Towards the Development of NGIS

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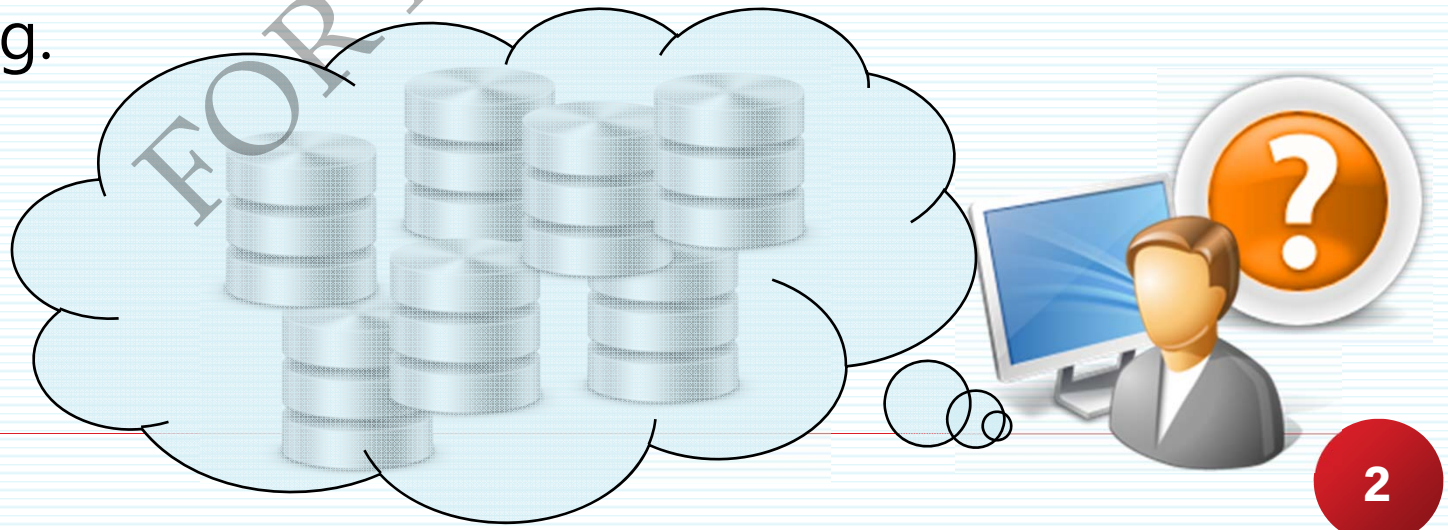
Background

- The development of geospatial technology in the past 3 decades has been a huge success.
- Bring tremendous improvements to the operations of governments, industries, research institutions, private sectors and even individual citizens.
- The development of a Nation-level Geographic Information System (GIS) requires an innovated thinking.



Technology development

Desktop GIS

- Collect & maintain data.
- Develop applications.
- Professional knowledge is necessary.

Web GIS

- Remote data storage.
- More applications.
- Lower technical requirement.
- Easier data distribution.

Service & Cloud

- Service-based applications.
- Flexible applications.
- Data and service in the cloud!
- A new way of thinking.

Requirement

- Various domains of data in needs.
- Continuously data updates.
- Cost reduction.
- Easy availability and accessibility of data.
- Data quality evaluation.
- Correct data use.
- Powerful and efficient applications.

Challenges

- Heterogeneous data
- Government organization
- Duplicated data production
- No sharing strategies
- Reliable
- Integration knowledge
- Cost/spending
- Business market
- Software support

Government actions?

Spatial Data Infrastructure

- SDI provides an ultimate solution to the development of a nation-level GIS:
  - "...relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data"

    ~GSDI cookbook
  - "… an umbrella of policies, standards, and procedures under which organizations and technologies interact to foster more efficient use, management, and production of geospatial data."

    ~The 1994 Plan for the NSDI.
- SDI is the key to the development of a nation-level GIS.

What is NGIS ?

- National Geographic Information System
  - A nation-level GIS project.
  - Government organizations of selected domain tasks are included and given specific responsibility.
  - Serves as a comprehensive repository of the geospatial data.
  - Facilitates information sharing and increases domains of applications.
  - Establishes a coherent relationship between governments and public organizations.
  - Some standardization works are necessary.
  - Avoids unnecessary data duplicates.
  - Improves application decision making.

NGIS plan

Conception(1986-1987)

- 1986: The National Development Council suggested to build NGIS

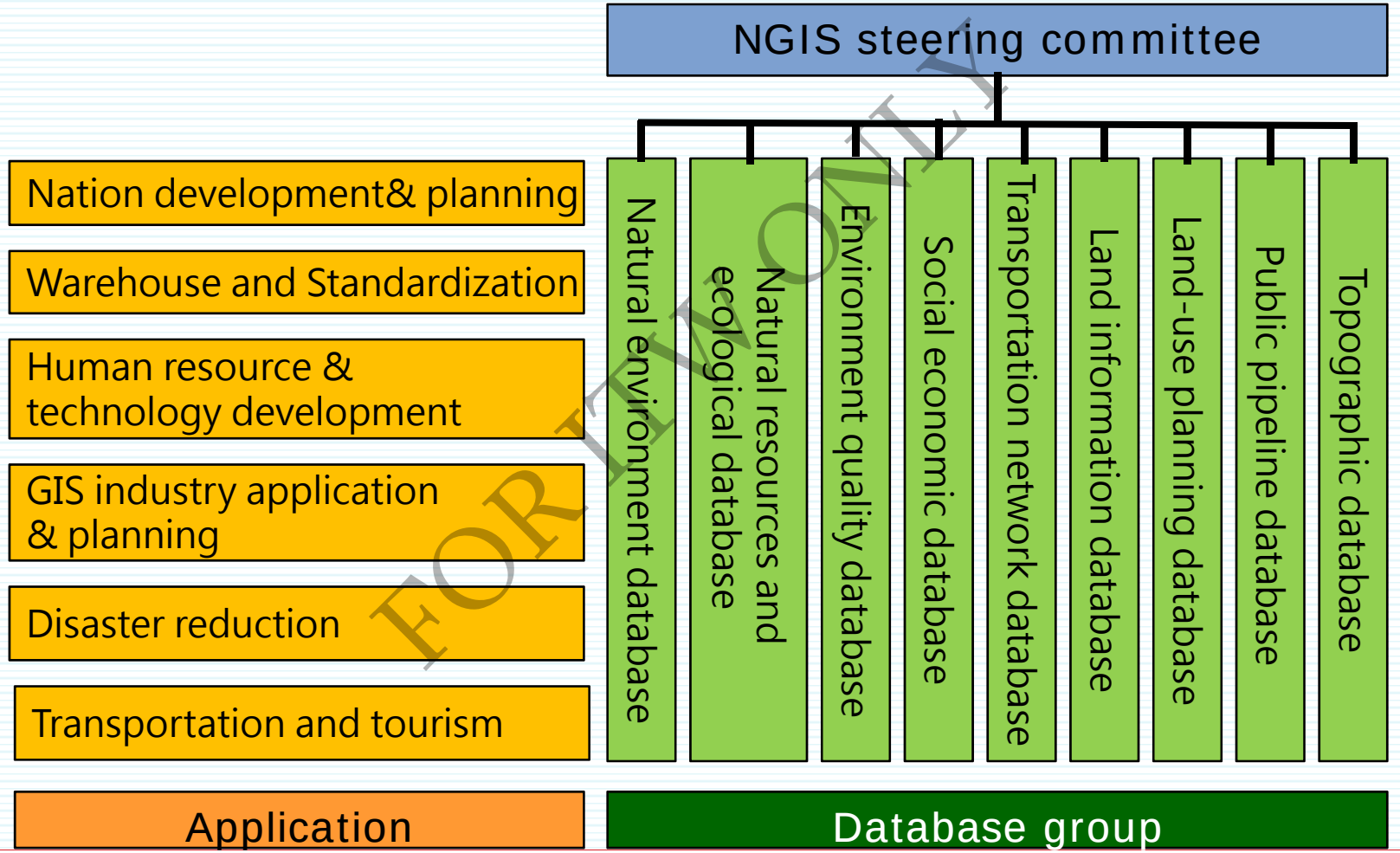
Growth(1987-1997)

- 1989: The Executive Yuan approved the Master Plan of NGIS.
- 1991: The formation of NGIS Steering Committee and the 9 spatial digital databases.

Execution(1998-)

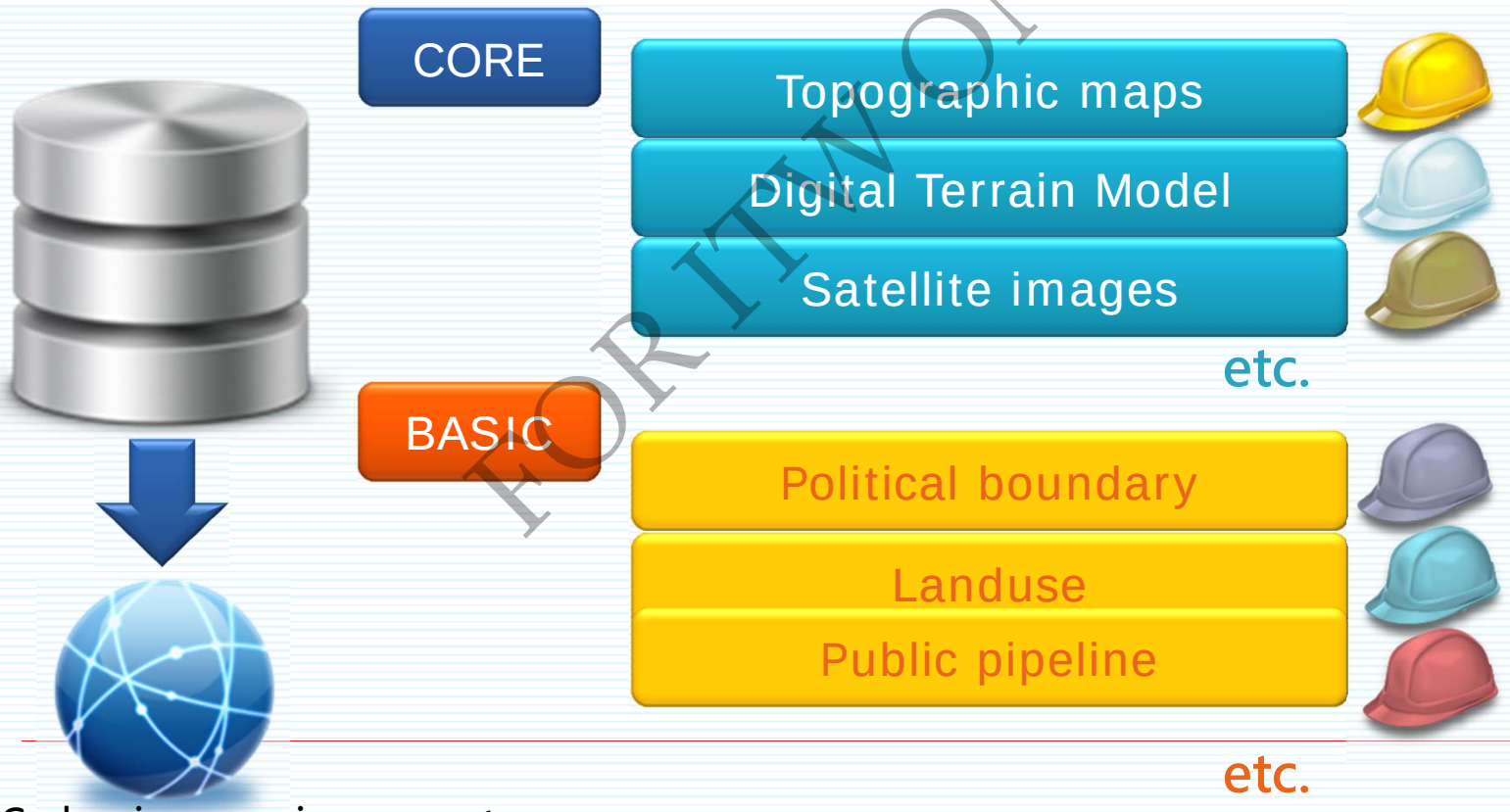
- 1998: Executed 6-year project of "NGIS Spatial Data Infrastructure Plan"
- 2004: Executed 4-year project of "NGIS Plan (2nd Phase of Infrastructure)
- 2006: Adjusted the structure of NGIS and elevated to the Council for Economic Planning and Development of Executive Yuan"
- 2007: The Executive Yuan approved the 10-year development project of NGIS

NGIS – architecture



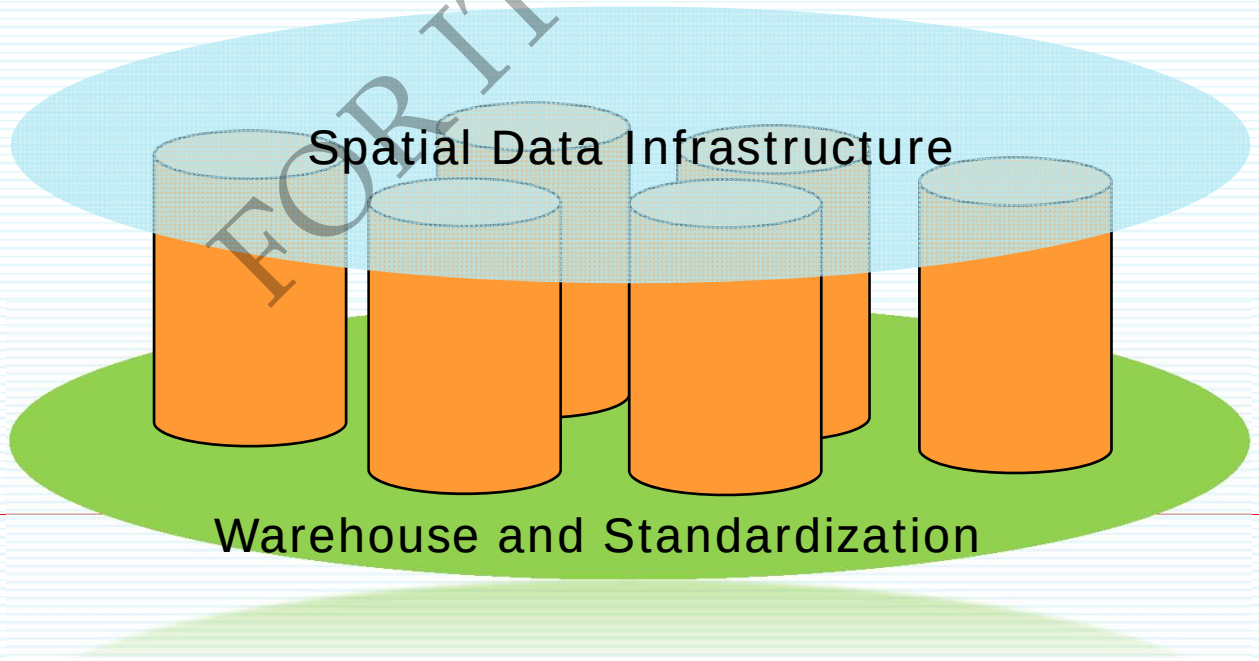
NGIS Datasets

- In the current 10-year project, the establishment of nation-wide core and basic digital database would be completed.



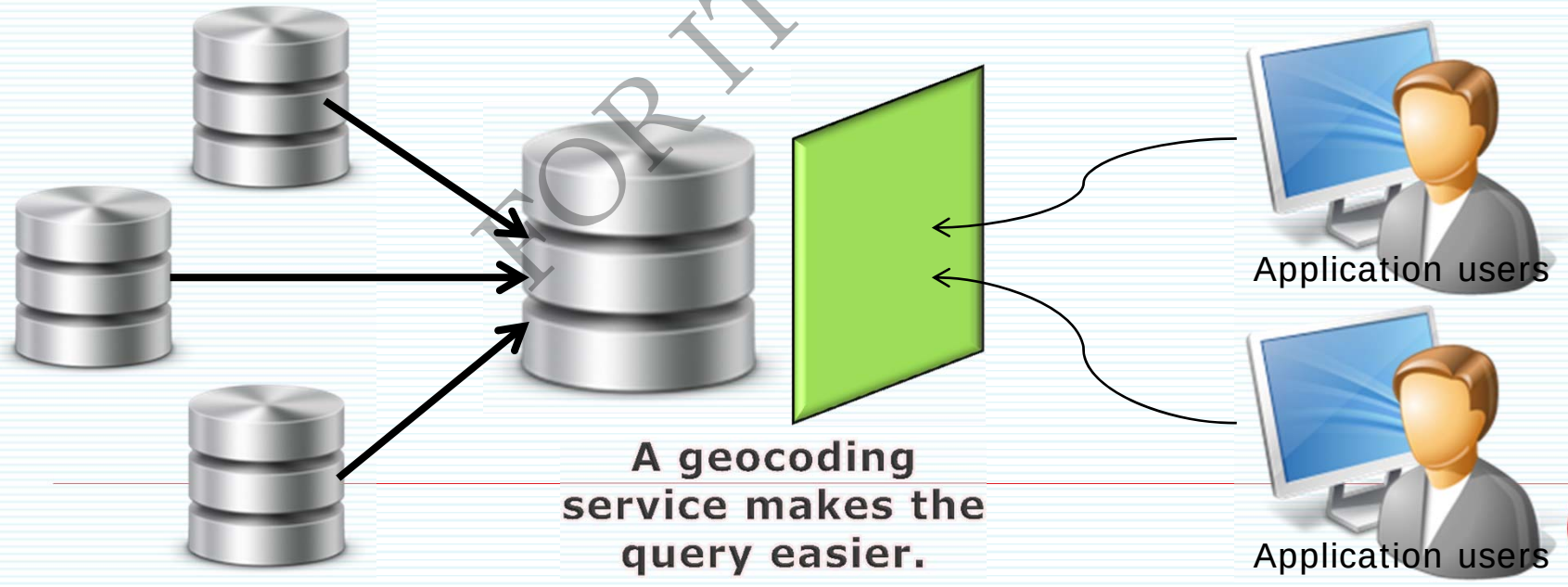
NGIS development

- Each database and application group is responsible for the creation and maintain of its domain data and applications.
- The warehouse and standardization group is responsible for developing common foundation of sharing and standardization.



Geocoding service

- *Searcy by street address* is an essential function to many GISs.
  - Requires the digital coordinates of each street address.
  - Must be continuously updated.
  - Separately maintained by regional governments.



Geocoding service example

全國門牌地址定位服務 整合式比對服務測試網頁

來源IP： 140.116.47.61　　本日已使用： 次　　本日可用尚餘： 次

◆ 查詢條件	
API KEY	
縣市	臺北市
門牌	南門市場
坐標系統	EPSG:4326　(WGS84)　國際通用
模糊比對程度	2,2,2,2 ?
路、街是否視為相同	否
號之、之號是否視為相同	否

查詢

Common version electronic map

- A 5-year project completed by the National Land Surveying and Mapping Center.
- GIS ready-to-use maps for topographic phenomena.
- Project objectives:
  - To support the infrastructure of NGIS
  - To accelerate the building of base maps
  - To facilitate the circulation of GIS data
  - To reduce the cost of value-added applications
  - To prevent the duplication of public and private sectors
  - To meet most needs of public

Portal for distributing map data

Georesource sharing

- Georesource sharing is a necessary step for implementing a nation-level GIS.
  - Reduce duplicates and spending.
  - Professional consideration.
- Georesource
  - Data
  - Service (application)

Interoperability

- Information systems
  - To find and get information, when they are needed, independent of physical location.
  - To understand the discovered information, no matter what platform supports them, whether local or remote.
- Geospatial domain
  - the ability of information systems to 1) freely exchange all kinds of spatial information about the Earth and about the objects and phenomena on, above, and below the Earth' s surface; and 2) co-operatively, over networks, run software capable of manipulating such information.

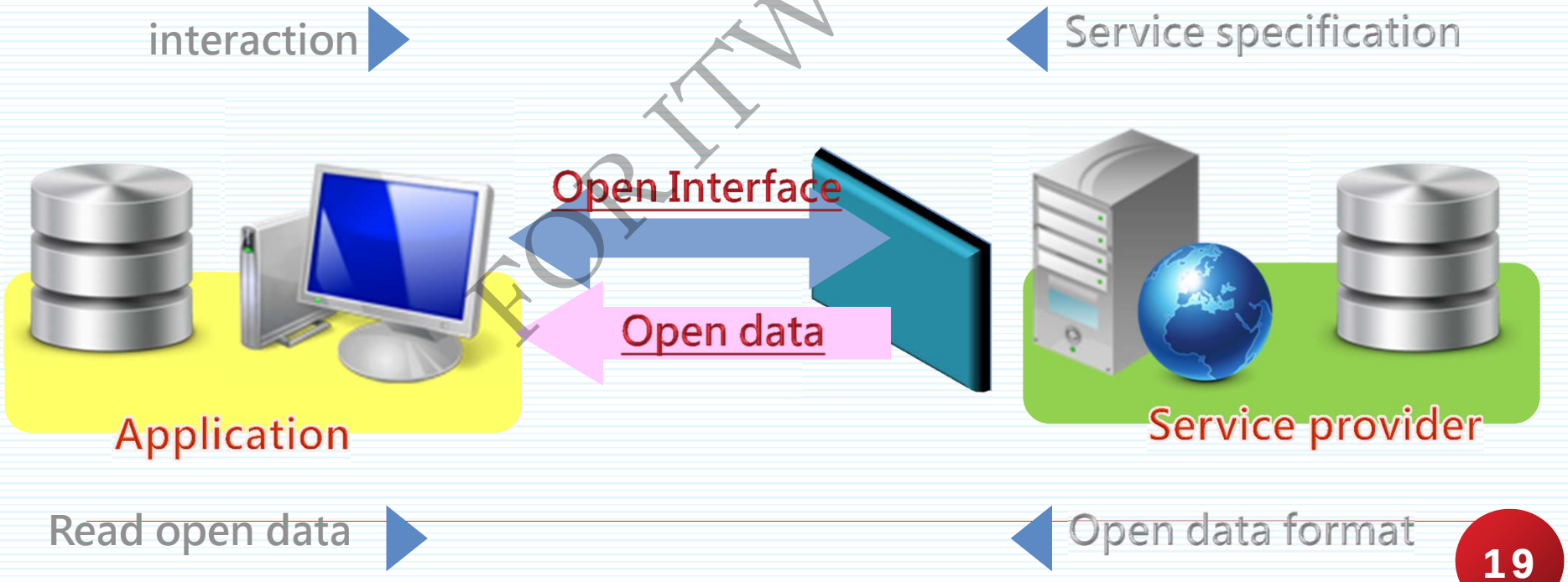
Why standards?

Common technical standards

Standards are **documented agreements** containing **technical specifications or other precise criteria** to be used consistently as **rules, guidelines, or definitions of characteristics**, to ensure that materials, products, processes and services are fit for their purpose.

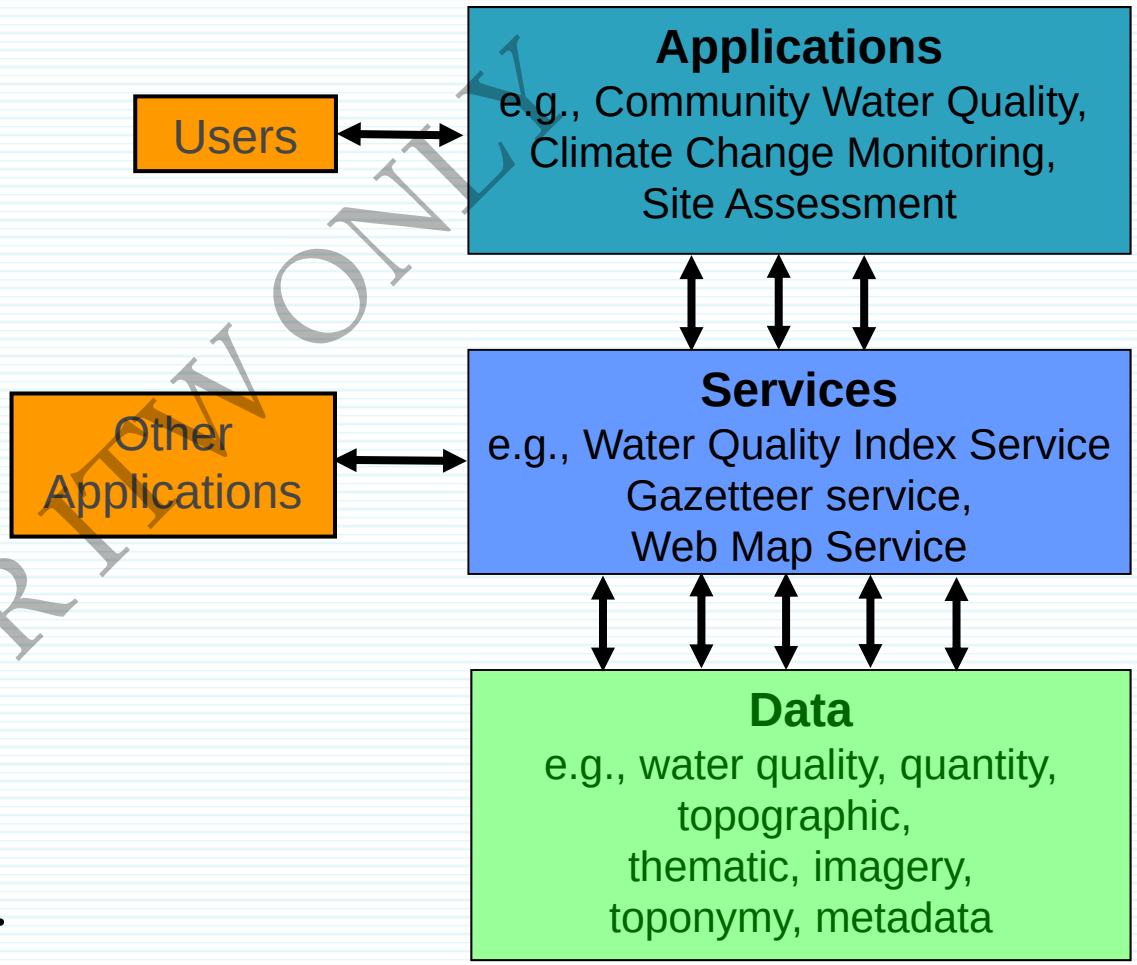
OpenGIS

- Use "Open" technology to facilitate the distribution of geospatial data.
  - Open data format, e.g., GML
  - Open web service, e.g., WMS, WFS.



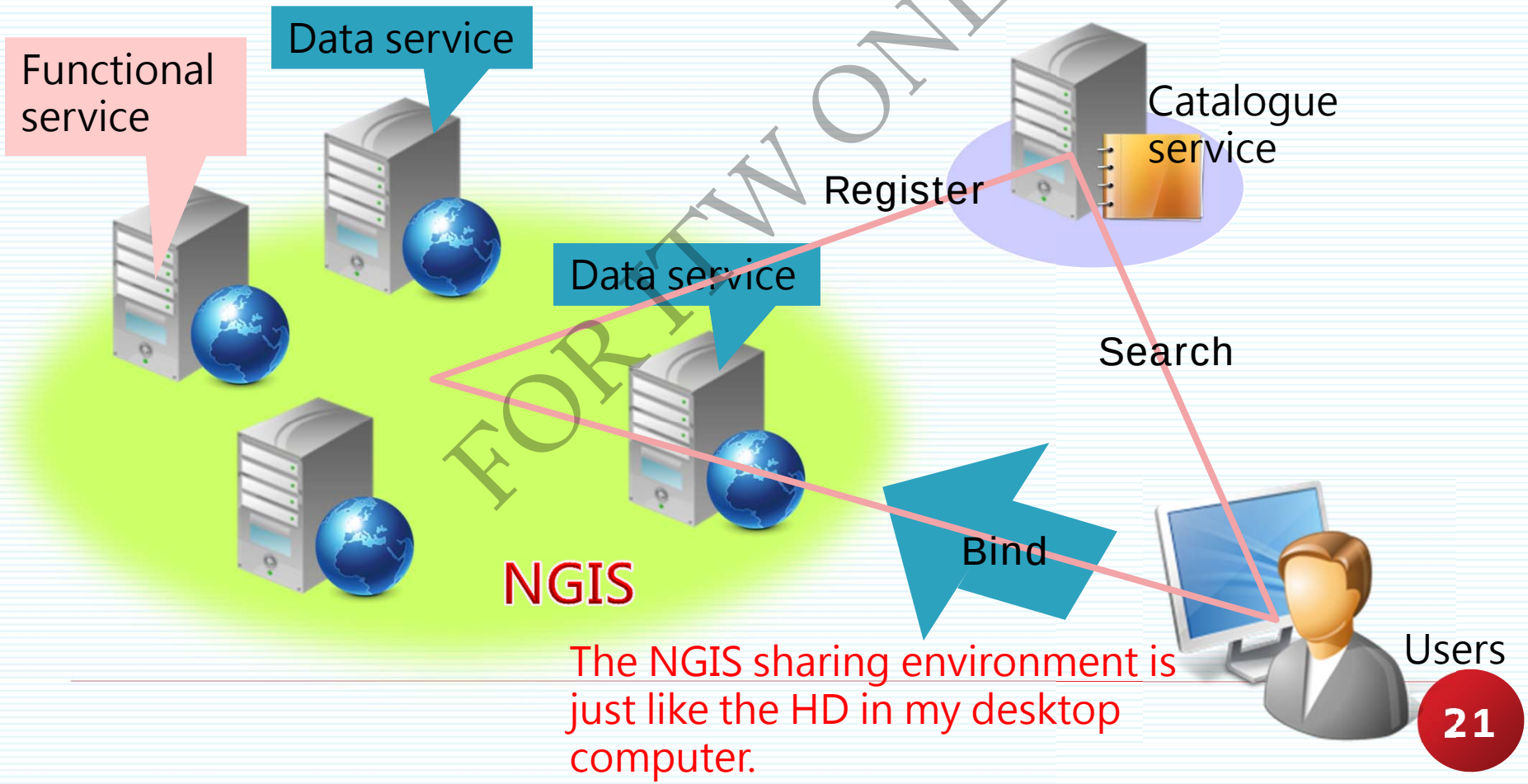
The SOA approach

- Organization
  - Produce & maintain data.
  - Design service.
  - Create applications.
  - Share data via service.
- Can use other organizations' service for their own applications.



Future working environment

Everyone is a service provider, and everyone is a user, too.



The NGIS sharing environment is just like the HD in my desktop computer.

The development of NGIS Standards

- The NGIS standardization framework was established in 2004.
  - Based on the ISO/TC211 and OGC standards.
  - Common standardized strategies and regulations.
  - Promotion of domain data (content) standards.
  - Determine the priority according to the importance of data.
  - OpenGIS distribution process (WMS/GML/WFS).
- Accomplishment
  - 20 data standards so far.
  - Metadata standards (version 2)
  - Various regulations, specification and reference documents.

OpenGIS data sharing environment

- To resolve the heterogeneous obstacles, OpenGIS technology is used.
  - Data is encoded in open format (e.g., GML) according to the data standard.
  - Using GML-aware software to read and use data.

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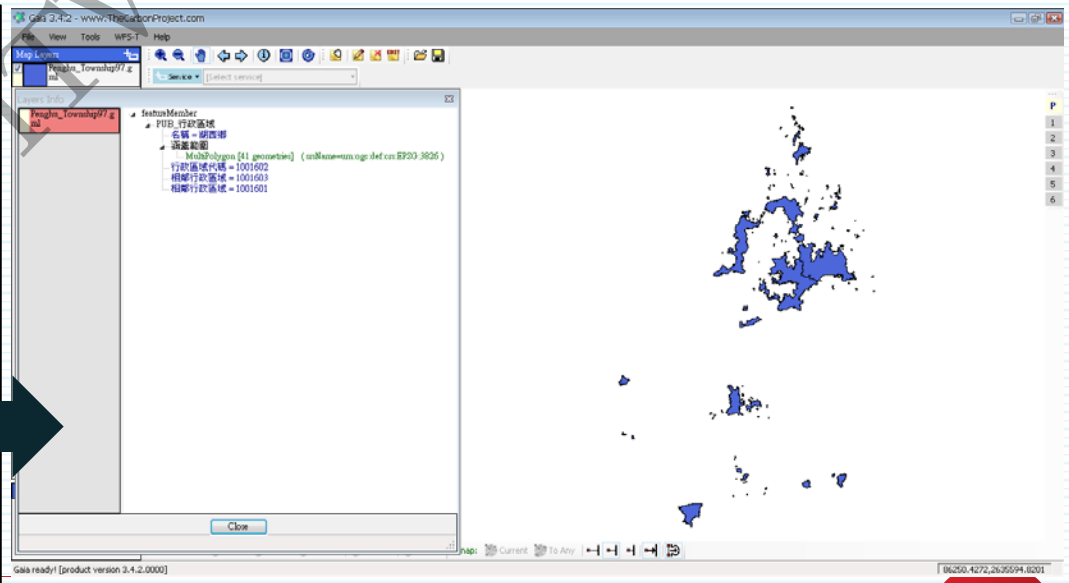


Data distribution scenario

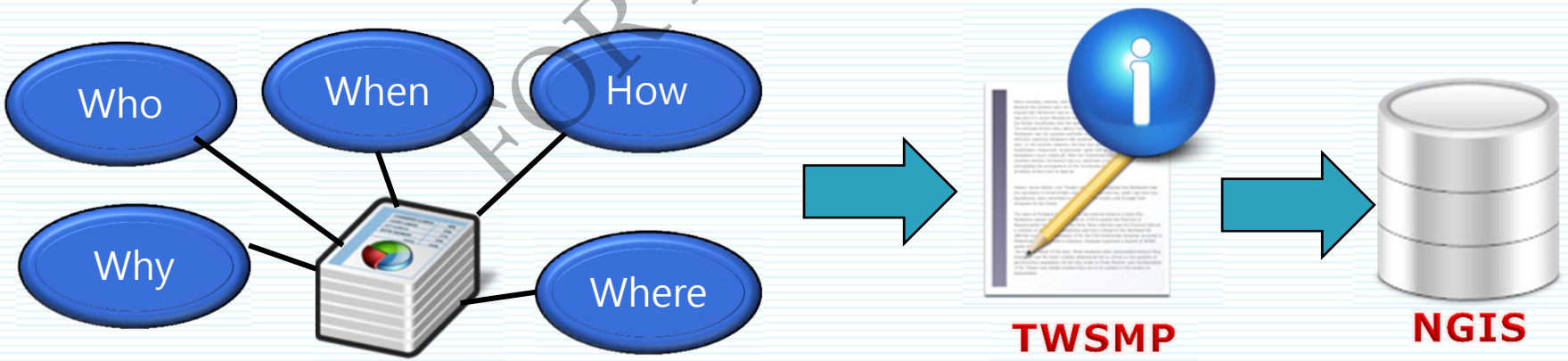
Downloadable data standard documents.

Original GIS data transformed into open GML data according to standards

Software that supports the reading of GML data

Metadata

- Spatial metadata encapsulates knowledge "about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data. "
- A metadata profile of ISO19115 standard, TWSMP, was established as the common foundation for spatial metadata in Taiwan.



Every organization is responsible for the data it produces.

Taiwan Geospatial One Stop

- Serve as a single entry for all the georesource in Taiwan.
- All produced data, services or apps are required to register to TGOS.

http://tgos.nat.gov.tw/tgos/Web/TGOS_Home.aspx

Geocoding with street address

首頁 > 地址查詢

地址查詢

新北市新店區北新路三段 200 號 9 樓

找地址

本次搜尋結果：1 筆

地址

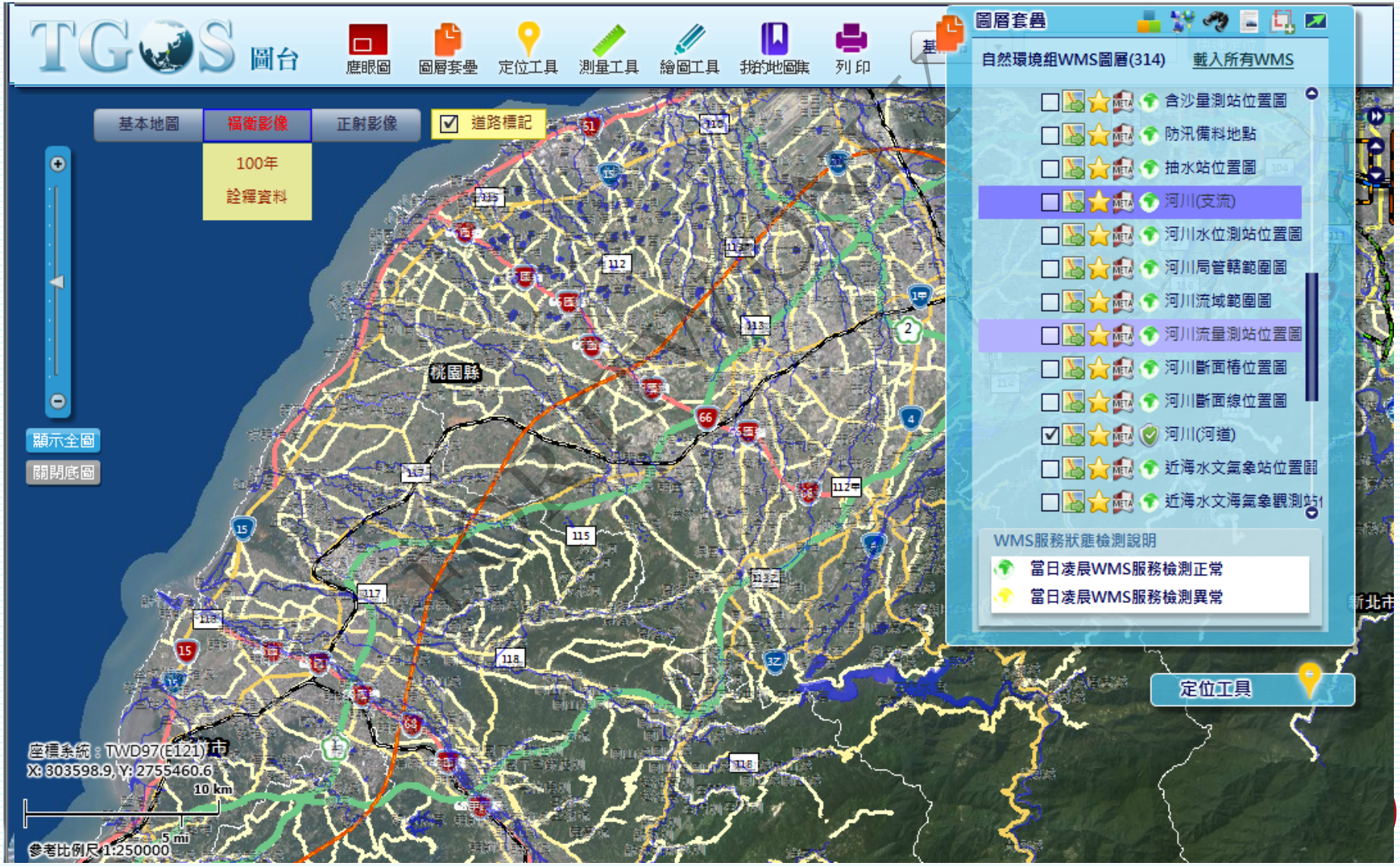
新北市新店區寶安里

Data discovery and metadata

Search result

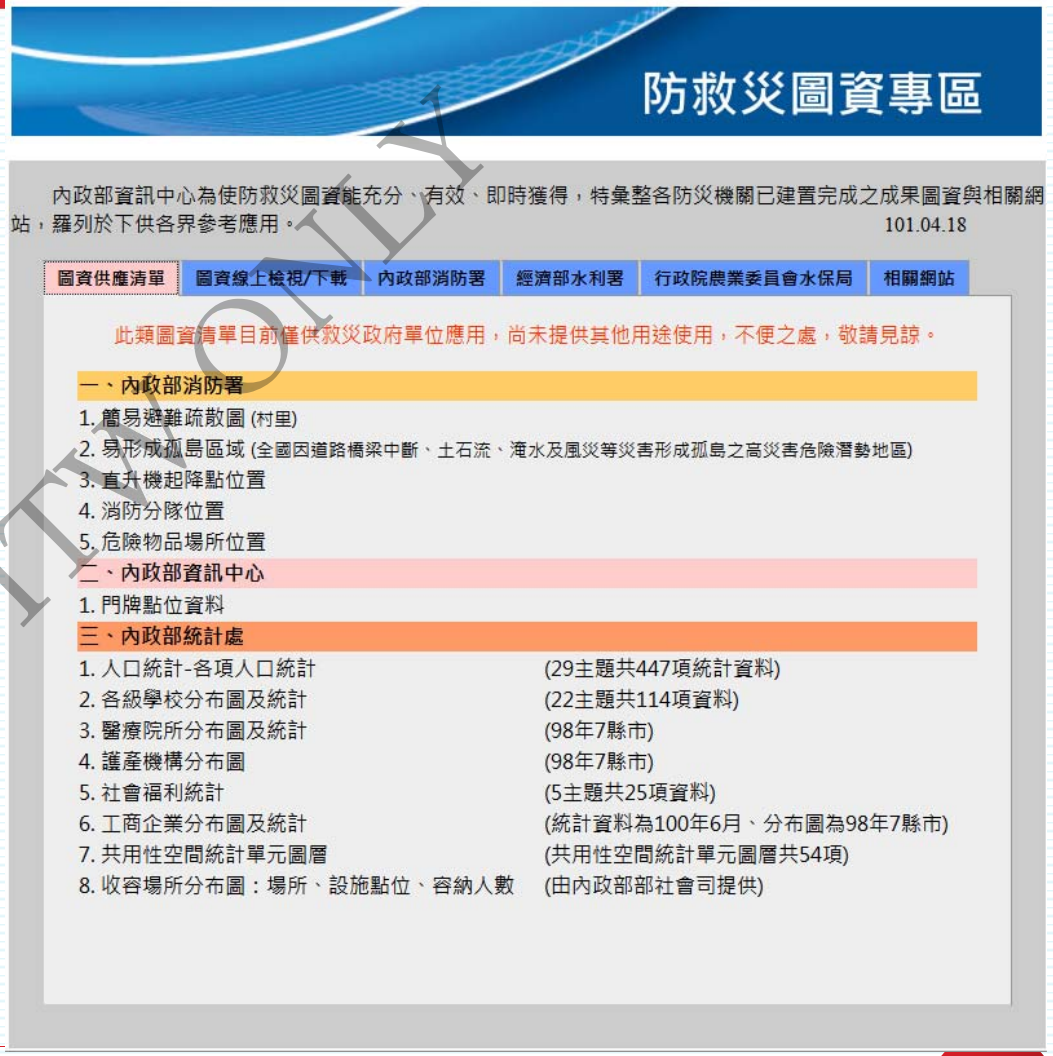
Metadata

TGOS Application platform



Hazard reduction related data

- TGOS
  - Fundamental information for hazard related applications.
  - Collected from various government organizations.
  - Open to authorized organizations.



Cloud computing

- As more and more data and services were established, the effective and efficient management and applications become a huge problem.
- Cloud computing technology will be introduced in the coming years:
  - Implementation of SOA for NGIS.
  - Cloud-based data storage and distribution.
  - Better, quicker and flexible response to application needs.
  - A new research and application paradigm for public and private participants of NGIS.

Conclusion

- NGIS in Taiwan has been successfully running for more than 20 years.
- A huge volume of data from various domains have been created following a collaborative design of framework.
- More and more Web-based applications were created in recent years.
- TGOS servers as the entry point for finding and use available georesource in NGIS.
- Standardization has improved the interoperability of geospatial data and made the integration much easier.