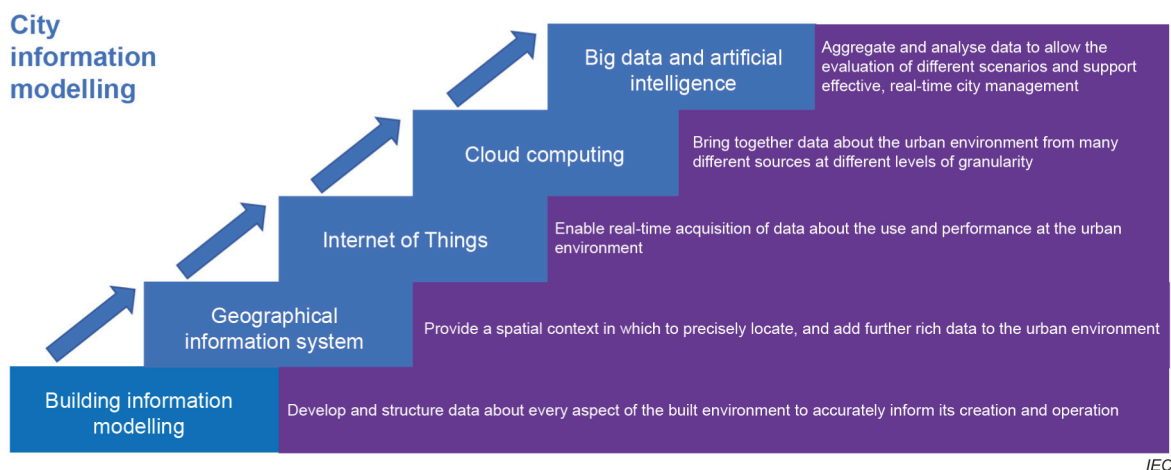


Figure 1 — City information modelling and its closely related components

6 City information modelling application area description

6.1 General

[CIM](#) can be applied in a vast scope of areas, include urban planning, whole life cycle of construction project management, disaster management, heritage preservation, transportation planning and management, water and urban utilities management.

Specifically, this document addresses the following application areas:

- 1) new town planning;
- 2) three-dimensional visualization of property and land administration;
- 3) construction approval management;
- 4) project management during construction;
- 5) real estate registration management;
- 6) city management using city brain;
- 7) heritage preservation and revitalization;
- 8) transportation infrastructure planning;
- 9) traffic management;
- 10) water management;
- 11) smart census project;
- 12) urban underground pipeline management based on data lake; and
- 13) emergency management and rescue.

Each of the above [CIM](#) application area descriptions has the following structure.

- a) Needs statement: Describes the problems and conditions that [CIM](#) can solve or address.
- b) Objectives: Describes the aims or goals of applying [CIM](#) in the specific area.

- c) Current practices: Describes the existing exercises or operations in the specific application area.
- d) Gaps in the application: Indicates the differences, especially undesirable ones, between needs statement and the current practices.
- e) Stakeholders: Identifies a person or group of people with an interest or concern in the application of [CIM](#) in specific application areas.
- f) Relationships between the stakeholders: Describes how two or more stakeholders are connected through [CIM](#).
- g) Scenarios: Describes the rationale for the new practice in the specific application area, which can include how [CIM](#) can help to achieve the objectives and how [CIM](#) is able to achieve the needs of different stakeholders in the ecosystem.
- h) General requirements: Illustrates the requirements, which can be the function, user, data, laws and regulations, standards, life cycle consideration and others relevant to the application of [CIM](#).

When describing stakeholders for the specific application area of [CIM](#), the following roles are used.

- Primary beneficiary: stakeholders who benefit directly from the solution.
- Secondary beneficiary: stakeholders who benefit indirectly from the solution.
- Tertiary beneficiary: stakeholders who benefit indirectly from the solution at one further step removed.
- Owner: stakeholders who own or manage the solution.
- Designer: stakeholders who can participate in designing the solution.
- Builder: stakeholders who can participate in building the solution.
- Maintainer: stakeholders who can participate in maintaining the solution.
- User: stakeholders who use the solution to help meet their needs.

There can be other roles, for instance, financier, regulator, etc. Some stakeholders will have several stakeholder roles, depending on the application scenario being considered.

6.2 New town planning

6.2.1 Needs statement

- a) Different types of new town planning relevant data need to be put into one platform for efficient data query and acquisition ([CIM-NS-NTP-01](#)).
- b) Different types of models and simulations need to be conducted for different themes for studies in new town planning ([CIM-NS-NTP-02](#)).
- c) The planning needs to be expressed in an easy-to-understand way ([CIM-NS-NTP-03](#)).
- d) Different stakeholders need to check and comment on the new town planning in a user-friendly platform ([CIM-NS-NTP-04](#)).
- e) The authorized groups need to acquire, upload, download, and edit the data in the platform without high skill requirements ([CIM-NS-NTP-05](#)).

6.2.2 Objectives

The application of [CIM](#) to the planning of new town planning aims to:

- a) integrate multiple data on one platform;
- b) conduct simulations on a wide range of themes;
- c) provide a [3D](#) and timely presentation of the new town planning;
- d) facilitate efficient and effective communication between different stakeholders.

6.2.3 Current practices

New town planning addresses shaping a quality living and working environment, facilitating economic development, and promoting the health, safety and general welfare of the community by guiding and controlling the use of land. A lot of new town planning projects around the world, for example in China, India, Indonesia, and Japan, are being conducted.

6.2.4 Gaps in the application

Traditionally, urban planners meet the challenges of generating and organizing of a large quantity of timely data and information and making precise estimations on specific themes (e.g. population growth, housing needs, traffic needs) for the new town planning. Moreover, it is difficult for urban planners to have efficient communication with different stakeholders in the new town planning. The ability to calculate the impact of environmental loss, emissions in the supply chain cycle, etc. is also a gap that will need to be included to accurately conform to net zero obligations by urban planners.

6.2.5 Stakeholders

Stakeholder 1: Urban planner

- Roles: Primary beneficiary of [CIM](#) as it will help urban planners do their work better and more effectively. Designers, as urban planners, will be involved to design the [CIM](#) platform according to their needs. Users, as they can use [CIM](#) as a fundamental tool in their work for the new town planning.
- Responsibilities: Urban planners should develop plans for the new town area that will achieve the aims indicated by the planning of the new town, enable residents to have a better life and employment and increase its sustainability.

Stakeholder 2: Real estate developer

- Role: Secondary beneficiary of [CIM](#) as it will help developers to understand the new town planning and identify the business opportunities. Builders, as they will participate to implement the new town planning.
- Responsibilities: Developers are interested in innovation and technology advancement in their property development. They are also interested in the information that the [CIM](#) will give them on how the area they are developing fits in with the new town plans, such as how far the homes will be from retail areas and employment areas, and what sort of public transport there might be and so on, to enable them to share their requirements into the overall plans.

Stakeholder 3: Business owner

- Role: Secondary beneficiary of [CIM](#), as it will help business owners to understand the new town planning and identify business opportunities.
- Responsibilities: Companies, especially the large-scale ones, are responsible for communicating with the urban planners and government if they are going to develop business in the new town.

Stakeholder 4: Citizen

Local community member: A person who lives, learns, works, plays, and prays in the communities.

Nonlocal community member: A person who lives, learns or works outside the community but who can live, learn or work in the community.

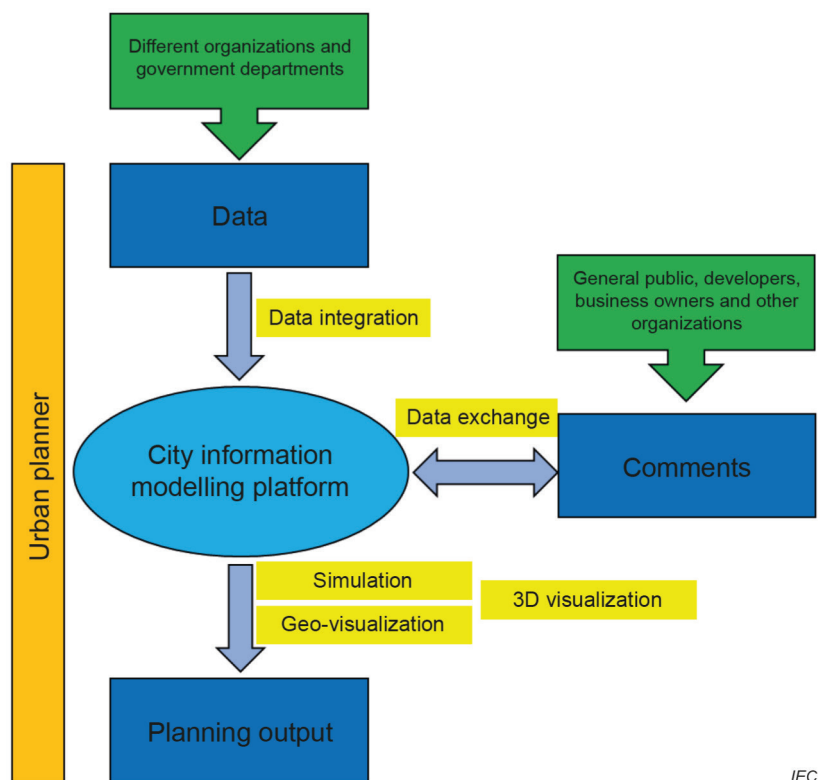
- Role: Tertiary beneficiary of [CIM](#), as it will help the general public to understand the new town planning and present their community comments. The general public includes indigenous inhabitants if any, the workers who will move their work to the new town, the residents who will move to the new town, etc.
- Responsibilities: General public are encouraged to participate in the new town planning by attending the surveys, public forums, workshops, exhibitions and other events to present their vision and comments.

Stakeholder 5: Urban planning decision maker

- Role: Owner and maintainer of the solution. Usually, the government is the owner and maintainer of the solution and has the final decision on the new town planning.
- Responsibilities: Government or the planning owner makes the final decision on new town planning and offers solutions to overcome the challenges to achieve the needs of different stakeholders.

6.2.6 Relationships between the stakeholders

Urban planners collect data from different organizations and government departments for the simulations in new town planning ([Figure 2](#)). They also collect the needs of different stakeholders, develop a plan and submit it to the government. Government has the final decision on the new town planning. Other stakeholders are encouraged to participate in the new town planning by checking the planning proposal and presenting their needs.



IEC

Figure 2 — Positioning city information modelling in new town planning

6.2.7 Scenarios

[CIM](#) can become a powerful tool to assist urban planners to achieve smart planning for new town areas. First, [CIM](#) provides a hub to collect, store and analyse different types of data. The data include secondhand data of census, traffic, land use, buildings and others, and firsthand data collected from the other stakeholders. Second, [CIM](#) enables urban planners to have more effective and efficient communication with the different stakeholders. The stakeholders can view different types of simulation and present their comments according to their needs and experiences. Third, [CIM](#) supports urban planners to develop different types of simulation and revise the simulation according to the needs of stakeholders. For example, [CIM](#) can simulate the traffic of one bridge according to the population in residential communities, business sections and other organization sectors. Finally, [CIM](#) supports the urban planner to visualize the results of planning in a [3D](#) model, which improves efficiency and accuracy.

6.2.8 General requirements

- The [CIM](#) platform should integrate different types of data into one hub, such as geographical information, population, traffic, weather, building, underground pipeline system, etc. The standards relevant to [CIM](#) should also look at the integration of different types of data which are used by the [CIM](#) platform.
- The application of [CIM](#) in new town planning considers the stage of planning in a smart city development, and an online platform should be developed for different stakeholders to review the planning and present their opinions and comments.
- The team of urban planning should include [CIM](#) professionals.

6.3 Three-dimensional visualization of property and land administration

6.3.1 Needs statement

- a) [3D](#) building model objects need to be loaded into a platform that facilitates [3D](#) visualization ([CIM-NS-3DV-01](#)).
- b) Stakeholders need to be able to view and navigate the new development application in an interactive user-friendly platform ([CIM-NS-3DV-02](#)).
- c) Data model needs to be able to be accessed for data queries and simulations ([CIM-NS-3DV-03](#)).

6.3.2 Objectives

The purposes of applying [CIM](#) to [3D](#) visualization of property and land administration include:

- a) to review and anticipate the changes in my communities-built environment;
- b) to support community engagement in built environment and infrastructure developments;
- c) to manage the land use and planning instruments in a data-driven way;
- d) to provide spatial and temporal pending and planned infrastructure developments in a digital environment;
- e) to create a data supply chain for better assessment and approval metrics and validations;
- f) to assess new developments against key community assets.

6.3.3 Current practices

Current process is as follows.

- Project scheme designer - submitter.
 - Prepare paperwork and reports.
 - Lodge.
- Local government assessment officer.
 - Manage paperwork.
- Local government certifier.
 - Review.
- Citizen and advocacy and public interest groups.
 - Public exhibition of plan and documents:
 - i) physical list at office or public space, e.g., library;
 - ii) textual list or [2D](#) image plan document online;
 - iii) newspaper notification (text information).

- Local government assessment officer.
 - Manage paperwork.
- Local government certifier.
 - Review and certify.
- Model is discarded or stored.
 - Construction begins.
 - Model is followed.
 - Model is not followed.

Current plans submitted by the developers awaiting approval are put on display through local council websites and in office environments (printed maps or in-house [GIS](#)). Online these plans are listed as textual descriptions and details along with associated legal and survey documents available for downloading and viewing.

Some development applications are indicated on an online map as points with a related identifier that links to document downloads. They are not commonly represented as two-dimensional or three-dimensional geometries in a geospatial ([GIS](#)) environment.

Digital model or plan images do not continue a pipeline of downstream activities or on a digital thread post the approval and construction process.

6.3.4 Gaps in the application

- Paper based.
- Manual.
- Time intensive.
- Reduced digital validation.
- Reduced automation capabilities.
- Reduced contextual insights.
- Plan literacy required - limiting wider understanding of implications of development in the spatial context.

In reviewing a plan and development application on paper, the public stakeholder needs to open each application and the associated information to gain insight on the vertical extent of the application on display. This is time-consuming and does not allow for quick and spatially based context of all the horizontal and vertical developments underway, as well as the relationship of the proposed objects with the surrounding existing built environment objects.

6.3.5 Stakeholders

Stakeholder 1: Local government certifier

- Role: Primary beneficiary: Maintainer: Stakeholders who benefit directly from the solution.
- Responsibilities: Certifier which benefits directly from the solution as it will speed up validations and certification checks for developments. Certifiers will help maintain the system by determining the rules of the system in regard to new development lodgements and their approval and rejection reporting.

Stakeholder 2: Local government assessment officer

- Role: Secondary beneficiary: User: Stakeholders who benefit indirectly from the solution.
- Responsibilities: Officer who benefits from the solution through monitoring development applications and sending them to other stakeholders within the ecosystem. Officer will utilize the system for administration of new or approved plans. Officers will update the currency of the platform for managing plans and keeping their administration maintained.

Stakeholder 3: Project scheme designer

- Role: Secondary beneficiary: User: Stakeholders who benefit indirectly from the solution.
- Responsibilities: Designer will benefit from the solution as they will be able to easily load and submit plan information for assessment. Designer will participate in suggesting interface improvements and capabilities for them to load plans.

Stakeholder 4: Advocacy and special interest group

- Role: Secondary beneficiary: User: Stakeholders who benefit indirectly from the solution.
- Responsibilities: Advocacy and special interest groups will benefit through being able to access and assess new developments in their community for negative and positive outcomes and put forward comments and analysis. These groups will use the platform to help understand the developments and extract data for analysis.

Stakeholder 5: Platform maintainer

- Role: Maintainer ecosystem: Stakeholders who can participate in maintaining the solution.
- Responsibilities: Maintainer will maintain the quality and currency of data in the system for the other stakeholders.

Stakeholder 6: Citizen

- Role: Tertiary beneficiary: User: Stakeholders who benefit indirectly from the solution.
- Responsibilities: The system will record and maintain comments on new developments from citizens. Citizens will review and comment on developments that are open for public display if they have concerns of the impact on their community.

6.3.6 Relationships between the stakeholders

Project scheme designer submits their plans to the local council, which places the development application on display ([Figure 3](#)).

The government certifier and government planning officer can assess the development application in relation to state and local regulations. This is facilitated by a platform maintainer.

A development application is placed on public display through online websites for the public to review and for special interest groups to engage. Special interest groups can have higher level access to the public data accompanying the visualization model to enable further analysis against groups specific location-based data (environmental and social data).