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# A Perspective on the Standardization Process of 3D City Models in Japan: History of Geospatial Information Policy and Government Commitment to Standardization

Yuya UCHIYAMA[1,2], Mayumi MIZOBUCHI[2,3], Jota YAMAMOTO[3], Chikako KUROKAWA[3], Yoshihide SEKIMOTO[2]

[1] MLIT, Ministry of Land, Infrastructure, Transport and Tourism
[2] CSIS, Center for Spatial Information Science, The University of Tokyo
[3] AAS, Asia Air Survey Co., Ltd.

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**Abstract**

Japan's geospatial information policy has evolved significantly since the 1995 Great Hanshin-Awaji Earthquake, marked by the enactment of the Basic Act on the Advancement of Utilization of Geospatial Information in 2007 and the recent "Project PLATEAU," a 3D city model initiative launched in 2020. This paper analyses the 30-year history of Japan's geospatial information policy and focuses on the impact of PLATEAU on administration and industry. The policy's journey, from the initial NSDI definition in 1999 to the contemporary PLATEAU Vision, showcases a shift from infrastructure establishment to broader social implementation. Key milestones include the 2007 Basic Act, which formalized geospatial information, and the Quasi-Zenith Satellite System (QZSS). PLATEAU, a nationwide 3D city model project, stands out for its rapid data creation, open data approach, and diverse use case development across sectors like urban planning, disaster prevention, and mobility. Analysis reveals a transition from infrastructure-centric policies to user-oriented strategies, with standardization efforts evolving from domestic rules to open standards like CityGML. PLATEAU's success stems from its "StandardsOps" methodology, emphasizing agile specification revisions and open community engagement. This approach, which balances open discussions with strict description rules, has fostered a dynamic standardization ecosystem. PLATEAU's impact extends beyond data standardization, influencing business model innovation and industry productivity. Its adoption of open standards and agile methods sets a precedent for future geospatial information policies in Japan and globally, demonstrating the potential for rapid innovation through collaborative standardization.

## 1. Introduction

The policy dealing with Geographic Information Systems (GIS) in Japan began in earnest following the Great Hanshin-Awaji Earthquake in 1995. The first definition of the National Spatial Data Infrastructure (NSDI) was specified in 1999, followed by the formulation of a GIS Action Program covering all government ministries and agencies in 2002[1]. In 2007, the Basic Act on the Advancement of Utilization of Geospatial Information was enacted, defining "geospatial information" as a legal term. Subsequently, advancements have been made, including the formulation of the Basic Plan for the Advancement of Utilization of Geospatial Information (reviewed approximately every 4-5 years, currently in its 4th term) and the launch of the Quasi-Zenith Satellite System (QZSS, the Japanese version of GPS). In 2020, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) initiated the 3D city model project "Project PLATEAU," and in 2023, the "PLATEAU Vision"[2], a medium-to long-term plan for the social implementation of 3D city models, was launched.

While Japan's geospatial information policy has steadily progressed, comprehensive research covering recent trends, including the PLATEAU Vision, is lacking. Existing studies, such as Akeno and Kumaki (Akeno and Kumaki, 1997) and Masser (Masser, 1999) from the initial NSDI formulation, and Shibasaki (Shibasaki, 2008) and Ohba (Ohba, 2008) following the enactment of the Basic Act on the Advancement of Utilization of Geospatial Information in 2008, are limited to the early stages of policy development. Therefore, this paper aims to analyse the 30-year history and evolution of Japan's geospatial information policy and elucidate the impact of PLATEAU on geospatial information administration and industry.

Chapter 2 of this paper chronologically organizes the 30-year history of Japan's geospatial information policy. Chapter 3 reviews this policy evolution and provides an analysis and discussion from five perspectives: policy planning and implementation process, standardization, definition of the NSDI, and policy implementation in local governments and industries. Chapter 4 focuses on Project PLATEAU, describing its overall ecosystem, standardization efforts, and social impact. Chapter 5 presents future perspectives.

While this paper does not analyse based on specific theories in policy science, the feature analysis in Chapter 3 is described in light of the stage model of the policy process (Dye, 2017) and variables influencing the policy implementation process (Mazmanian and Sabatier, 1989).

## 2. History of Geospatial Information Policy in Japan

### 2.1 1990s: Initiation of GIS Policy

Although GIS technology emerged in the 1970s, Japan began developing National Land Digital Data[3] for national land planning in 1974. Subsequently, GIS gradually became prevalent in local governments on such as digitizing topographic maps and urban planning, road management, and fixed asset tax assessment. The Great Hanshin-Awaji Earthquake in January 1995 revealed issues such as (1) insufficiency of digitized maps (necessity of digitization), (2) the inability to mutually use digital maps across different systems (necessity of standardization), and (3) the misalignment of digital maps from different departments and

[1] https://www.cas.go.jp/jp/seisaku/gis/h15action-honbun.html
[2] https://www.mlit.go.jp/plateau/vision/
[3] https://nlftp.mlit.go.jp/


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agencies (necessity of positional standards)[4]. In response, the inter-ministerial "GIS-Related Ministries and Agencies Liaison Conference" was established in September of the same year to systematically and comprehensively promote the development and mutual use of GIS. The following year, 1996, the conference issued the "Long-Term Plan for the Development of the National Spatial Data Infrastructure and the Promotion of GIS Diffusion"[5] and in 1999, the "National Spatial Data Infrastructure Standards and Development Plan"[6], which defined the National Spatial Data Infrastructure (comprising basic spatial data, spatial data infrastructure, and digital images; the first definition in Japan) and promoted the development and standardization of the NSDI.

## 2.2 2000s: Enactment of the Basic Act

In 2000, the government advocated the e-Japan strategy, aiming to realize a Japanese-style IT society. Aligned with this, the "GIS Action Program 2002-2005"[7] was published as a new national GIS promotion plan. During this period, standardization activities progressed, including participation in ISO/TC211 and the establishment of a domestic committee for the JIS conversion of the ISO 19100 series[8]. Policy achievement goals were set for promoting digitization and distribution, such as the number of digitized spatial data infrastructure and the number of GIS implementations in local governments.

Meanwhile, in 2002, studies began on the development and use of Japan's own satellite positioning system (QZSS). In March 2005, the ruling Liberal Democratic Party established the "Joint Committee on Positioning and Geographic Information Systems"[9], and its manifesto stated, "Establish satellite positioning as a national infrastructure and develop fundamental spatial information. Submit the 'Basic Act on Positioning and Spatial Information' to the next ordinary Diet session to establish a system that can guarantee the accuracy and reliability of satellite positioning and promote the standardization and development of fundamental spatial information." In response to this movement, the GIS-Related Ministries and Agencies Liaison Conference was abolished in September 2005, and the "Council for the Promotion of Positioning and Geographic Information Systems" was established. Following deliberations, the "Basic Act on the Advancement of Utilization of Geospatial Information"[10] was enacted and promulgated in May 2007. As described in the Liberal Democratic Party's manifesto, this law comprises both GIS and satellite positioning measures. In 2008, the "Basic Plan for the Advancement of Utilization of Geospatial Information (1st term)"[11] was published as a national policy based on this basic law, establishing the framework for Japan's geospatial information policies.

## 2.3 2010s: The Great East Japan Earthquake, QZSS Launch

The Great East Japan Earthquake in March 2011 was unprecedented, with extensive damage over a wide area. Geospatial information technologies played a crucial role in various aspects, including damage assessment and evacuation shelter establishment, through satellite image analysis, aerial surveying, and GIS-based information overlay and dissemination. In Urayasu City, an advanced GIS-utilizing city, liquefaction, sewer damage, and road damage occurred over a wide area. The city used GIS to visualize damage information and plan countermeasures from the early stage of the disaster occurred. They identified challenges, such as the difficulty of sharing information, including resident information, which is usually difficult to share, and the need for regular system development (Daigo, 2013). In the 2nd term Basic Plan for the Advancement of Utilization of Geospatial Information[12], published in 2012, disaster response was positioned as a key pillar, emphasizing the need for initiatives for disaster prevention and mitigation, including preparations for the future earthquakes, including the predicted Nankai Trough Earthquake.
Meanwhile, satellite positioning measures also progressed. The first QZSS was successfully launched in 2010, and three additional satellites were launched in 2017, establishing a four-satellite system. The goal is to establish a seven-satellite system in the 2020s, enabling positional information measurement using only QZSS without relying on other countries' GNSS, by always keeping at least four satellites in the Japanese sky.

## 2.4 2020s: Project PLATEAU

In 2020, MLIT launched "Project PLATEAU", a project to develop and open-data 3D city models. This project is a urban digital twin initiative that aligns with the Society 5.0[13] concept, which envisions a society where cyberspace and physical space are integrated, as advocated by the government in 2016. Although 3D models had been utilized in various contexts, the project's speed and scale are internationally notable, with plans to develop and publish data for approximately 250 cities nationwide by the end of fiscal year 2024, utilizing assets such as numerical topographic maps and aerial photographs held by local governments. The initial use cases for 3D city models, coinciding with the onset of the COVID-19 pandemic, primarily involved the use of people flow data. Subsequently, over 100 use cases have been developed across diverse areas such as urban planning, environment and energy, disaster prevention, and mobility and robotics. The project is positioned as one of the symbolic projects in the 4th term Basic Plan for the Advancement of Utilization of Geospatial Information[14], published in 2022.

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[4] In GIS Action Program 2010 (p.2), it is stated that the establishment of the GIS-related inter-ministerial council in 1995 was due to the fact that "during the Great Hanshin-Awaji Earthquake, relevant agencies were unable to mutually utilize the geospatial information they each possessed."

[5] https://www.cas.go.jp/jp/seisaku/gis/h8cyouki.html

[6] https://www.cas.go.jp/jp/seisaku/gis/h11seibi-honbun.html

[7] https://www.cas.go.jp/jp/seisaku/gis/h15action-honbun.html

[8] Around the year 2000, G-XML (JIS X 7199), a GIS data format extended from XML, was proposed from Japan to ISO and OGC, and was subsequently incorporated into the GML standard of ISO 19136 (JIS X 7136).

[9] https://www.cas.go.jp/jp/seisaku/sokuitiri/190531/siryou1-1.pdf

[10] https://laws.e-gov.go.jp/law/419AC1000000063/

[11] https://www.cas.go.jp/jp/seisaku/sokuitiri/kako_plan/dai1_plan.pdf

[12] https://www.cas.go.jp/jp/seisaku/sokuitiri/kako_plan/dai2_plan.pdf

[13] https://www8.cao.go.jp/cstp/society5_0/

[14] https://www.cas.go.jp/jp/seisaku/sokuitiri/r040318/220318_masterplan.pdf


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## 3. Analysis and Discussion of Policy Features

### 3.1 Policy Planning and Implementation Process

As described in Chapter 2, Japan's geospatial information policies have been promoted since the Great Hanshin-Awaji Earthquake in 1995. However, the systematic operation of the policy cycle, from policy planning to decision-making, implementation, and evaluation, has been pivotal since the enactment of the Basic Act on the Advancement of Utilization of Geospatial Information in 2007. Based on the law, an inter-ministerial responsible organization (Council for the Promotion of Geospatial Information Utilization) was established, and the basic plan is evaluated and revised every 4-5 years, comprehensively covering GIS and satellite positioning as measures.

Geospatial information policies are significantly influenced by social conditions and technological developments. In terms of social conditions, the 2nd term Basic Plan for the Advancement of Utilization of Geospatial Information, published after the 2011 Great East Japan Earthquake, includes disaster response as a key pillar. The 3rd term Basic Plan (published in 2017)[15] emphasized measures showcasing the Olympics, in anticipation of the Tokyo Olympics. The 4th term Basic Plan (published in 2022) focused on people flow data and big data utilization amid the COVID-19 pandemic. In terms of technological developments, the 1990s and 2000s saw many technical measures to establish infrastructure, such as promoting digitization and standardization including positional standards. Since the 2010s, measures have emerged that consider more on the use of geospatial information, such as the establishment of Geospatial Information Center[16] as a geospatial data sharing and distribution hub, utilization by machines as well as humans in automated driving systems, unmanned aerial vehicles, and smart agriculture.

### 3.2 Standardization

As described in 2.2, Japan's standardization efforts for geospatial information began in earnest in the 2000s. ISO standards were converted to JIS standards, and frequently used provisions were extracted and organized as "JPGIS (Japanese Profile for Geographic Information Standards)"[17] in 2005, which was operated as a domestic rule. However, at that time, few GIS systems could handle XML, and the ability to independently formulate application schemas provided high flexibility. As a result, only a limited number of GIS systems could directly handle JPGIS-compliant data. On the other hand, Project PLATEAU, which began in 2020, adopts CityGML, a standard for 3D city models, and can be handled by many GIS applications due to the widespread use of XML and the fact that CityGML itself is an application schema with defined specifications. This will be detailed in Chapter 4.

### 3.3 Definition of NSDI

As described in 2.1, the first definition of Japan's spatial data infrastructure was in the 1999 "National Spatial Data Infrastructure Standards and Development Plan." It divided the NSDI into three categories: basic spatial data, spatial data infrastructure, and digital images. The spatial data infrastructure was defined by 19 feature items, including control points, roads, and buildings. Subsequently, in 2001, "shared spatial data" was defined as spatial data commonly used in daily works such as urban planning and road management in local governments, with 16 feature items. In 2007, the Basic Act on the Advancement of Utilization of Geospatial Information stipulated "fundamental geospatial information," defining 13 feature items. These NSDI serve as base maps for creating thematic data and are used as positional standards (Table 1).

| Spatial data infrastructure（1999） | Shared spatial data（2001） | Fundamental geospatial information（2007） |
|---|---|---|
| Control point | Control point | Control point |
| | Land boundary marker | |
| Elevation / Water depth | Elevation | Elevation point |
| Road boundary | | Road boundary |
| | Road | Road edge |
| | Track boundary | |
| Road centerline | Road centerline | |
| Railway centerline | Railway | Railway centerline |
| Waterway | | |
| River boundary | River boundary | River boundary |
| Bank line | | Bank line |
| | Water structure | River levee slope |
| Coastline | Coastline | Coastline |
| Lake / Pond | Lake / Pond | |
| Low tide line | | |
| River centerline | | |
| Cadastral boundary | Cadastral boundary | |
| Forest boundary | | |
| Building | Building | Building |
| Park | | |
| | Administrative boundary | Administrative boundary and representative point |
| | City block | City block and representative point |
| Reference point | | |
| Imagery | Imagery | |

Table 1. Transition of features within NSDI in Japan

### 3.4 Policy Implementation in Local Governments

In local governments, since the emergence of GIS in the 1970s, advanced cities have introduced GIS for individual works such as urban planning and road management. Subsequently, many departments began introducing GIS, and in 2001, the concept of "integrated GIS" for use across all departments and "shared spatial data" for common use was proposed, with guidelines issued by the Ministry of Internal Affairs and Communications (MIC). Simultaneously, local financial measures were implemented to subsidize part of the development costs to promote the introduction of integrated GIS in local governments. This local financial measure continued for over 15 years, resulting in an increase in the proportion of local governments introducing integrated GIS to 33.1% (579 cities) by 2010 and 65.9% (1,142 cities) by 2023 (MIC, 2010 and 2023). Similarly, Project PLATEAU, which began in the 2020s, has contributed to the expansion to 250 cities by subsidizing half of the 3D city model development and utilization costs.

### 3.5 Industry Development

As an industrial promotion measure, symbolic projects have been established in the basic plan, especially since the enactment of the Basic Act on the Advancement of Utilization of Geospatial Information, and various demonstration projects have been implemented with direct national budgets. Projects involving

[15] https://www.cas.go.jp/jp/seisaku/sokuitiri/kako_plan/dai3_plan.pdf

[16] https://front.geospatial.jp/

[17] https://www.gsi.go.jp/GIS/jpgis-jpgidx.html

advanced and pioneering technological development are high-risk for private businesses, so it is reasonable for the government to subsidize demonstration costs in the early stages. Through these demonstrations, technologies and services such as automated operation of agricultural machinery in conjunction with satellite positioning systems and real-time tsunami simulations have become in practical use. Project PLATEAU in the 2020s has attracted participation not only from traditional geospatial information industry players such as surveying, construction, and information and communication companies, but also from a wide range of industries such as mobility, real estate, and finance, as well as many startups, demonstrating its broad impact.

## 4. Impact of the 3D City Model Standardization Project "PLATEAU"

### 4.1 Overview of Project PLATEAU

The Urban Development Bureau of MLIT has been researching advanced overseas examples such as Helsinki 3D+[18] in Finland and Virtual Singapore[19] to contribute to Society 5.0 and smart cities, and has been studying the feasibility of introducing 3D city models in Japan. As a result of these preliminary studies, the Cabinet Office Regional Revitalization Promotion Secretariat formulated the "i-Urban Revitalization - Urban Planning Technical Specifications (Draft)" [20] in 2019, adopting CityGML2.0 for urban digital twin description, which is adopted by the Open Geospatial Consortium (OGC), an international standardization organization for geospatial information. However, this specification was defined as a subset to incorporate Japan's unique urban planning concepts into the concept model of CityGML2.0 defined by OGC, and did not define the data specifications of the basic application schema package (building models, etc.) for 3D city models. Therefore, the necessary technical assets for creating 3D city model data did not exist. Although the specifications were published, actual data creation and use case development were not sufficiently conducted, so it did not have an enough impact on the market and local governments, and remained in the research stage.

In this context, Urban Development Bureau of MLIT launched "Project PLATEAU" in 2020, a social implementation project for urban digital twins (Figure 1).

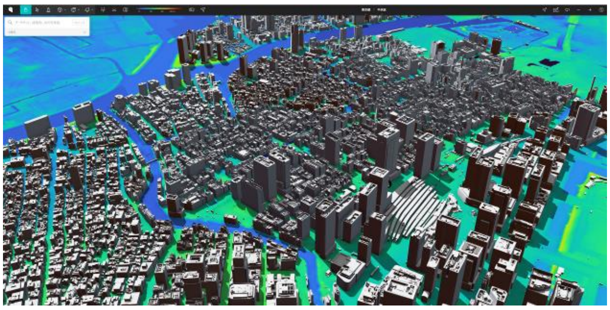

Figure 1. PLATEAU 3D City Model

This section analyses the impact on the overall GIS policy through the theoretical analysis of PLATEAU's measures, its achievements, and its methodology.

#### 4.1.1 Standardization of Data Specification and Development of Dataset

PLATEAU defines "3D City Models" as fundamental data for realizing urban digital twins and has formulated standard data specifications for Japan [21] using CityGML2.0. The standard specifications defined by PLATEAU comprehensively define feature packages for urban digital twin description and consist of a vast collection of documents that define data quality, surveying standards, and work procedures. By focusing on these practical level standardizations, PLATEAU achieves unified data quality nationwide and data trust for both creators and users.

The reasons for selecting CityGML as the data specification for 3D city models are summarized in the following four points. First, the neutrality of the specification. Since PLATEAU is a national project, there was a desire to adopt a neutral specification that does not depend on any specific application. Second, it is a text-based format. Because it can be read and written without specialized tools, and considering the future utilization of AI technologies, distributing geospatial information in a text format is important. Third, CityGML is an application schema that is already defined with standardized tags. Additionally, it has extension rules, providing the flexibility to add Japan-specific data items. Fourth, it has extensibility, with considerations for interoperability with other standards such as IFC.

Although CityGML was adopted for the reasons described above, several challenges were encountered. For example, due to the enormous data volume, many data users pointed out that operation was only feasible on high-specification PCs. To address this, measures such as dividing the GML files by map tiles complied with the Japanese map mesh standards were implemented to reduce the file size per unit. Additionally, the PLATEAU SDK was developed and provided to convert PLATEAU data from CityGML into other data formats (e.g., OBJ, FBX). This approach facilitates the dissemination of PLATEAU data to users who cannot handle CityGML natively.

In parallel with the creation of the initial standard specifications, MLIT has promoted large-scale data creation nationwide and has made all of it available as open data. In the first year of the project, 2020, MLIT directly created and published data for approximately 50 cities nationwide as a data creation demonstration project. This provided samples as initial 3D city model data, disseminated their usefulness, and utilized feedback on development methods to improve the quality of standard specifications. Since 2021, local governments have been designated as data creators, and since 2022, a financial support system for local governments[22] has been established to promote nationwide data development.

As of early 2025, 3D city models are being continuously developed and updated in over 250 cities in Japan, with a total development area of approximately 30,000 km2 and over 23 million buildings. Considering that Japan's first 3D city model standard specifications were created in 2020, this speed of achievement is remarkable.

[18] https://www.hel.fi/en/decision-making/information-on-helsinki/maps-and-geospatial-data/helsinki-3d

[19] https://www.sla.gov.sg/articles/press-releases/2014/virtual-singapore-a-3d-city-model-platform-for-knowledge-sharing-and-community-collaboration

[20] https://www.chisou.go.jp/tiiki/toshisaisei/itoshisaisei/iur/index.html

[21] https://www.mlit.go.jp/plateaudocument/

[22] https://www.mlit.go.jp/toshi/daisei/plateau_hojo.html

#### 4.1.2 Use Case Development and Provision of Development Environment

PLATEAU has adopted a different approach from traditional government GIS policies in terms of activating use case development. The most significant feature is that it has expanded the application area of 3D city models not only to traditional GIS fields but also to a wide range of technology areas such as Web technology, game engine, XR, various AI technologies, and smartphone applications. In terms of solution development, it is approaching diverse areas such as mobility, environment, entertainment, infrastructure management, and architectural design, in addition to urban planning, fixed asset tax, and disaster prevention, where GIS has traditionally been used.

For example, there is a use case in development permit procedures conducted between developers and administrative agencies, relatively traditional field of GIS. Currently, developers visit municipal offices to consult in advance regarding applicable regulations and required procedures for the planned development area. In contrast, a development permit application system utilizing 3D city models enables users to select the target area online, automatically displaying the necessary procedural information, land parcel numbers, road width data, and other relevant details associated with that area. This approach significantly streamlines the preliminary verification process (Figure 2).

Figure 2. Use Case Example: Digital Transformation of Land Development Permit Procedures

Another example is a use case that leverages XR technology for citizen-participatory urban development. In workshops focused on the reorganization of public facilities and urban redevelopment across multiple Japanese cities, an AR application was introduced. A web-based system for managing 3D city models and related content, an AR app integrated with this system, and a card game for idea generation were developed as a package. This approach enables participants to interact with 3D city models without requiring specialized ICT skills (Figure 3).

As of March 2025, a total of 128 PLATEAU use cases have been published, comprising 81 public sector cases and 47 private sector cases. Among these, the fields with the highest number of cases are urban planning and community development with 52 cases, disaster risk management with 21 cases, environment and energy with 10 cases, transportation and mobility with 9 cases, and infrastructure management with 5 cases[23].

Figure 3. Use Case Example: Application of XR Technology for Citizen Engagement in Urban Planning

The challenge in expanding the application area of 3D city models is that software vendors and private companies that provide specific solutions in new areas do not have the necessary knowledge to handle geospatial data. In particular, 3D city models described in CityGML format are unfamiliar data formats in Japan, and improving system development capabilities was an urgent issue. Therefore, MLIT has adopted two main approaches. One is the creation of knowledge through national initiatives. Specifically, the Urban Development Bureau's specialized team plans and implements a variety of use cases using 3D city models, and conducts demonstration projects from system development to service provision as national direct-controlled projects. This approach directly controls the development scope of use cases that maximize the potential of 3D city models, and leads to the public release of technical assets such as scripts, system configurations, requirement definitions, and system interfaces[24].

The other approach is that the government directly provides a development environment for developers and planners in the market to handle 3D city models. Specifically, the government has developed and provided technical assets as open source for handling 3D city models in various development environments, such as converters and plugins for handling data in existing GIS software such as ArcGIS and QGIS, WebGIS for PLATEAU that extends Cesium, development environments (SDK) for game engines such as Unity, and converters for BIM software[25].

As a result of these approaches, over 100 different use cases have been demonstrated as of 2025, and some have started actual commercialization[26]. Many of these are applications in fields different from the traditional GIS area, bringing new business scenes to GIS vendors and the surveying industry.

#### 4.1.3 Promotion of Open Innovation

All PLATEAU 3D city models are available as open data[27]. The purpose is to promote data utilization and innovation in various open data communities, academia, and industry, in addition to government-led use case development. Therefore, PLATEAU has focused on forming an engineering community as an innovation activation measure using 3D city models. Specifically, it has held app development competitions such as PLATEAU AWARD[28], various hackathons, accelerator programs, and university lectures on a large scale. These measures disseminate technical knowledge for handling 3D city models in various layers of the public and private sectors, and promote bottom-up innovation creation.

[23] https://www.mlit.go.jp/plateau/use-case/
[24] Some of the development products have been made publicly available as open-source software (OSS) on the PLATEAU GitHub repository.
[25] https://github.com/Project-PLATEAU/
[26] https://www.mlit.go.jp/plateau/use-case/
[27] https://front.geospatial.jp/plateau_portal_site/
[28] https://www.mlit.go.jp/plateau-next/

#### 4.1.4 Development of PLATAU Standardization Ecosystem

PLATEAU is a project that has achieved domestic standardization of CityGML2.0 format data as a social implementation model for urban digital twins in a very short period from the three perspectives of data creation, use case development, and community formation. Behind this is a standardization ecosystem in which players such as the government promoting standardization, local governments responsible for data creation, private companies responsible for solution development, and communities responsible for innovation creation cooperate with each other.

As a theoretical methodology for organizing the practice of building a standardization ecosystem in Project PLATEAU, Ishimaru (Ishimaru et al, 2025) proposes "StandardsOps." StandardsOps is a methodology that (1) establishes a cycle of rapid operation and feedback to open standards by developing systems in advance in parallel with data creation, (2) adopts open standards that anyone can use for free through acceleration by supporting open communities, (3) formulates product specifications by localizing semantics (semantic information) as necessary (Figure 4).

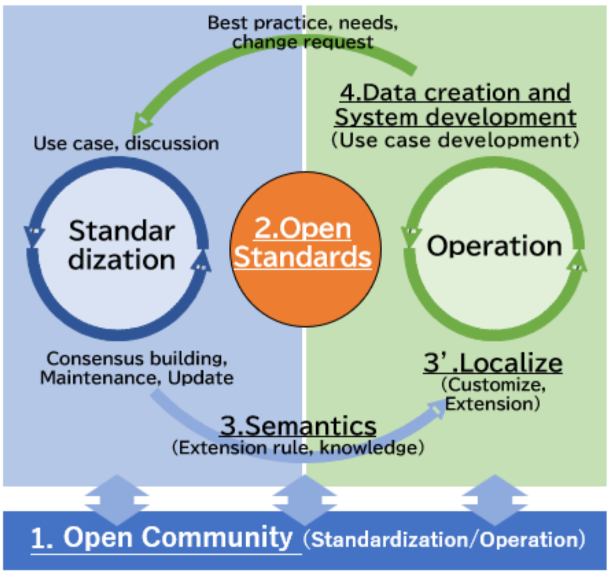


Figure 4. StandardsOps Configuration (Ishimaru et al, 2025)

As Ishimaru points out, the most important factor in PLATEAU's short-term success is the adoption of open standards in specifications and the agile revision method.

As mentioned above, PLATEAU's 3D city models create standard specifications that localize the open standard CityGML2.0, formulated by OGC, for domestic use. Therefore, the technical specifications themselves are always open and have always been subject to improvement based on discussions among data creators, developers, researchers, etc. And it is also important to note that the 3D city model standard is not a full-scratch standard to avoid vendor lock-in, which is often seen in traditional government-led GIS standards. CityGML is a standard for describing, managing, and exchanging city models (Ishimaru, 2014), and the first version, CityGML 1.0, was formulated as an OGC standard in 2008, and CityGML 2.0 was published in 2012. CityGML 2.0 is an application schema of GML 3.1.1, the previous version of GML 3.2, which will later become an ISO standard, and has interoperability with the ISO 19100 series standards formulated by ISO/TC211. In other words, as a subset of the GML format, it imposes relatively strict regulations on data structure, logical consistency, and topological consistency. By establishing the operation of open standards that balance open discussions of technical specifications and strict description rules, PLATEAU's standard specifications have achieved availability and usefulness.

Also, as a policy operation aspect of standard specifications, thorough feedback collection and rapid implementation into specifications by the Urban Development Bureau of MLIT is also important. PLATEAU's standard specifications continue to expand feature packages and revise them every year from the perspective of realizing early social implementation. For example, in the first version of the standard specifications formulated in 2020, only six features were defined: building, road, land use, relief feature, disaster risk and urban planning decision models. In the fourth edition of 2023, 19 feature packages and comprehensive LOD definitions have been made (Table 2). Revisions are also made annually to application schema design, data description rules, quality control standards, and other practical level revisions for data creation. These revisions are based on technical feedback submitted by software vendors responsible for various use case developments held every year and development communities such as hackathons, and the review and reflection of these feedback into specifications are rapidly conducted by MLIT's specialized team and the support of the academic community. Usually, in the formulation and revision of government-level GIS standard specifications, discussions by experts, not practitioners, are emphasized over several years. However, PLATEAU has adopted a strategy of maintaining the "freshness" of standard specifications in the field of solution development using data by thoroughly focusing on the practical level.

As described above, the reason why PLATEAU's standard specifications exhibit value as a "living standard" and have succeeded in building an ecosystem cantered on standard specifications is largely due to the adoption of open standards and also the adoption of an agile specification revision method.

| | | | LOD0 | LOD1 | LOD2 | LOD3 | LOD4 |
|---|---|---|---|---|---|---|---|
| Feature application schema | Building | | ● | ● | ● | ● | ● |
| | Underground Building | | ● | ● | ● | ● | ● |
| | Transportation | Road | ● | ● | ● | ● | |
| | | Square | ● | ● | ● | ● | |
| | | Track | ● | ● | ● | ● | |
| | | Railway | ● | ● | ● | ● | |
| | | Waterway | ● | ● | ● | | |
| | Bridge | | ● | ● | ● | ● | ● |
| | Tunnel | | ● | ● | ● | ● | ● |
| | Other construction | | ● | ● | ● | ● | |
| | Underground feature | | ● | ● | ● | ● | |
| | Waterbody | | ● | ● | ● | ● | |
| | Land use | | | ● | | | |
| | Relief feature | | | ● | ● | ● | |
| | Disaster risk | | | ● | | | |
| | City furniture | | ● | ● | ● | ● | |
| | Vegetation | | ● | ● | ● | ● | |
| | Urban planning decision | | | ● | | | |
| | Zone | | | ● | | | |

Table 2. PLATEAU Standard Specifications (4th Edition) Feature Package

## 5. Conclusion: Impact of PLATEAU on the Geospatial Information Standardization Process

PLATEAU has achieved such as the rapid spread of new data standards, the use of GIS data by diverse players different from the past, and the creation of innovation through an approach that is distinct from traditional GIS policies in Japan. The lessons learned from this success could significantly influence future GIS policies in Japan. For example, in standardization measures in other fields, for example, "Spatial ID"[29] and "Building BIM"[30], we can see the impact of methods such as the adoption of open standards, agile specification revision methods, use case development and feedback to specifications, and open community formation, which are characteristics of the PLATEAU methodology.

Furthermore, the PLATEAU methodology may be applicable not only to data standardization policies but also to productivity improvement measures for the entire industry like business model standardization. In the future, it is expected that the theoretical analysis of the impact of the PLATEAU methodology and Japanese GIS policies will be further refined, contributing to standardization policies in Japan and worldwide.

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[29] https://www.ipa.go.jp/digital/architecture/guidelines/4dspatio-temporal-guideline.html

[30] https://www.mlit.go.jp/jutakukentiku/kenchikuBIMsuishinkaigi.html