CARTOGRAPHY IN JAPAN 2019-2023

NATIONAL REPORT TO THE 18th GENERAL ASSEMBLY OF THE INTERNATIONAL CARTOGRAPHIC ASSOCIATION

Cape Town 2023

NATIONAL COMMITTEE FOR CARTOGRAPHY, SCIENCE COUNCIL OF JAPAN JAPAN CARTOGRAPHERS ASSOCIATION

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PREFACE

This is the National Report of Japan to the 18th General Assembly of ICA and the 31st International Cartographic Conference in Cape Town, South Africa, 2023.

The purpose of this report is to introduce the outline of the cartographic activities that have taken place in Japan from 2019 to 2023. The contents describe the following:

- 1. Activities of the National Committee for Cartography and related academic associations
- 2. Activities of national mapping organizations
- 3. Activities of local government
- 4. Activities of public corporations, foundations, museums and libraries
- 5. Activities of the private sector

We hope that the many cartographers among the ICA members will be able to better understand the cartographic activities in Japan through this report.

Kaori Ito Chairperson, National Committee for Cartography, Science Council of Japan

I. ACTIVITIES OF THE NATIONAL COMMITTEE FOR CARTOGRAPHY AND RELATED ACADEMIC ASSOCIATIONS

1. Activities of the National Committee for Cartography (NCC)

The National Committee for Cartography (NCC) is a branch of the Science Council of Japan (SCJ). The SCJ, which is a governmental organization, established in 1946 and reformed in 2006, directs Japanese academic research (http://www.scj.go.jp/en/index.html). The SCJ is therefore a member of the International Cartographic Association (ICA), and NCC is a national committee for the ICA.

Council members and associate members of the SCJ are nominated by the SCJ on the basis of co-optation by the council members and associate members. The NCC currently has fifteen members, consisting of council members, associate members, and non-members of SCJ. The chairperson for the current term is Prof. Kaori Ito, whose term runs from 2020 to 2023.

(1) Activities for the 17th General Assembly of the ICA, and the 29th International Cartographic Conference in Tokyo, Japan, in 2019

ICC2019 Local Organizing Committee, Japan, hosted the 29th International Cartographic Conference in Tokyo from July 15-20, 2019, with 1017 participants from 75 countries and regions (including 261 from Japan). The number of presentations including oral and poster presentations was 634 (of which 113 were from Japan). 386 map works were exhibited at the International Cartographic Exhibition, and 188 maps from 33 countries and regions were exhibited at the Barbara Petchenik Children's Map Competition. At the General Assembly, the continuation of the Ubiquitous Mapping Commission proposed by Japan was approved at the General Assembly, and Prof. Yoshiki Wakabayashi was nominated as the chair of the commission.

(2) Activities for the 30th International Cartographic Conference in Florence, Italy, 2021

The 30th International Cartographic Conference was held in Florence, Italy as a hybrid conference. One inperson oral presentation, six online oral presentations, and one online poster presentation were made from Japan. Seventeen map works were exhibited from Japan at the international map exhibition, and "1:10,000 Topographic Map, "CENTRAL TOKYO", in commemoration of the enthronement of His Majesty the Emperor" was awarded the third prize in the maps on panels competition. Four maps from Japan were exhibited at the Barbara Petchenik Children's Map Exhibition.

(Kaori ITO)

2. Activities of the Japan Cartographers Association

· Japan Cartographers Association (JCA) sponsored the 29th International Cartographic Conference, Tokyo, 2019.

In addition, JCA Annual Meeting was held concurrently with ICC2019, leading to outreach to domestic researchers, businesses, and citizens.

- JCA provides international grants for young researchers in Japan using a part of the surplus from the ICC2019.
- · JCA established the Reiko Seto Fund for Women's Cartography Promotion and Support Grant Program.
- JCA published "Encyclopedia of Maps (*Chizu no Jiten*, in Japanese)" in November 2021, which was featured in an article in ICA News no.79.
- · JCA holds Annual Conference of the JCA, a regional conference, and some JCA Workshops every year.
- JCA publishes a quarterly journal "Chizu -- Kukan Hyogen no Kagaku (Map, Sciences of Spatial Representation)", which is composed of scientific papers, various reports, book reviews and news, and has a paper map as an appendage.
- · JCA tries to enhance dissemination of information utilizing information technology such as SNS.

(Kaori ITO)

3. Certification of GIS engineer organized by the GIS Association of Japan (GISA)

GIS Association of Japan (GISA) established GIS Certification Association (GISCA) under the corporation of related academic societies including JCA in 2006.

The roles of GISCA are the certification of "GIS Expert" and "GIS Expert Emeritus" to the professional individuals and the certification of GIS education to the academic and social education organizations.

GISCA draws upon the method of GISCI in US and modifies it for Japan to evaluate GIS professionals.

The title "GIS Expert Emeritus" is presented to the people who have been taking leadership to the field of GIS more than 25 years, if the certification committee decides the certification by the nomination from GIS related organizations.

7 people shown under have been celebrated since 2020.

Nonoko Tsukada, Hiroshi Une, Takashi Oguchi (2021)

Hitoshi Hasegawa, Hiroshi Ota, Toru Mori, Toshihiro Osaragi (2023)

GISCA: https://www.gisa-japan.org/english/index.html

(Madoka NAKAJIMA)

II. ACTIVITIES OF NATIONAL MAPPING ORGANIZATIONS

1. Geospatial Information Authority of Japan, Ministry of Land, Infrastructure, Transport and Tourism (GSI/MLIT)

GSI conducts national surveying and mapping activities, which provide a basis for the land management. In addition, GSI promotes disaster response-related measures employing the latest geospatial technology to protect national land and people's lives and assets, and also provides "Geographic Information for Disaster" that is useful for "preparing" disaster prevention and mitigation.

From FY 2019 to FY 2022, GSI's distinctive initiatives are as follows.

(1) Special efforts for 2020 TOKYO OLYMPICS

GSI has created special pictograms and developed a standardized notation system for English names of area and facility to prepare maps that can easily be read by international visitors to Japan for Tokyo 2020 Olympic and Paralympic Games and after with a view to realizing an authentic tourism-oriented country.

	Koban (Police Box)	Post Office	Hospital
Japanese map symbols	Х	0	æ
International visitors- oriented map symbols	ŝ	\bowtie	÷

Figure 1 Japanese map symbols and corresponding map symbols for international visitors



Figure 2 A map with English names of areas and facilities https://www.gsi.go.jp/kihonjohochousa/multilingual.html

(2) Publishing Emperor's Enthronement Commemorative Maps

GSI published a set of 1:10,000 commemorative topographic maps "CENTRAL TOKYO" on October 22, 2019, day of "Sokuirei-Seiden-no-gi," ceremony of the enthronement of His Majesty the Emperor. These commemorative maps were published to record the features of the metropolitan area of Tokyo, the capital of Japan, in the form of map as of the date of enthronement and to make the public more interested in geography and maps in general.



Figure 3 Emperor's Enthronement Commemorative Maps

(3) The Natural Disaster Monuments to disaster lessons conveyed to us by our ancestors

The Natural Disaster Monuments are stone memorials, monuments, etc., that contain information related to natural disasters that have occurred in the past. In July 2018, there were many victims of heavy rain events. Although there were memorials in such districts to floods that had occurred 100 or more years before, the messages were not utilized satisfactorily, and there were places where they were not used for evacuation activities. Against this backdrop, GSI began to list such information in FY 2019 on its web maps (GSI Maps) and its 1:25,000 topographic maps.

The work of promoting all municipalities to register Natural Disaster Monuments in GSI Maps was made; as of late December 2021, there were nearly 1200 listings. To contribute to today's disaster lessons from as many ancestors as possible to provide safe and secure lives for future generations, and to contribute to regional disaster training, GSI is working to promote and popularize disaster lessons through as many Natural Disaster Monuments as possible.



Figure 4 Natural disaster monuments symbolization

(Takuya NOJIRI)

2. Hydrographic and Oceanographic Department, Japan Coast Guard, Ministry of Land, Infrastructure, Transport and Tourism

(1) Japan Coast Guard's Largest Survey Vessel Entered into Service

"Heiyo" entered into service in January 2020

"Koyo" entered into service in March 2021

[Dimension]

Length Overall: 103m

Gross tonnage: 4,000 tons

(both ships)

[Major equipment]

Heiyo: multi-beam echo sounder, Autonomous Underwater Vehicle (AUV), Autonomous Surface Vehicle

(ASV) (unmanned survey along pre-programmed route)

Koyo: multi-beam echo sounder, sonar (equipment for exploring the strata beneath the seafloor), mud samplers They are engaged in research and other activities related to seafloor topography and geology around Japan. This is the first time in about 20 years that a large survey vessel has been commissioned by the Japan Coast Guard. With the commissioning of these vessels, the Japan Coast Guard now has seven large surveying vessels and seven small surveying vessels.

(4) 150 Years of Nautical Charts

The year 2021 marks the 150th anniversary of the start of modern hydrographic operations, from oceanographic surveys to chart production, in 1871. To commemorate the anniversary, the emblem used on nautical charts and other hydrographic publications to indicate that they were produced in Japan was changed to a new design.

(Shinichi ASANO)

3. 3D City Model by Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Ministry of Land, Infrastructure, Transport and Tourism (MLIT) launched Project PLATEAU, a 3D city model open data project, in March 2021.

PLATEAU is a project to develop, utilize, and open 3D city model. MLIT develops use cases in various fields such as city planning, disaster prevention policy making, and developing new services by using data that reflect real urban space in cyberspace. Furthermore, they aim to create open innovation ecosystems by enabling anyone to freely pull out urban data.

By FY2022, 3D city models for 130 cities nationwide have been developed. In addition, use cases have been developed in various areas in the public and private sectors, and the social implementation is accelerating.



Figure5 Project PLATEAU https://www.mlit.go.jp/plateau/

(Kaori ITO)

III. ACTIVITIES OF LOCAL GOVERNMENT

1. Mapping Activities

Virtual Shizuoka is an initiative to acquire and accumulate "3D point cloud data" by surveying real spaces with a laser scanner to turn them into open data. This data is used for urban development, infrastructure maintenance, and disaster prevention. In fact, after the mudslide that occurred in Atami City in July 2021, point cloud data from both before and after the disaster was used to calculate soil amounts, which proved useful for recovery (see Figure 6).



Figure 6 Point Cloud Data in Atami City Virtual Shizuoka(movie) https://youtu.be/AH6INi6epzk

(Madoka NAKAJIMA)

2. Open Innovation

Activity of an open innovation is continued still today. Especially, the activity called a living lab prospers and it is getting the fruit in Yokohama.

In December 2021, as COVID-19 placed many limitations on activities, an ideathon/hackathon that actively used human flow data was held online with the goal of solving tourism issues in the Yokohama port area. Students from three universities in Yokohama took the lead in developing new tourism plans and applications.

https://front.geospatial.jp/wp-content/uploads/2022/04/9ca4bfffc1d9e9ed089a8fd4ddc87672.pdf (in Japanese) (Madoka NAKAJIMA)

IV. ACTIVITIES OF PUBLIC CORPORATIONS, FOUNDATIONS, MUSEUMS AND LIBRARIES

1. Public Corporations and Foundations

(1) Japan Map Center (JMC)

JMC reproduces and distributes official maps of Japan and geospatial information issued by the Geospatial Information Authority of Japan, sells related information services and books, raises public awareness, and conducts research and development on mapping and GIS. JMC and Japan Geographic Data Center jointly hold Proficiency Test on Cartography and Geography. On September 2, 2019, JMC started providing topographic maps with symbols of natural disaster monuments, and on April 28, 2023, started providing map images of 1:50000 topographic maps.

(2) Japan Hydrographic Association (JHA)

JHA reproduces and distributes Nautical charts, Electronic Navigational Charts, Miscellaneous charts, Special publications, and Aeronautical charts published by the Japan Coast Guard (JCG). JHA is as a general sales agent of Electronic Navigational Chart for the Straits of Malacca and Singapore (MSS-ENC). In addition, JHA publishes and disseminates navigational Yachting charts (Y chart), Port guide (S guide) and Electronic Reference Charts (new pec), for small craft, yachts, and motorboats. In January 2023, "1871-2021 HYDROGRAPHY IN JAPAN" was published as the 150th anniversary of the Japanese nautical chart in 2021.

(3) Map Association

The members of Map Association are wholesalers and retailers of the Japanese official maps issued by the Geospatial Information Authority of Japan. Cooperating with the Japan Map Center, it plays a key role in smooth and rapid distribution of the maps as well as promoting better utilization of maps.

(4) Mapping Technology Association

The Mapping Technology Association is an association of mapping companies, and conducts research and development, dissemination, and human resource development related to geospatial information technology.

(5) Japan Digital Road Map Association (DRM)

DRM produces and provides digital road map databases for road management administration and navigation in Japan, and conducts research, technology development, and international standardization related to these. As a task from now on, DRM supports for location references in road management and cooperation in the development of high-precision mapping for autonomous driving.

(6) Japan Association of Surveyors (JAS)

JAS is an association of surveyors whose purposes are to conduct surveys and research in the fields of surveying and geospatial information and to contribute to dissemination and advancement of surveying technology. At the same time, it aims to enhance mutual friendship among, and the social status of, its members. JAS publishes journals and books, holds seminars and forums, provides training and study courses, leads the operation of CPD (Continuing Professional Development) system for surveyors, certifies competent and/or outstanding surveyors, provides consulting services, examines surveying results, and validates surveying instruments. During COVID-19 pandemic, JAS has expanded opportunities of online meetings and webinars as well as blended learning.

(7) Association of Precise Survey and Applied Technologies (APA)

APA conducts research and experiments on advanced surveying and map technology, international standardization of digital geospatial information, examination of survey results, and publication of specialized journals and books. APA is entrusted with work from national institutes to develop and disseminate geospatial measurement and observation techniques and utilizations. In the field of international standardization, APA is accredited as a domestic deliberative body of ISO/TC211(Geographic information/Geomatics). In December 2019, APA hosted the 47th plenary meeting of ISO/TC211 in Saitama-Omiya, Japan.

(Masaharu TSUZAWA)

2. Museums and Libraries

(1) GSI / Science Museum of Map and Survey

Science Museum of Map and Survey was established in 1996. It is the adjunct facilities of the Geospatial Information Authority of Japan. It has three main facilities: Exhibition Hall, Information Service hall, and Earth Plaza. The Exhibition Hall consists of exhibition rooms, map gallery and orientation room. The Information Service Hall offers perusal and delivery service of the survey results and documents produced by the GSI. At Earth Plaza, a spherical model of the Japanese archipelago is on display to give visitors an idea of the roundness of the Earth. A retired survey aircraft is also displayed.

(2) Gifu Prefectural Library / World Distribution Map Center

The library collects, exhibits and provides the maps, distribution maps in particular, that were collected from all over the world. A special exhibitions and lectures for school children are carried out periodically.

(3) ZENRIN MUSEUM

ZENRIN MUSEUM in Kitakyushu is operated by ZENRIN co., Ltd., a leading mapping company in Japan. Its collections include antique maps collected from across the world and historic schoolbook atlas. The museum has staff called "Z curators" who give advice on how to enjoy maps.

(4) Museum of Yokohama Urban History

Museum of Yokohama Urban History exhibits antique maps and documents to show the development and expansion of Yokohama-city.

(5) Yamanote Museum

Yamanote Museum exhibits mineral of Hokkaido and the world. On the wall, in addition to the world geological maps, the reprint of "Ino map" are on display. There is also a corner to showcase the legacy of surveying equipment.

(6) National Diet Library

Various original maps and reproductions of old maps are stored.

(7) Rissho University Library Keiji Tanaka Library

There is a collection donated by Prof. Keiji Tanaka, who is a geography master. A collection of about 14,000 valuable items, such as Japanese-style books from the Edo period, pre-war geography-related books, old maps, and drawings, are stored.

(8) The Inoh Tadataka Museum

The Ino Tadataka Museum was founded in 1998 in Katori City, the hometown of Ino Tadataka, who surveyed all over Japan and created the Complete Map of Dainippon Coastal Area. In the hall on the opposite bank of the former residence of Tadataka Ino, a national historic site, materials related to Tadataka Ino, which are national treasures, such as surveying instruments, survey maps, and diaries, are stored.

(Hiroyuki ENDO)

V. ACTIVITIES OF PRIVATE SECTOR

1. Digital Services

The four years from 2019 have been an unprecedented period. First of all, 2019 was a booming year for research, construction and tourism in connection with the 2020 (held in 2021) Olympic Games. However, since 2020, the movement of people has reversed from the stagnation caused by the COVID-19 disaster, and the map and GIS business related to transportation and tourism has been negatively affected for several years due to the stagnation of the movement of people. After that, from the middle of 2022, work such as survey work, data creation, and simulation related to social activities looking ahead to the post-COVID-19 era has increased. In addition, the map data and GIS business related to the management of traffic volume and congestion levels, the increased demand for contactless business, and the progress of DX in society as a whole have expanded.

There are many kinds of companies contributing in the fields of GIS and Mapping services in Japan.

A large part of building GIS data and Mapping services are done as the trustee business from national or the local government as a part of the infrastructure maintenance of the country. Main players of GIS and Mapping services in Japan are surveying companies, map preparation companies, and map publishing companies.

The main task of surveying company is the engineering survey, geographic data entry and maintenance, and cadastral survey under public organizations. Moreover, quite a few private companies have capability to consult, design and construct GIS for their clients such as national and local governments. Biggest companies such as Kokusai and Pasco contribute for the fields of GIS, photogrammetry, geological survey, civil engineering, overseas assistance, oceanographic survey, marketing, and so on. They keep more than 1000 employees, and their annual incomes are more than 300 million US\$.

In the case of mapping companies, it is said that the business environment has become increasingly severe in recent years, especially since the COVID-19 crisis. The main reasons for this are the increase in competitors in the map business, such as IT companies and office supplies companies, and the decrease in budget cuts by national and local governments. However, in light of the increasing severity of natural disasters in recent years, it is important to create and update various hazard maps and disaster prevention systems for government agencies and local governments for the safety and security of the region, or to conduct educational activities for residents. demand for is increasing. Many companies engaged in work related to maps and GIS, which require a high level of expertise, continue to evolve and maintain a solid business.

The map publishing companies in Japan traditionally play an important role to supply maps for transportations, sightseeing, shopping and for public organizations. Nowadays, their business expands to the field of car and human navigations not only Japanese users but for inbound people. Biggest companies in this field are, for example, ZENRIN and Shobunsha Holdings, Inc. Other well-known companies that provide human navigation services include Geotechnologies, NTT Docomo, and Navitime Japan. These companies use smartphones and the Internet to guide you to your destination and provide information about the area around your destination.

Companies	URLs
Kokusai Kogyo	https://www.kkc.co.jp/english/
Pasco	http://www.pasco.co.jp/eng/
ZENRIN	http://www.zenrin.co.jp/english/
Shobunsha Holdings,Inc	https://www.mapple.co.jp/en/
GeoTechnologies	https://english.geot.jp/
NTT docomo	https://www.docomo.ne.jp/english/
Navi-Time Japan	http://corporate.navitime.co.jp/enl

Table 1 List of URLs of companies offering digital services



Figure 7 The Image of the use of map data by Zenrin

(Nonoko TSUKADA)

2. Car Navigation and LBS

(1) Car Navigation

In recent years, car navigation has evolved to take on a variety of expanded roles beyond traditional destination guidance functions.

Navigation

A feature of recent years is the diversification of devices. In addition to the in-vehicle type, the spread of PND and smartphone applications has intensified competition in car navigation systems. It was thought that many users would shift to smartphone apps, but in-vehicle car navigation systems have maintained their dominance due to their strengths, such as interlocking with back monitors and TV viewing via 1seg.

Connected car

Connected car is a car that has a function as an ICT device. It is expected that new value will be created by acquiring various data such as vehicle condition and surrounding road conditions by sensors and accumulating and analyzing through communication network.

Automatic driving support

The high-precision 3D map "Dynamic Map" for each lane for automatic driving support has been developed for expressways and motorways (29,205km in total), and efforts are currently being made to expand the coverage to general roads. Dynamic maps are used not only for autonomous driving support, but also for supporting snow removal activities to maintain lifelines in areas with heavy snowfall.

	• 0
Toyota	https://global.toyota/en/
Nissan	https://www.nissan-global.com/EN/
Honda	http://www.honda.co.jp/navi/
Panasonic	http://panasonic.jp/car/
Pioneer	https://global.pioneer/en/
GeoTechnologies	https://english.geot.jp/products/automotive_solution/carnavi/
Zenrin	http://www.zenrin.co.jp/product/carnavi/inquiry/index.html
Yahoo! JAPAN	https://carnavi.yahoo.co.jp/promo/
Dynamic Map Platform	https://www.dynamic-maps.co.jp/en/index.html

Table 2 List of URLs of companies related to car navigation service



Figure 8 Navigation map data on smartphone by Mapfan

(2) LBS for DX

In recent years, LBS has attracted attention as a DX tool in various industries.

Construction industry

In the construction industry, the Ministry of Land, Infrastructure, Transport and Tourism is promoting ICT called I-Construction, and LBS is the core of it, and many companies such as construction machinery manufacturers are participating.

Manufacturing industry

In the manufacturing industry as well, optimization of production lines and staffing using LBS is a trump card for DX.

Retail business

In the retail industry, LBS is used for area marketing such as customer analysis and for optimizing product placement.

Transportation industry

In the transportation industry, LBS is also used for optimizing transportation plans, tracking packages, and as a base for MaaS.

(3) LBS Game and AR

The game using the LBS (Location-Based Services) on smartphone has been very popular.

Colopl, a game using geospatial information, has virtual money system called "Pl". You can gain "P1" by the distance you work or move to create your own virtual city called "Colony".

"Station Memories!" is a game where you can compete train station ownership by visiting stations around the country with your partner characters.

"Ingress" that appeared in 2013 and "Pokemon GO" that appeared in 2016 are location information games that combine AR (Augmented Reality) and location information. Both brought a big boom. In particular, "Pokemon GO" has been supported by a wide range of age groups and has overturned the conventional wisdom that it is the youth who play location information games.

Table 3 List of URLs of companies related to LBS Game and AR

Colopl	http://colopl.co.jp/
Keitai Kunitori Gassen	http://kntr.jp/
Station Memories!	https://ekimemo.com/
Ingress	https://www.ingress.com/
Pokémon GO	https://www.pokemongo.jp/

(Hiroyuki ENDO)

3. Trends in Map Publication

According to the map utilization fact-finding conducted by ZENRIN CO., LTD in 2018, it has been shown that 84.1% of the users have used the map within the past year. While there are still many people using maps, only 21.4% of people use paper maps, which is decreasing year by year. On the other hand, the number of users of web maps continues to increase, and in particular, the use of smartphone maps at the time of travel has reached 62%.

(1) Web map service

Web map services play a leading role in current map usage. "GSI Maps", which can display various information about national land in multiple layers, is used in a wide range of fields such as disaster prevention and education through API and tile services. In recent years, the distribution of map tiles has made it possible to browse various maps in multiple layers beyond the barriers of web map services. Old maps and past aerial photographs are particularly popular.



Figure 9 "Konjaku-map on the web" can be viewed while comparing with the old version map http://ktgis.net/kjmapw/index.html

(2) Smartphone apps

Map apps for smartphones and tablets are becoming more popular than paper maps. Improvements in positioning accuracy using the Quasi-Zenith Satellite System "Michibiki" have spurred this trend.

It's not all about navigating to a destination. It is becoming common to combine old maps and pictorial maps with positioning system to enjoy walking, and to view scenery while displaying realistic terrain representations. Also, when you search for facilities such as shops, restaurants, cafes, hotels, hospitals, banks, etc., the information is

displayed on the map. These days, when you search for an item you want, it's not uncommon for a map to show nearby stores that carry that item.

During the COVID-19 pandemic, an app that displays uncrowded stores on a map has attracted attention in order to avoid crowding.



Figure 10 Characteristic maps app for smartphones and tablets

(3) Map-themed publications

Paper maps are declining, but map-themed publications are in vogue. Content that focuses on the topography of the region and walking maps that follow the traces of old rivers and culverts are gaining popularity, and maps and topography are sometimes featured in general magazines.

In recent years, many books have been published that focus on cartography or explain how to create maps using GIS.



Figure 11 Map-themed publications

(4) Bird's-Eye View

Publication of traditional manually drawn bird's-eye views is decreasing, but in 2021, a bird's-eye view collection by Hatsusaburo Yoshida, a bird's-eye view painter who was active from the Taisho era to the Showa era, was published and gained popularity. In recent years, it has become possible to easily create bird's-eye views from DEM through automatic computer processing, so it is not uncommon for bird's-eye views to be sold as souvenirs at mountain resorts.

(5) Atlas

In private sectors, the mainstream products are revised editions of school atlas and their arrangement of compact atlases of B5 and A4 sizes. Road maps and urban maps formerly published in the form of single sheet are now published in a book-format and a style of city atlas by Prefecture. However, with the spread of Web maps, sales of such atlas have recently declined.

Under these circumstances, relatively strong sales have been maintained by various information maps that explain the economy, culture, and history of Japan and the world. These atlases are published annually from publishers specialized in practical articles and drawing wide interests. Also, in recent years, atlases with the theme of comparing past and present maps have appeared and are attracting attention as an attempt to make use of the assets of past atlases.

(6) Residential Map

In a residential map, the ground plan of individual housing and building can be identified and each building is provided with such information as occupants' name and name and address of the building. In addition to such information as names of the building and tenants, road traffic information such as locations and names of bus stop, traffic signals, crossings, street names and one-way traffics are also indicated. The scale of those maps is usually large as ranging from 1:1,000 to 1:5,000. The residential map covers all more than 2,800 local governments across the country. They are drawn up and sold by several private firms and usually made into a bound book edited for each city, town or village. In recent years, there has been an increase in variations, such as printing services at convenience stores and smartphone versions with a monthly fee. All basic data for those maps are solely collected by a private field survey. Data update by a field survey is usually done annually for cities where changes are frequent, and once every 2 to 5 years for the rest of areas. As the information update is done regularly, those maps are used in wide applications such as delivery service and moving industry, ambulance, police, and security service works and marketing research.



Figure 12 Residential Map and smaller scale Data by ZENRIN Co., Ltd.

(7) Imaginary Map

Imaginary maps have been attracting a lot of attention in recent years. Imaginary map is a map that depicts a fictitious town or region that does not actually exist, according to a map design that many people are familiar with. Imaginary maps are not drawn chaotically, but instead express cities that "appear to exist" by reflecting the history of the city, its development process, and the trends of society and people. In recent years, many Imaginary cartographers have appeared and are gaining popularity.



Figure 13 Popular imaginary map of "Nakamura City" by "Chirijin" Takayuki Imaizumi https://imgmap.chirijin.com/

(Hiroyuki ENDO)