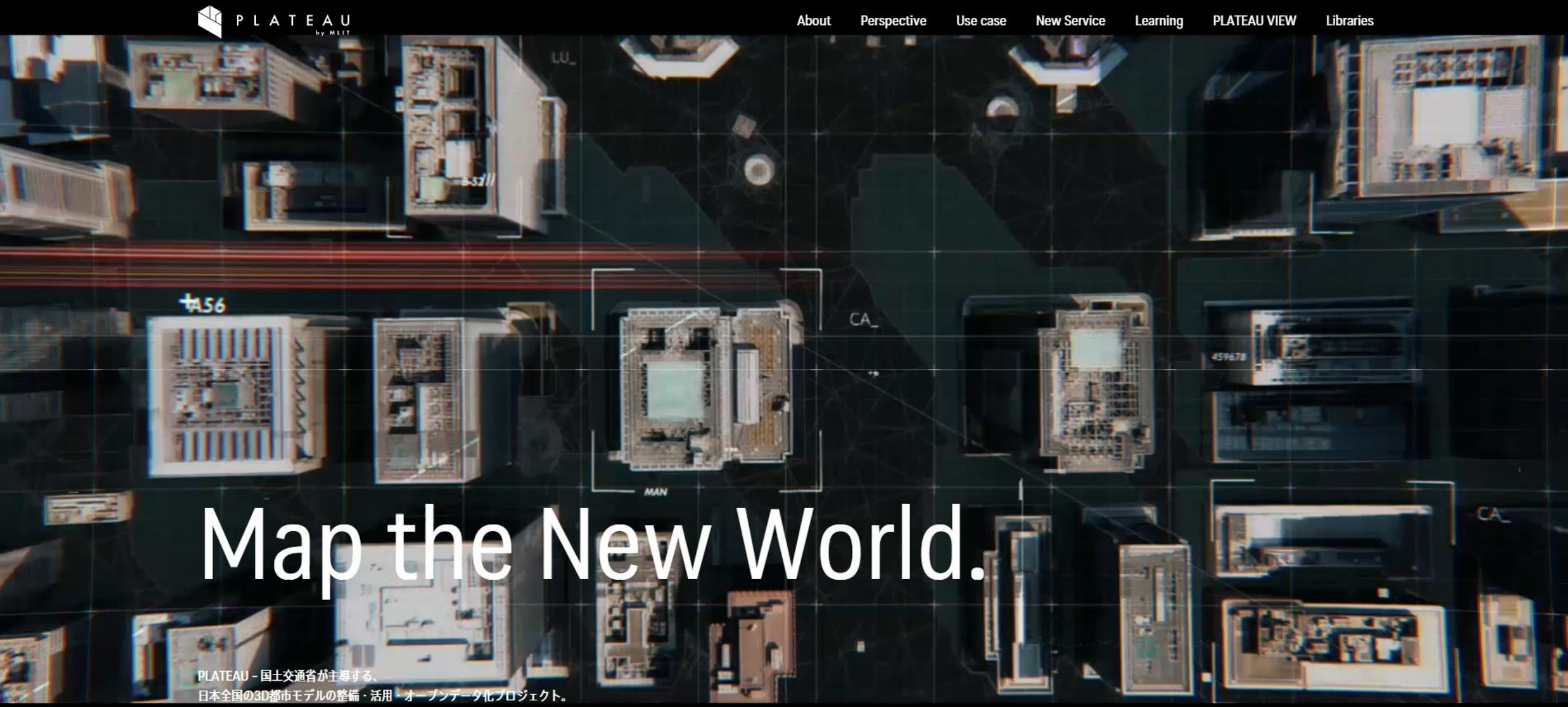
Project PLATEAU: The initiatives of Japanese Digital Twin



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About US

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PLATEAU by MLIT

Project Mission:

Realization of Digital Twin and Society 5.0

through the Digital Transformation of Urban Policy

Society 5.0: a human-centered society in which a high degree of integration between cyberspace and physical space can promote economic development and solve societal problems

Project PLATEAU Strategic Thrusts

Developing and Opening Data

Creating Use Cases

Encourage Engagement of Public and Private

Urban Digital Transformation

Sustainable City

Based on the 3D city model, analyzing various urban issues such as disaster management, environment, and transportation.

The results will be reflected in urban planning **to enhance sustainable urban development.**

Human-Centric City

By visualizing the urban structure using 3D City Models, Citizens can share policy issues.

Through the power of civic tech, developing **human-centric city can be realized.**

Agile Development for Community Design

In addition to static data of the urban activities, dynamic data can be used to simulate the situation of urban activities more precisely.

These technologies can realize **agile urban planning or community design.**

3D City Models: a data platform of 3D urban space which represents urban structures as data

Creation of 3D City Models

- ✓ Combining **graphic data of urban areas such as "urban planning basic map," etc.** (urban planning GIS) which is developed for urban planning and **data of building and topographic height and building shapes** obtained through aerial surveys, etc. and create 3D models of buildings, etc.
- ✓ Develop 3D City Models by **adding attribute information (meaning of urban space)** obtained through urban planning basic surveys, etc. to buildings.

Urban planning basic map
2D rectangular data of buildings, roads, blocks, etc.

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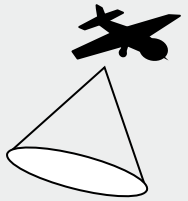
Aerial survey
3D data of building heights, shapes, etc.



Aerial survey using technologies of laser profiler(LP), oblique camera, etc.

→

Urban planning basic survey data, etc.
Current status of buildings and land use, etc.

↓

3D City Model

Cities to develop 3D City Models

No.	Prefecture	City	No.	Prefecture	City
1	Hokkaido	Sapporo	29	Shizuoka	Numazu
2	Fukushima	Koriyama	30	Shizuoka	Kakegawa
3	Fukushima	Iwaki	31	Shizuoka	Kikugawa
4	Fukushima	Shirakawa	32	Aichi	Nagoya
5	Ibaraki	Hokota	33	Aichi	Okazaki
6	Tochigi	Utsunomiya	34	Aichi	Tsushima
7	Gunma	Kiryu	35	Aichi	Anjo
8	Gunma	Tatebayashi	36	Osaka	Osaka
9	Saitama	Saitama	37	Osaka	Toyonaka
10	Saitama	Kumagaya	38	Osaka	Ikeda
11	Saitama	Niiza	39	Osaka	Takatsuki
12	Saitama	Moroyama Town	40	Osaka	Settsu
13	Chiba	Kashiwa	41	Osaka	Tadaoka Town
14	Tokyo	23 Wards	42	Hyogo	Kakogawa
15	Tokyo	Higashimurayama	43	Tottori	Tottori
16	Kanagawa	Yokoyama	44	Hiroshima	Kure
17	Kanagawa	Kawasaki	45	Hiroshima	Hukuyama
18	Kanagawa	Mogamihara	46	Ehime	Matsuyama
19	Kanagawa	Yokosuka	47	Fukuoka	Kitakyushu
20	Kanagawa	Hakone Town	48	Fukuoka	Kurume
21	Niigata	Niigata	49	Fukuoka	Iizuka
22	Ishikawa	Kanazawa	50	Fukuoka	Munakata
23	Ishikawa	Kaga	51	Kumamoto	Kumamoto
24	Nagano	Matsumoto	52	Kumamoto	Arao
25	Nagano	Okaya	53	Kumamoto	Tamana
26	Nagano	Ina	54	Kumamoto	Mashiki Town
27	Nagano	Chino	55	Oita	Hita
28	Gifu	Gifu	56	Okinawa	Naha

Data Specification of 3D City Models

✓ **In FY 2020, 3D City Models (LOD1 and partly LOD2) of 56 cities from all parts of Japan about 10,000km² (over 10,000,000 buildings)** in total were developed by MLIT.

Item	Detail	
Data specifi-cation	CityGML 2.0	Building, Road, LandUse, Relief (Terrain)
	Urban Planning ADE	Semantics information for urban planning *1,*2
	Extended data	Hazard map (River flood, Tsunami, and Landslide)
CRS	EPSG:6697 JGD2011 + JGD2011 (vertical) height	Geographic (Lat/Lon/H) is used since there is no Plane Rectangular Coordinate System covering all over Japan
Building data coverage	LOD0, LOD1	Urban Planning Area (city or town level)
	LOD2	City center area, Landmark (e.g. castle)
Positional accuracy	Horizontal ±1.75m, Vertical ±0.66m	Based on Japanese regulation (Map information level 2500) used by Urban Planning Basic Map (source of LOD0)
Data quality	Quality control compliant with ISO 19157	Qualities (e.g. Topological consistency) are described in Data Product Specification*3 and evaluated by validation tools *4,5,6

56 cities which developed 3D City Models

No.	Prefecture	City	No.	Prefecture	City
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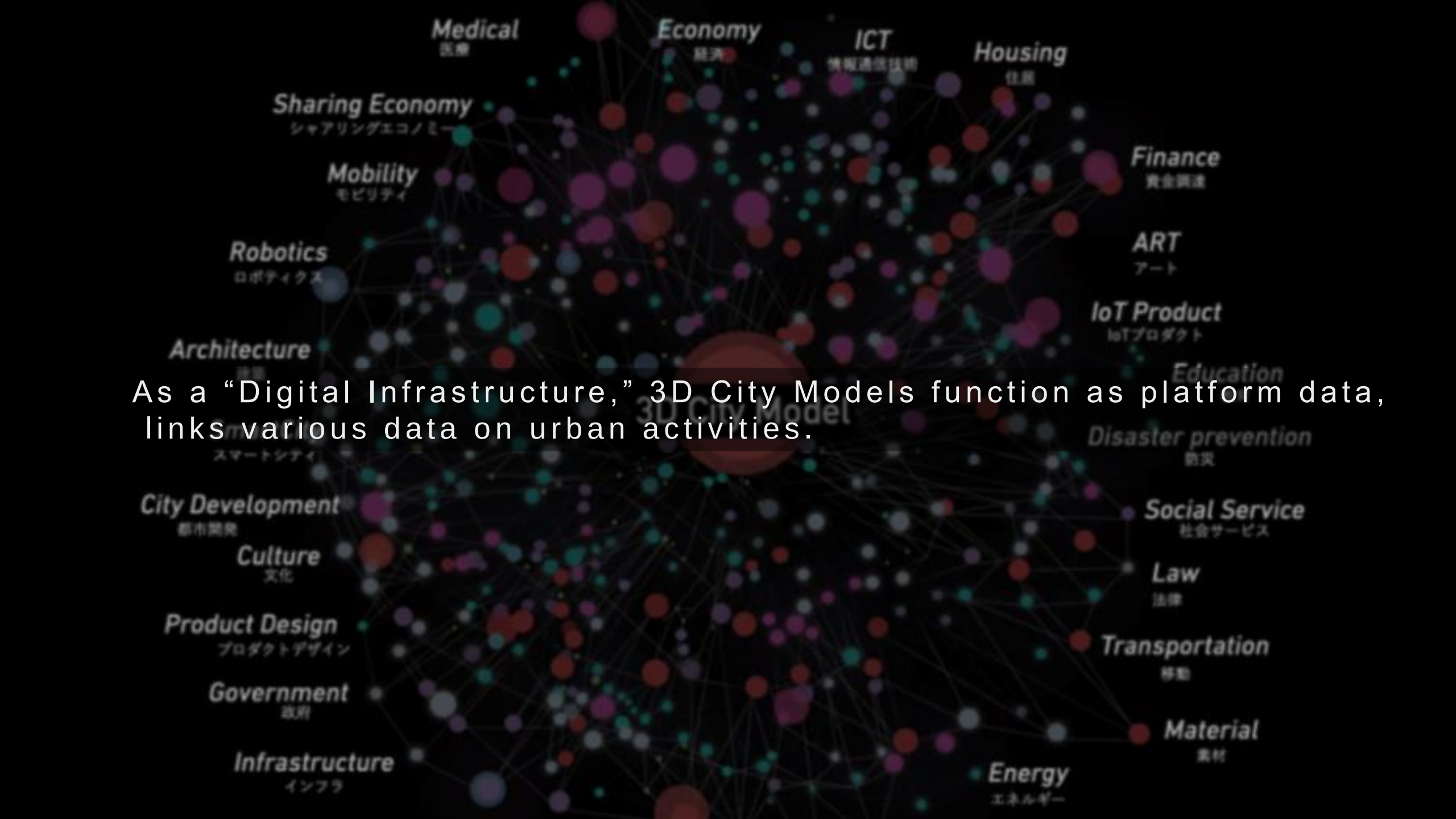
28	Gifu	Gifu	56	Okinawa	Naha

*1 Akahoshi, K., Ishimaru, N., Kurokawa, C., Tanaka, Y., Oishi, T., Kutzner, T., and Kolbe, T.H.: I-URBAN REVITALIZATION: CONCEPTUAL MODELING, IMPLEMENTATION, AND VISUALIZATION TOWARDS SUSTAINABLE URBAN PLANNING USING CITYGML, ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci., V-4-2020, 179–186 , 2020. https://doi.org/10.5194/isprs-annals-V-4-2020-179-2020
*2 Ishimaru, N., Kurokawa, C., Tanaka, Y., Oishi, T., Akahoshi, K., Kutzner, T., and Kolbe, T.H.: CityGML Urban Planning ADE for i-Urban Revitalization, OGC 20-000r1, 2020. https://portal.ogc.org/files/?artifact_id=92113
*3 Standard Data Product Specification for 3D City Model. Handbook of 3D City Models, Project PLATEAU. https://www.mlit.go.jp/plateau/file/libraries/doc/plateau_doc_0001_ver01.pdf
*4 CityGML Geometry Validator. Project PLATEAU GitHub. https://github.com/Project-PLATEAU/CityGML-geometry-validator
*5 CityGML Evaluation System. Project PLATEAU GitHub. https://github.com/Project-PLATEAU/CityGML-evaluation-system
*6 CityGML Production System. Project PLATEAU GitHub. https://github.com/Project-PLATEAU/CityGML-production-system



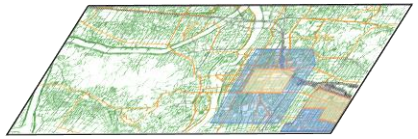
As a “Digital Infrastructure,” 3D City Models function as platform data, links various data on urban activities.

Project PLATEAU: 3 Project Values

1 Creation of a new solution using existing data

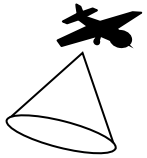
Urban Planning Basic Map

2D map data of buildings, roads, blocks, etc.



Aerial survey result

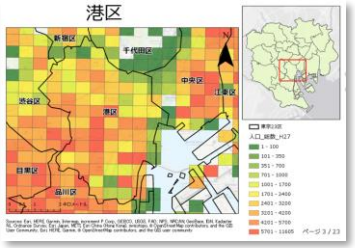
3D data of building heights, shapes, etc.



3D City Models

Urban Planning Basic Survey data, etc.

Current status of buildings and land, etc.



"Reusing" GIS data previously used by municipalities and develop a new value-added 3D City Models.

- Establish a reasonable and scalable data development scheme using existing resources effectively.

❷ Establishment of an eco-system of 3D City Models through the development of data and use cases concurrently

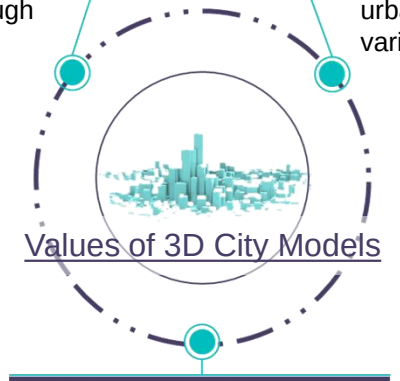
Values of “3D City Models”

Visualization

- ✓ Improving urban policy understanding through 3D visualization.

Simulation

- ✓ Developing accurate urban space data enables various simulation.



Interactive

- ✓ Providing a platform for physical space and cyber space to exchange data and improve physical space interactively.

Develop data and use cases concurrently. Produce applications in various fields and maximize the value of 3D City Models.

▶ Establish a cycle of data usage in private sectors and data development in public sectors.

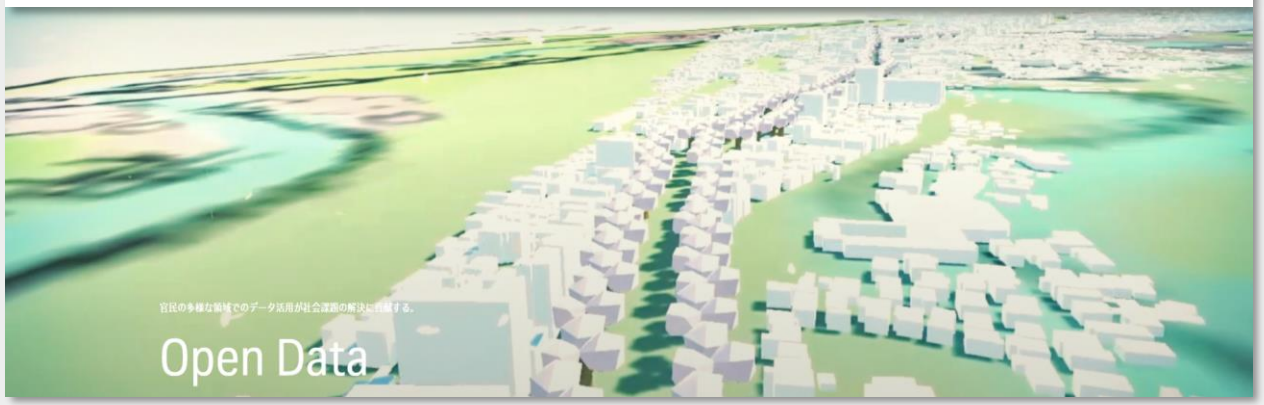
CityGMLのスタジオアルタ

CityGMLを制作補助とし３DCGソフトで制作

❸ Open format and open source

Establish a developer-friendly data usage environment including the formulation of standard specification with open format which meets international standards, documenting knowledge and creating OSS of related software.

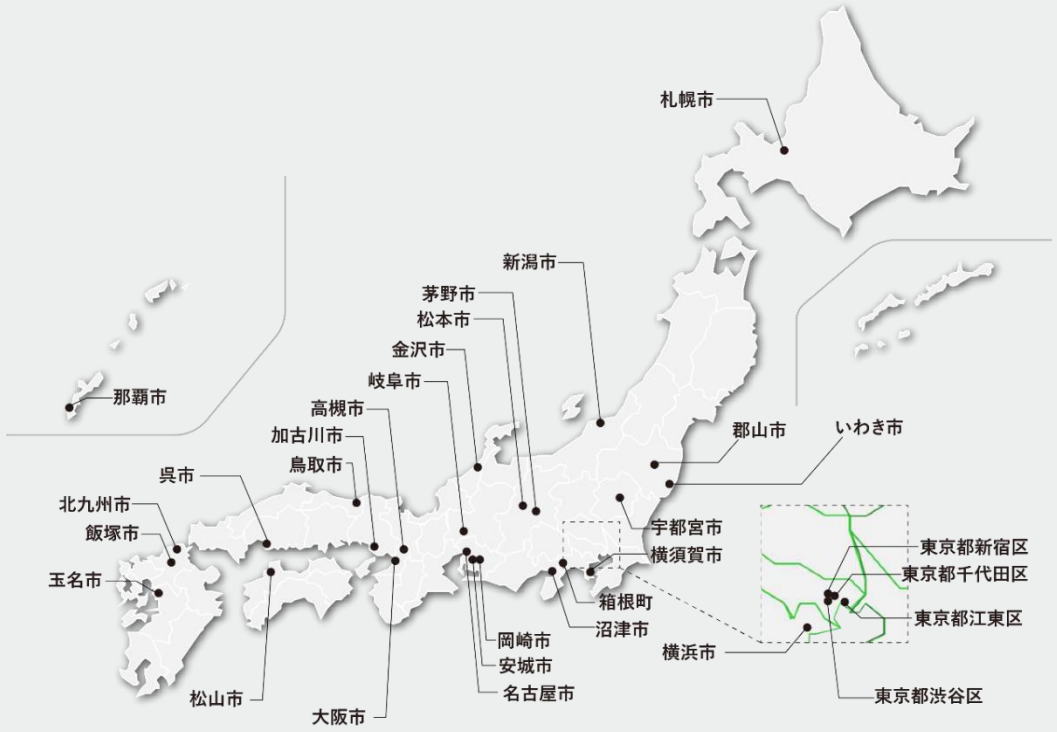
▶ Creation of open innovation in various fields

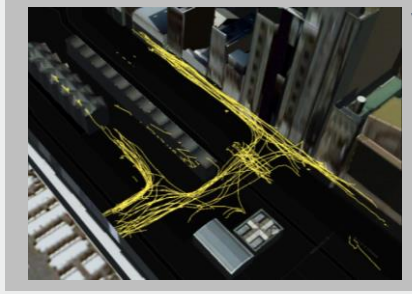


Use Cases

Case-Study for utilization of 3D City Models

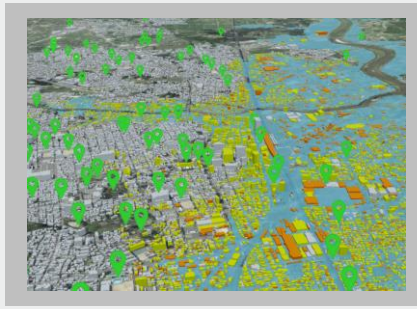
- ✓ In FY 2020, **44 Case-Study for various utilization were implemented** in collaboration with public and private sectors.





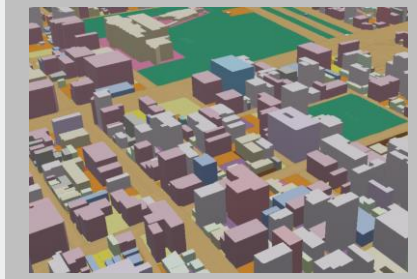
Visualization of urban activities using dynamic information such as from cameras, sensors, etc.

- ✓ Density control as a countermeasure for COVID-19
- ✓ Identifying urban activities and using it to improve city dynamics.
- ✓ Disaster evacuation guidance for persons unable to return home.



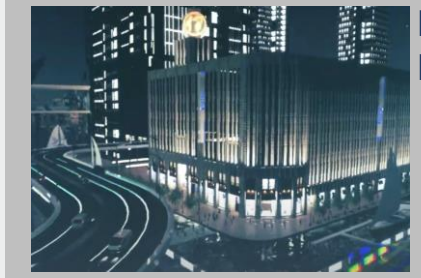
Advancement of disaster management policies through the visualization of disaster risks.

- ✓ 3D visualization of disaster hazard data such as flood, etc.
- ✓ Picking up buildings which enables vertical evacuation.
- ✓ Time-series simulation of passable evacuation routes.



Data-driven urban planning and urban development

- ✓ Realization of Data-driven urban planning and smart cities.
- ✓ Smart management of areas, infrastructure and facilities.
- ✓ Utilization as a tool building consensus for urban policy.

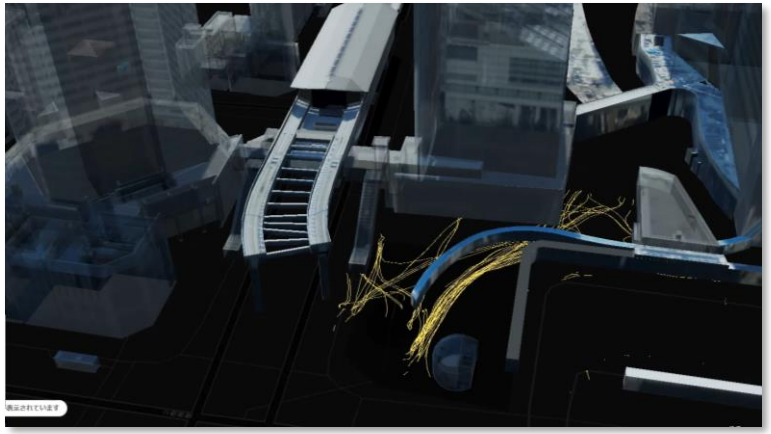


Market Creation of various services using 3D City Models

- ✓ Development of web-based applications which contribute to the improvement of citizens' QoL.
- ✓ Monetization in various services using 3D City Models, such as urban planning, infrastructure management, entertainment and communications.

Various Use Cases

☐ Space planning using urban activity data



FY 2020 Case-Study UC_ID_1-001
“Measuring urban activities using a laser sensor on a high-accuracy and real-time basis” Matsuyama City and Hitachi, Ltd.

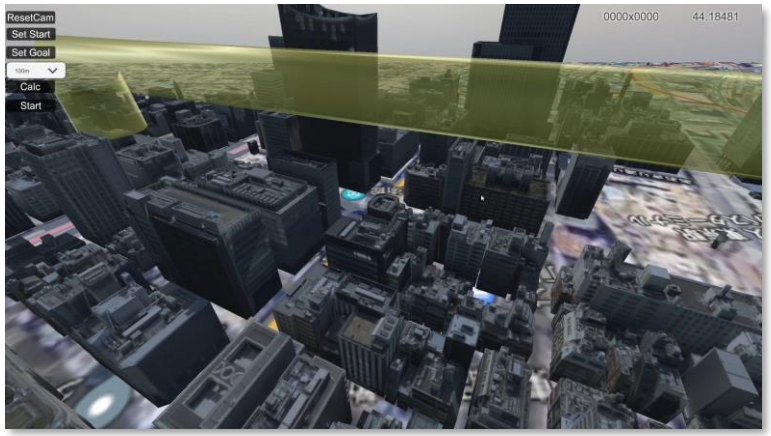
☐ New urban experiences in virtual space

FY 2020 Case-Study UC_ID_4-001
“ City tour and shopping experiences in virtual space”
Isetan Mitsukoshi Holdings Ltd.
Shinjuku 3-chome area, Shinjuku, Tokyo

☐ Digital twins for area management

FY 2020 Case-Study UC_ID_4-007
“Implementation of digital twins for area management”
Takeshiba Area Management x Tokyu Land Corporation, Softbank

☐ Flight simulation of logistics drones



FY 2020 Case-Study UC_ID_4-005
“Flight simulation of logistics drones” A.L.I. Technologies

☐ Risk analysis using disaster simulation

FY 2020 Case-Study UC_ID_2-003
“Planning Disaster management policy and enhancing disaster prevention awareness through 3D visualization of time-series flood simulation data”
Mitsubishi Research Institute, Inc.

☐ Contents in AR/XR fields

AR live streaming (2021 PLATEAU Hackathon)

Reference Materials

- **PLATEAU Open Data**

3D City Models of 56 cities (10,000 km2) can be downloaded from the Association for Promotion of Infrastructure Geospatial Information Distribution as CityGML, 3D Tiles, GeoPackage, etc. (CC BY 4.0)

https://www.geospatial.jp/ckan/dataset/plateau

- **PLATEAU Documents**

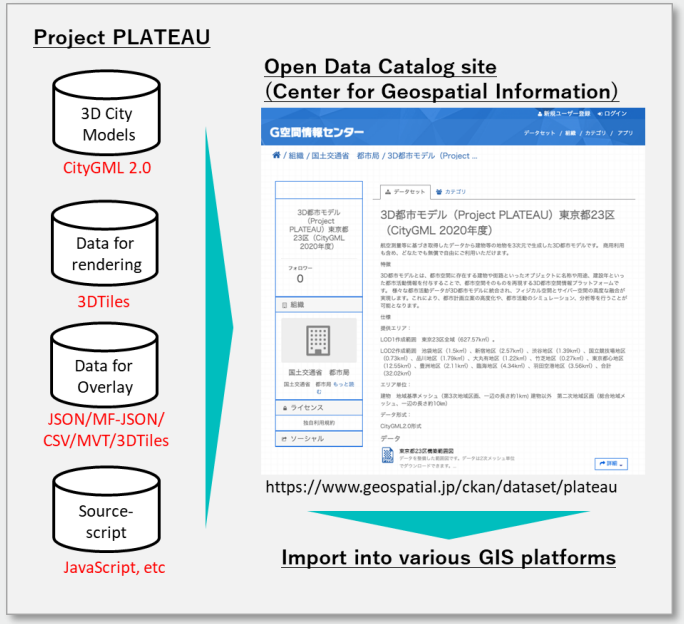
Various documents such as Data product specifications, Data implementation procedures, Use case manuals, etc. are available via the PLATEAU official HP.

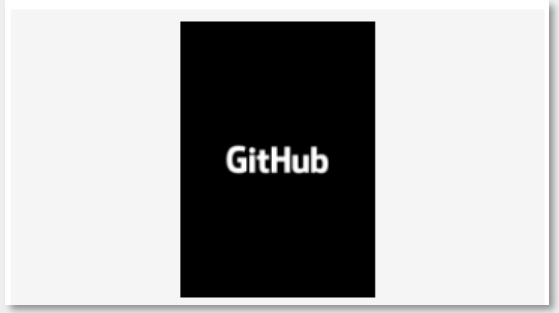
https://www.mlit.go.jp/plateau/libraries/

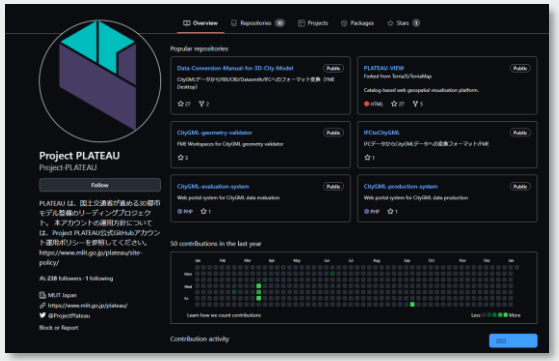
- **PLATEAU Open Source**

Various open-source software such as PLATEAU VIEW (based on Cesium.js and Terria.js), IFC to CityGML converters (FME script), validation systems, etc. are available via GitHub repositories.

https://github.com/Project-PLATEAU

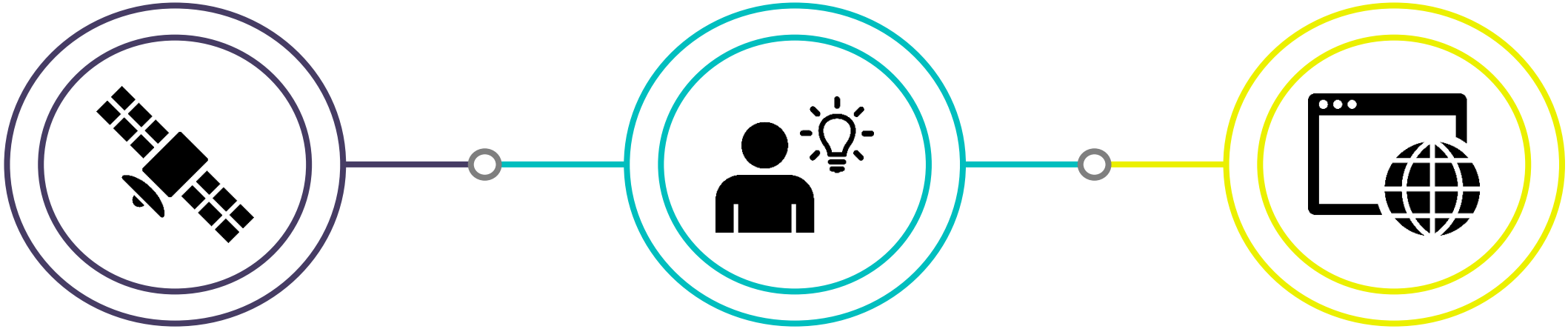






Future development
—Realization of an eco system: sustainable development, utilization and sharing of 3D City Models as a digital infrastructure

Medium- to long-term development after FY 2021



Efficient and advanced data development

- Enhancement of standard specifications such as for detailed building and road models.
- Development of more accurate-scale data by combining ground surveying.
- Development of auto-generated tool for 3D modeling.

Implementation of smart cities through various use cases

- Development of best practices for implementation of smart cities such as automated driving, robot deliveries, carbon neutral, etc.
- Further promotion of open data utilization, improvement of data distribution including data creation and establishment of update schemes, etc.

Expansion of numbers of municipalities

- Financial and Technical Support for municipalities to develop, utilize, and share 3D City Models.

国土交通省

PLATEAU by MLIT

Ministry of Land, Infrastructure,
Transport and Tourism (MLIT), Japan

https://www.mlit.go.jp/plateau/