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Statistical and Geospatial Information in Japan

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Day 3 Plenary Session 7
Theme 3 Topic: Towards a global statistical-geospatial framework

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National Statistics Center
Incorporated Administrative Agency

National Statistics Center, a working arm of Statistics Bureau (SBJ), is an independent administrative agency.
NSTAC employees have status of governmental official.

Outline

- Two geospatial frameworks
  - Census Mapping System Data (CMS data)
    - A framework for managing boundary data of Population Census and presenting small area statistics of the result.
    - They were developed from 1990 Census and the boundary data has been freely disseminated since 2004
  - Fundamental Geospatial Data (FGD)
    - A legal framework as the national spatial data infrastructure
    - They has been developed progressively, and became available free of charge for limited area in 2008 and for nationwide by 2012.

1. SBJ and GSI

National Statistics Office

- Statistics Bureau of Japan (SBJ), Ministry of Internal Affairs and Communications
  - Statistics Act (1947)

National Mapping Office

- Geospatial Information Authority of Japan (GSI), Ministry of Land, Infrastructure, Transport and Tourism
  - Survey Act (1949)
  - Basic Act on the Advancement of Utilizing Geospatial Information a.k.a. *National Spatial Data Infrastructure (NSDI) Act* (2007)

2. Geostatistics by SBJ

- SBJ has two Geographic Information Systems.

2.1. Census Mapping System

An administrative tool for managing Enumeration District maps of Population Census

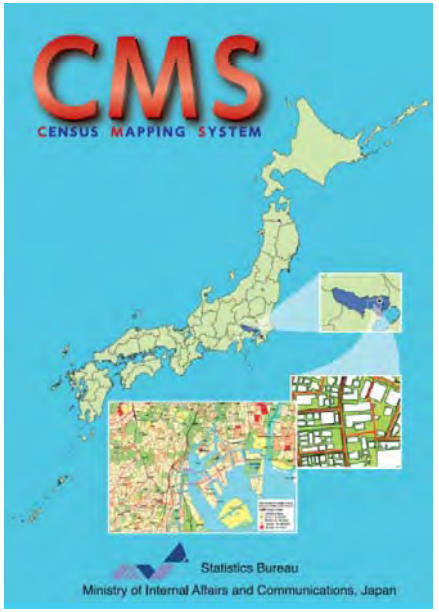
2.2. *statistics GIS*

A website for drawing thematic maps

2.1. Census Mapping System

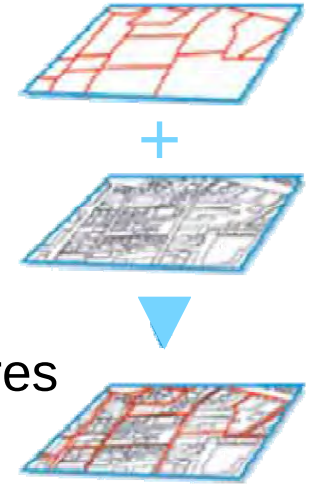
- SBJ has developed CMS
  to facilitate Enumeration District mapping
  since 1990 Population Census.

- CMS stores boundary data
  of sub regional statistical units
  in combination with statistical data.



2.1. Census Mapping System

- In Japan Population Census is conducted every five years.
- Every time before Population Census is conducted, Enumeration Districts (EDs) are demarcated.
  - SBJ gives municipalities
    the use of the boundary data of the preceding CMS data
    and commercial-based residential maps
    (as referential base maps)
  - Entrusted by SBJ,
    municipalities update the boundary data
    to produce ED maps, and submit them to SBJ.
    - Field examination of boundary data
      reflecting topographic and national terrestrial features
    - Revision of boundary data
    - Drawing up lists of corresponding codes
      for the BUBs and the newly defined EDs and ABs



2.1. Census Mapping System

- Hierarchy of boundary data stored in CMS

Type	Division	Note	# as of 2010Pop.Census
Adminis-trative unit	Prefecture *to, do, fu* and *ken*	• First tier of local government	47
	Municipality city, town and village	• Second tier of local government	1,728
Statistical unit	Address Block (AB) *Cho cho-aza tou*	• Boundary intending to simulate Community Boundary.	217,400
	Enumeration District (ED)	• Boundaries based on the number of household (around 50 for each ED to assign an enumerator to deliver and collect questionnaires). • The sampling frame for many statistical surveys.	1,010,340
	Basic Unit Block (BUB)	• Elemental (smallest) boundaries expected to be stable over time	1,885,188

2.1. Census Mapping System

- Hierarchy of boundary data stored in CMS

In urban areas, they are practically the same.

They are mostly similar, but not identical.

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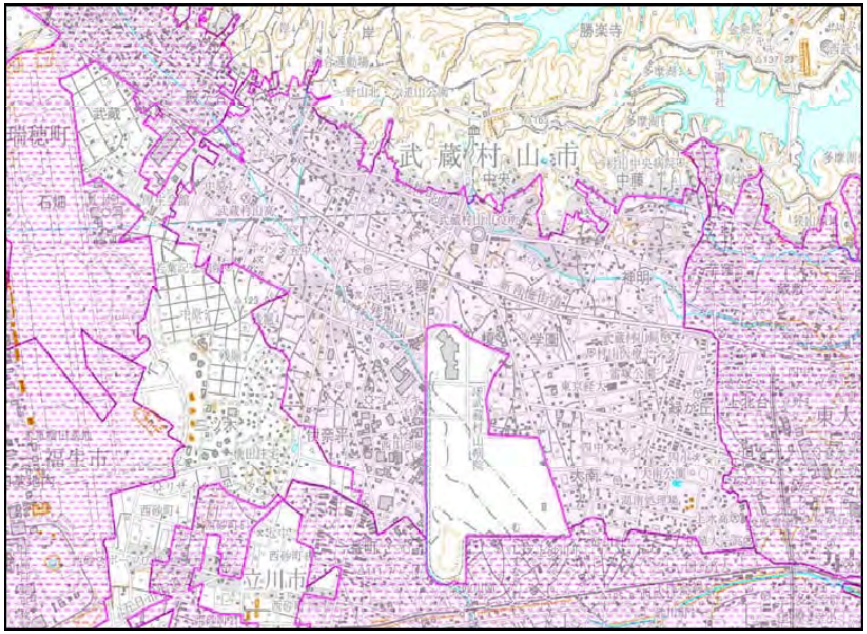
A primary statistical unit for disseminating small area statistics

Official municipalities' subdivision

2.1. Census Mapping System

- Application of CMS
  - Densely Inhabited Districts (DIDs) (1960-)
    CMS supports calculation of population density
    to determine DIDs

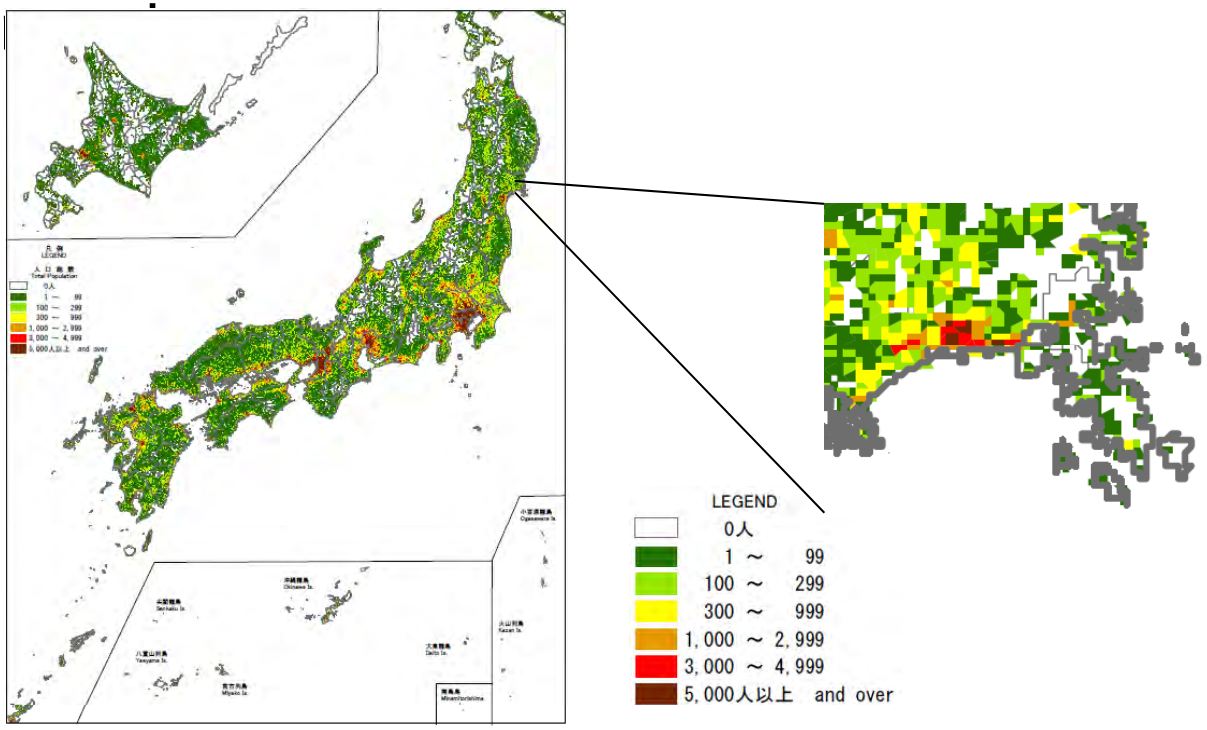


DIDs in Tokyo suburb

http://www.stat.go.jp/data/chiri/gis/index.htm！ (in Japanese language)

2.1. Census Mapping System

- Application of CMS
  - Grid Square Statistics (1970-)
    CMS supports assigning BUBs to Grid Squares for agg



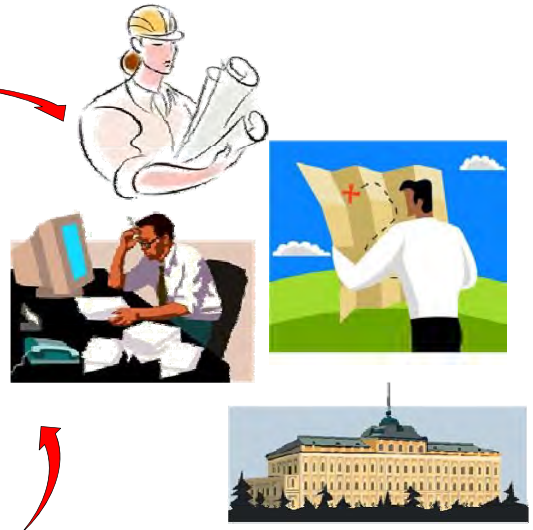
Total Population, 2010 all Japan at Basic Grid Square level
http://www.stat.go.jp/english/data/chiri/map/c_koku/2010.htm

2.1. Census Mapping System

- Application of CMS
  - Dissemination

    CMS data facilitate advanced geostatistical analysis

statistics GIS



City planning, disaster management, area marketing, etc.

(c) KOKUSAI KOGYO CO., LTD.

Solution providers in private sector

2.2. *statistics GIS*

- *statistics GIS* is an information system for drawing thematic maps as part of *“Portal Site of Official Statistics in Japan” (e-Stat)*.

  - In 2004 SBJ open a website for disseminating statistical data of Population Census along with boundary data of Address Block and Grid Square for free.
  - In 2008, SBJ with the collaboration of other statistical departments launched *e-Stat* to provide statistical data across all ministries free of charge.
    The above website was merged into *e-Stat* , titled *statistics GIS*

2.2. *statistics GIS*

- A snap shot of ***statistics GIS*** (www.e-stat.go.jp)
  - A choropleth map of population by **Address Block** (Population Census 2010)

statistics GIS is in Japanese language only.
e-Stat, developed by SBJ with the collaboration of Ministries and Agencies, is managed by National Statistics Center (NSTAC)

3. Fundamental Geospatial Data

- National Spatial Data Infrastructure Act
  - Enacted in 2007, the NSDI Act is to provide an overarching legal framework on how geospatial information should be developed, distributed and used in the nation.
- Fundamental Geospatial Data
  - The Act defines FGD as the NSDI.
  - FGD is compliant with *Japan Profile for Geographic Information Standards* (JPGIS).
    - JPGIS is defined in accordance with ISO 19100 series standards.

www.gsi.go.jp/kiban (in Japanese)

3. Fundamental Geospatial Data

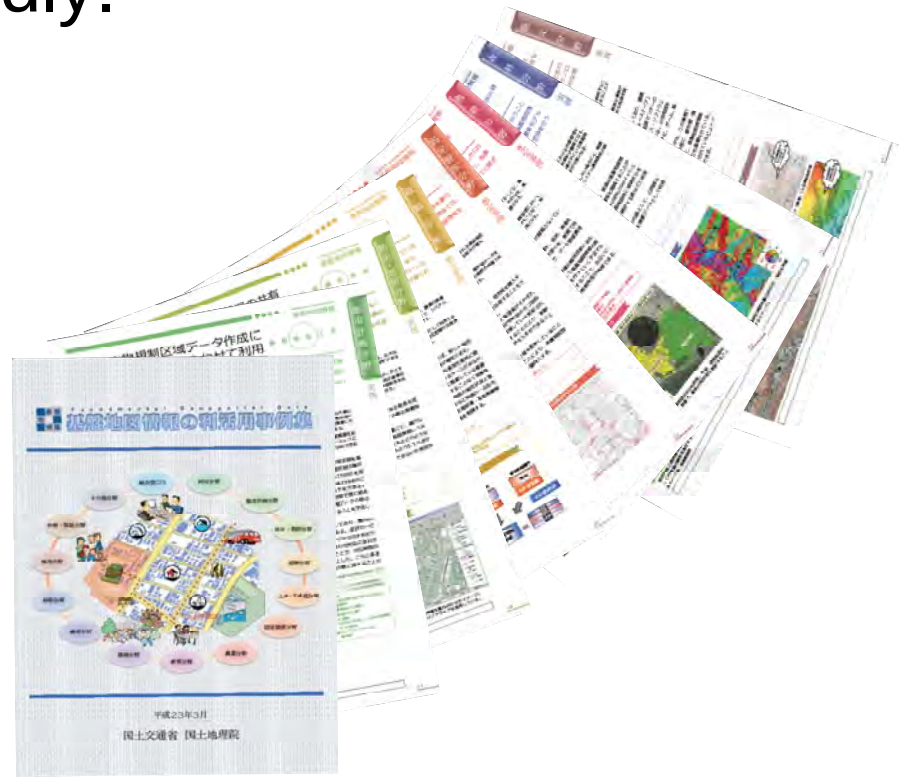
- FGD are freely downloadable from the GSI website.
  - In fiscal 2008,
    FGD of 1:25,000 in scale
    for the entire country
    were released.
  - At the end of fiscal 2011,
    highly precise 1:2,500 FGD
    covering nearly all of Japan's urban planning zones were released.

    Japanese fiscal year starts from April to March next year
  - Today, FGD are revised progressively, and revised data are released every quarter.

Areas designated
for urban planning

3. Fundamental Geospatial Data

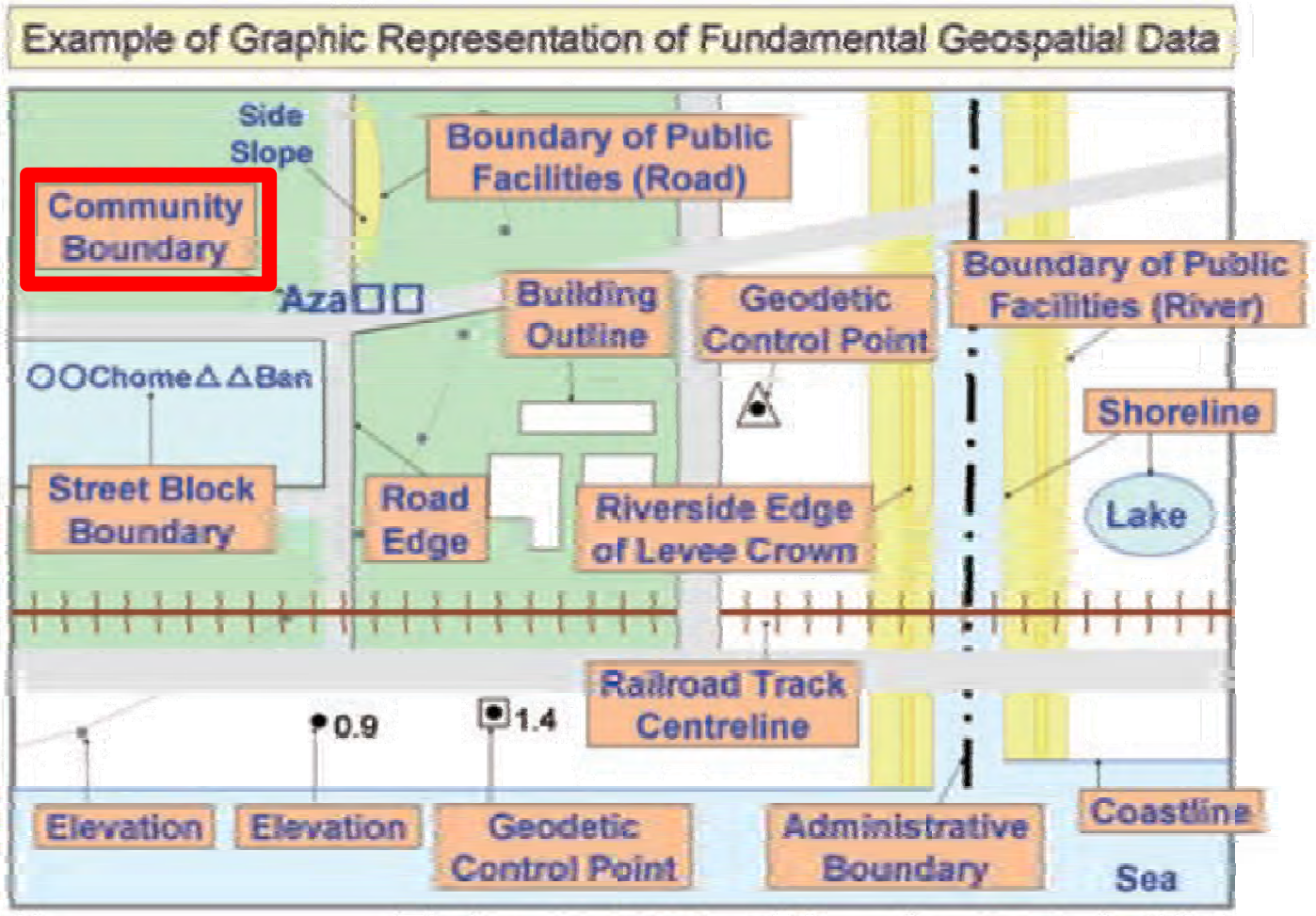
- FGD are utilized broadly.
  - Urban planning
  - Disaster prevention
  - Road management
  - Real estate taxation
  - Agriculture
  - Forestry
  - Tourism …



Showcase booklet of FGD applications
http://www.gsi.go.jp/kiban/fgdindex.html (in Japanese)

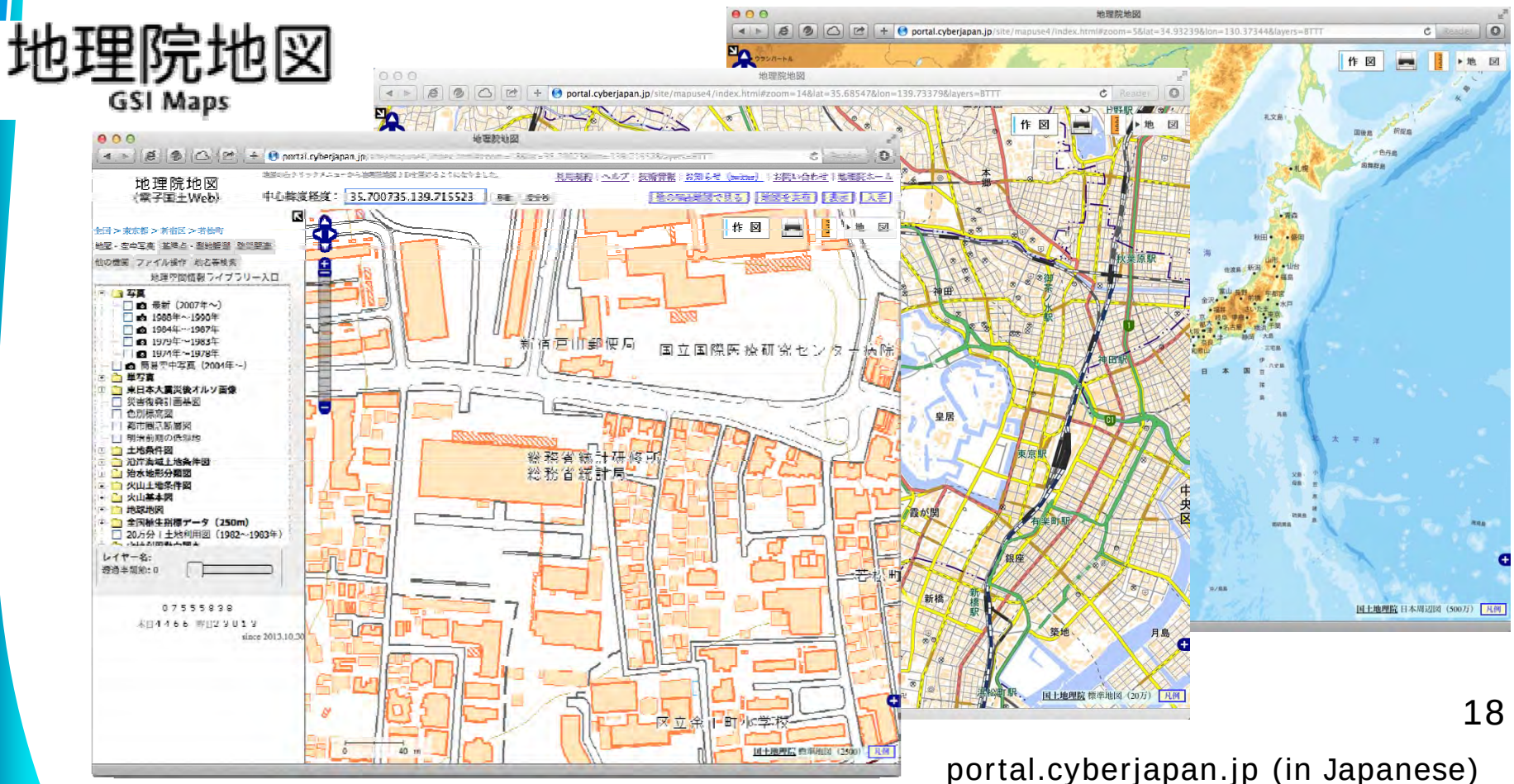
3. Fundamental Geospatial Data

- FGD consists of 13 components



4. Fundamental Geospatial Data

- FGD supplemented with additional data (vegetation, cliffs, structures, etc.) can be seen on the web as ***GSI Maps***.



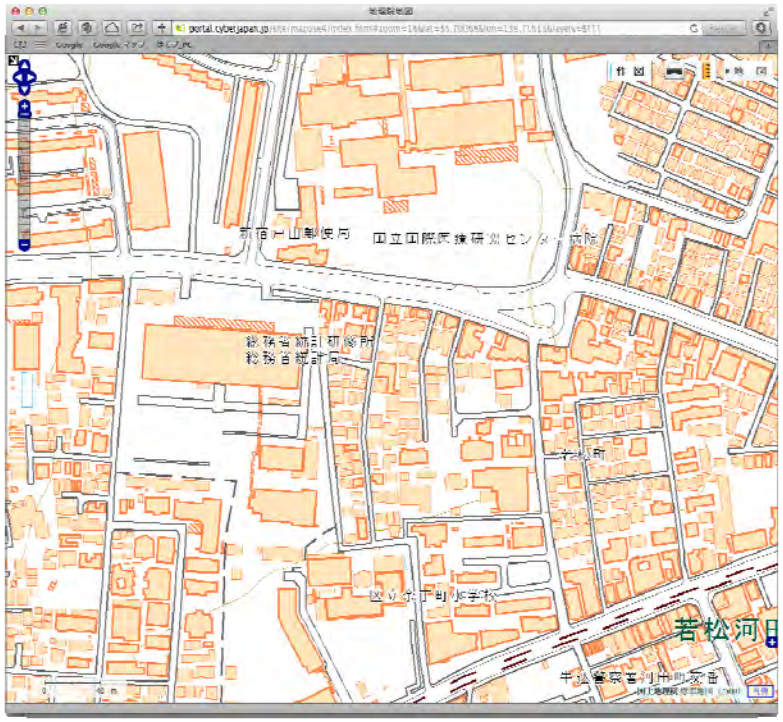
portal.cyberjapan.jp (in Japanese)

4. Commercial maps

- Aside from maps produced by GSI, commercial maps with rich neighboring information has been evolved in Japan.

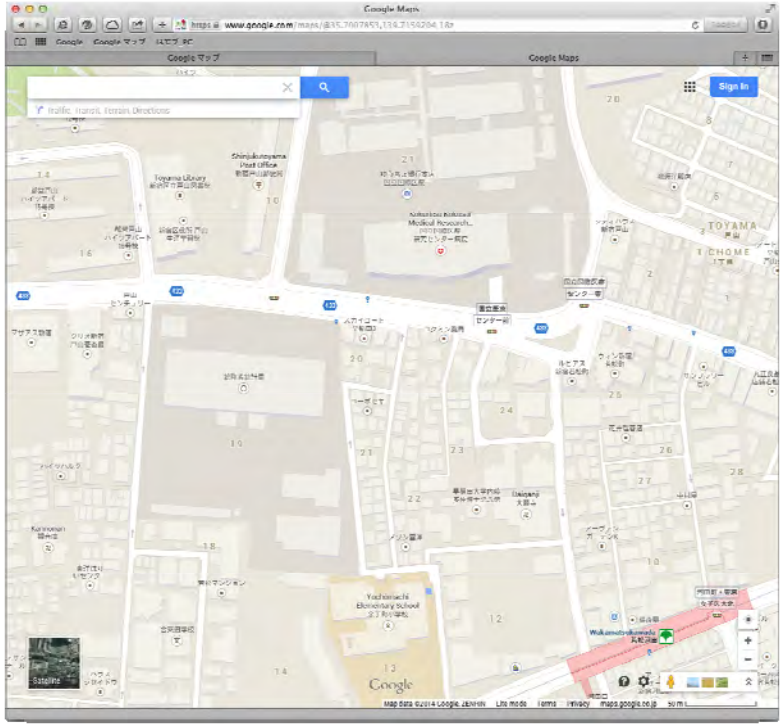
GSI Maps

(c) GSI



Google Map

(c) Google, (c) ZENRIN



4. Commercial maps

- In particular, commercial residential maps are widely used.
  Many administrative institutions,
  even police stations and fire departments, rely on them.

GSI Maps

(c) GSI

Commercial Residential Maps (priced) (c) ZENRIN

Covering 99% municipalities in Japan, the residential maps feature the names of each building and residence as well as names of streets and crossings.

4. Commercial maps

- Commercial maps are
  very popular for their rich neighboring information,
  though, their digital maps are ***not*** necessarily
  guaranteed to be compliant with FGD, yet.
  - Commercial maps are produced in general
    based on maps of GSI
    with additional information from maps of municipalities
    (urban planning maps, road management maps, etc.)
    as well as information collected by field surveyors.
- In effect, many map users utilize
  maps of GSI and commercial maps all together,
  with little problem for most cases.

4. Commercial maps

- A hazard map, *Landslide Disaster Portal Hiroshima*, is viewable over five different interchangeable base maps.
  - Vulnerable zones are overlaid with maps :from GSI maps, municipalities' original maps (urban planning maps, etc.) to commercial maps.

(c) OpenStreetMap (c) GSI (c) Microsoft, (c) ZENRIN

5. CMS data and FGD

- The boundary data of Population Census have been demarcated by municipalities for a long time. CMS data launched in 1990 don't have direct relation with FGD.
- While FGD of highly precise level has been made available since March 2012, the boundary data of CMS data for the forthcoming 2015 Population Census will be revised by municipalities with reference to commercial residential maps. Therefore, the 2015 CMS data are not guaranteed to be compliant with FGD.

5. CMS data and FGD

- Possibility shall be pursued to make use of FGD for maintaining the boundary data of CMS data.
  - Obstacles: differences between the two frameworks such as
    - Concepts
      It is not easy to converge Address Blocks with Community Boundaries, some of which are not necessarily compatible/rational enough for statistical purpose.
    - Frequencies of revision
      CMS data are updated for whole Japan all at once every 5 years while FGD are revised progressive
- Be that as it may, CMS data somewhat align to FGD for practical use, in particular in urban areas.

5. CMS data and FGD

- CMS boundary (red) laid over FGD (green)

(c) SBJ, (c) GSI, (c) ESRI

Thank you for your attention!

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  ゼンリン許諾番号：Z14LC第123号、Z14LD第1085号

- Reference
  - New Legislation on NSDI in Japan: “Basic Act on the Advancement of Utilizing Geospatial Information” (Hiroshi MURAKAMI, Bulletin of the GSI (Vol.55), 2008)
  - "Geographic Boundaries of Population Census of Japan" (Naoki MAKITA, UN Statistical Geospatial Expert Group Meeting, 2013)
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