

Towards the Development of NGIS

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Associate Professor

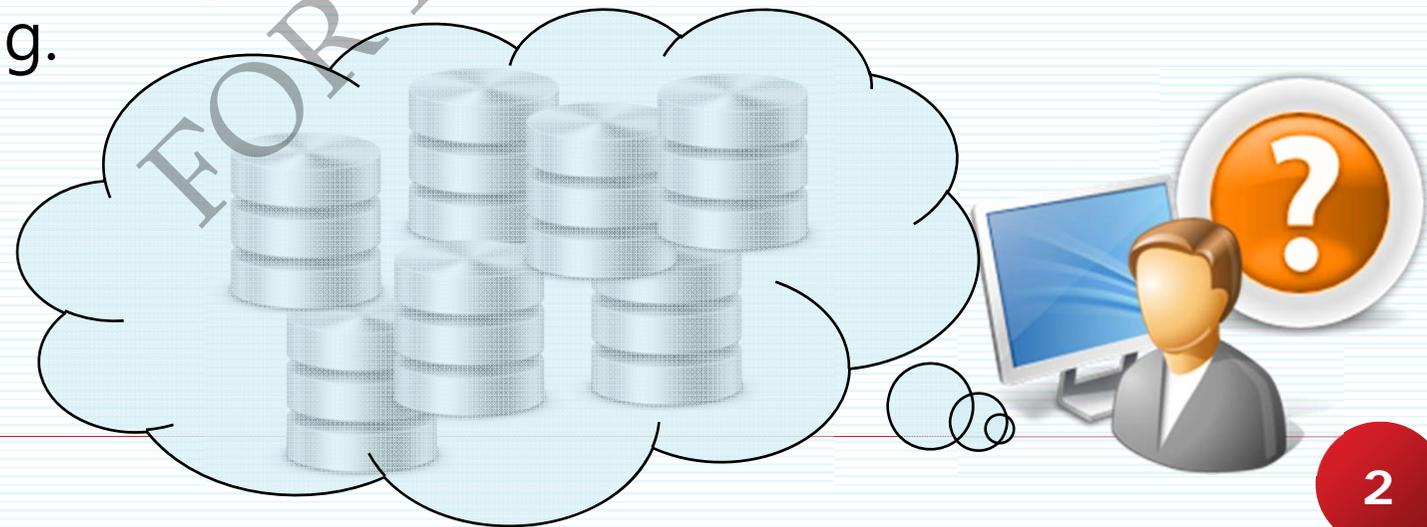
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Background

- ❑ 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.

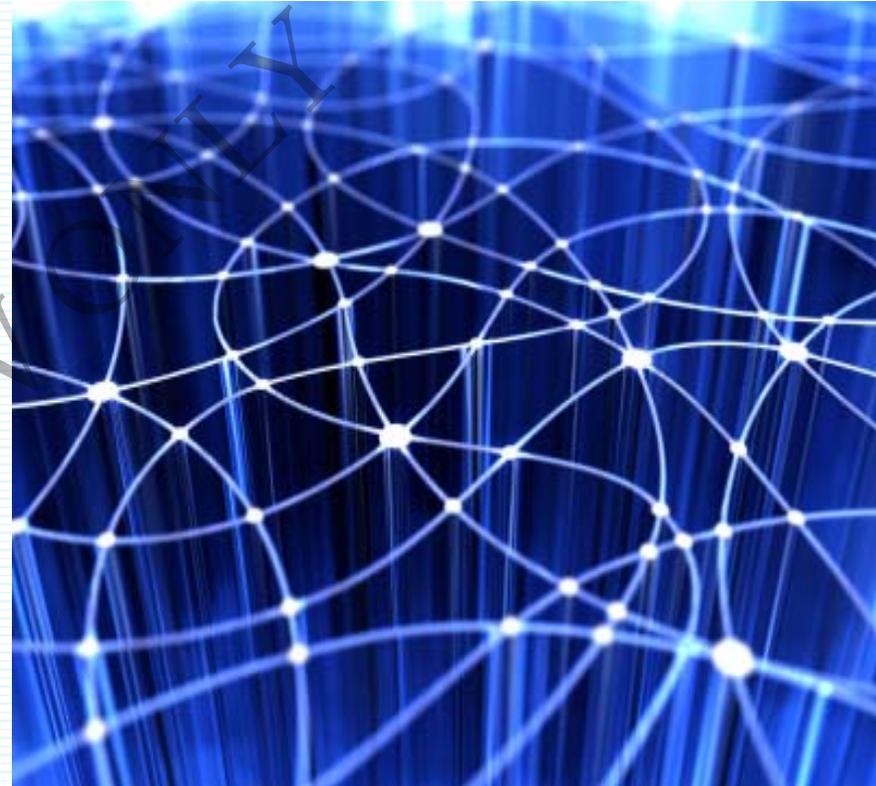


Service & Cloud

- 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)

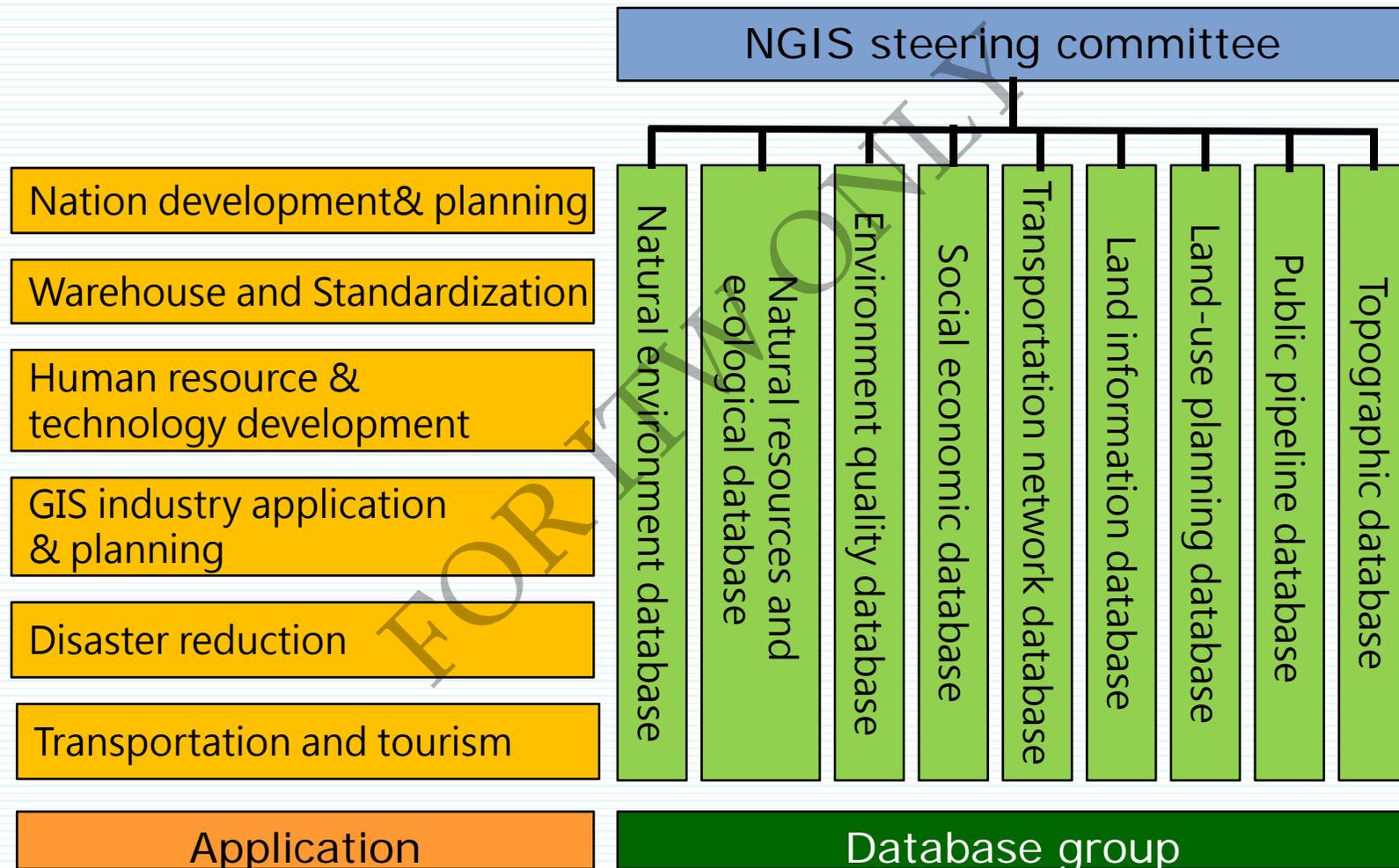
- 1989: The Executive Yuan approved the Master Plan of NGIS.
- 1991: The formation of NGIS Steering Committee and the 9 spatial digital databases.



Execution(1998-)

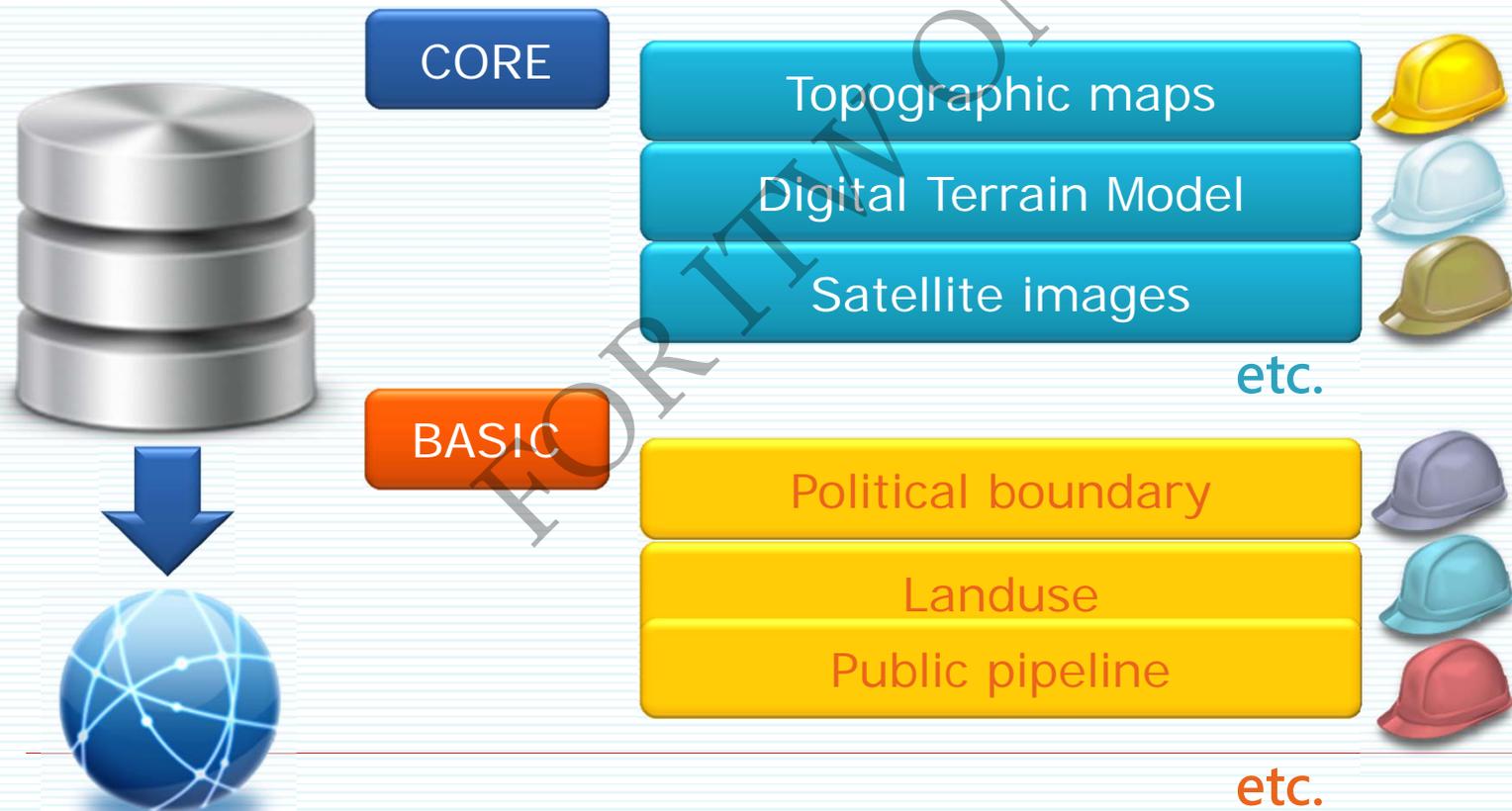
- 1998: Executed 6-year project of "NGIS Spatial Data Infrastructure Plan"
- 2004: Executed 4-year project of "NGIS Plan (2nd Phase of Infrastructure)"
- 2006: Adjusted the structure of NGIS and elevated to the Council for Economic Planning and Development of Executive Yuan"
- 2007: The Executive Yuan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

NGIS – architecture



NGIS Datasets

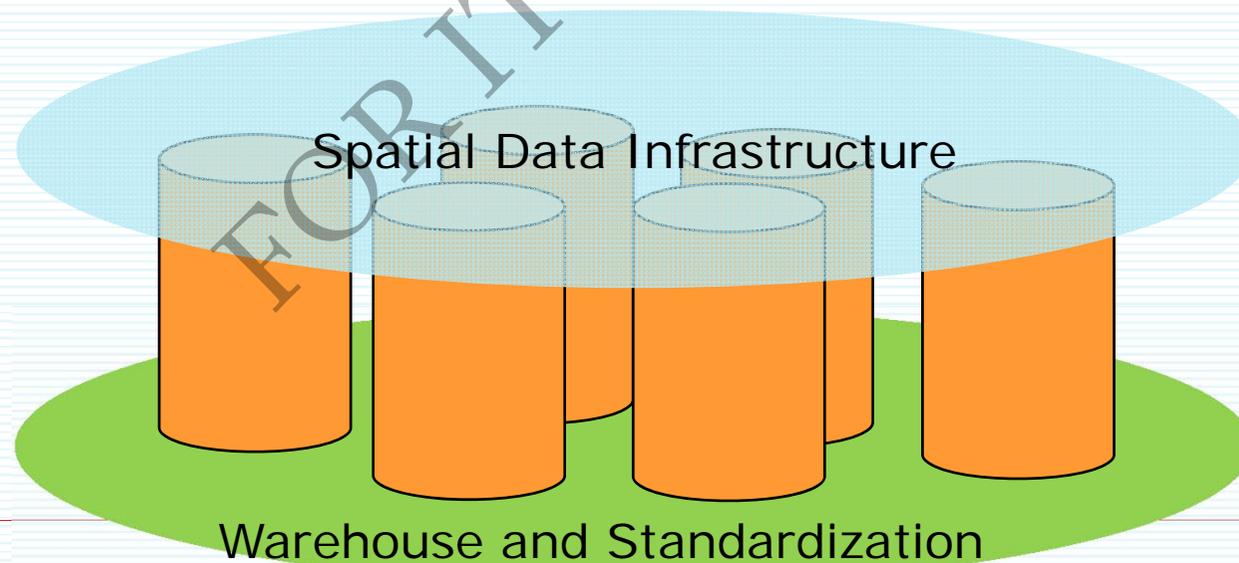
- ❑ In the current 10-year project, the establishment of nation-wide **core** and **basic** digital database would be completed.



NGIS sharing environment

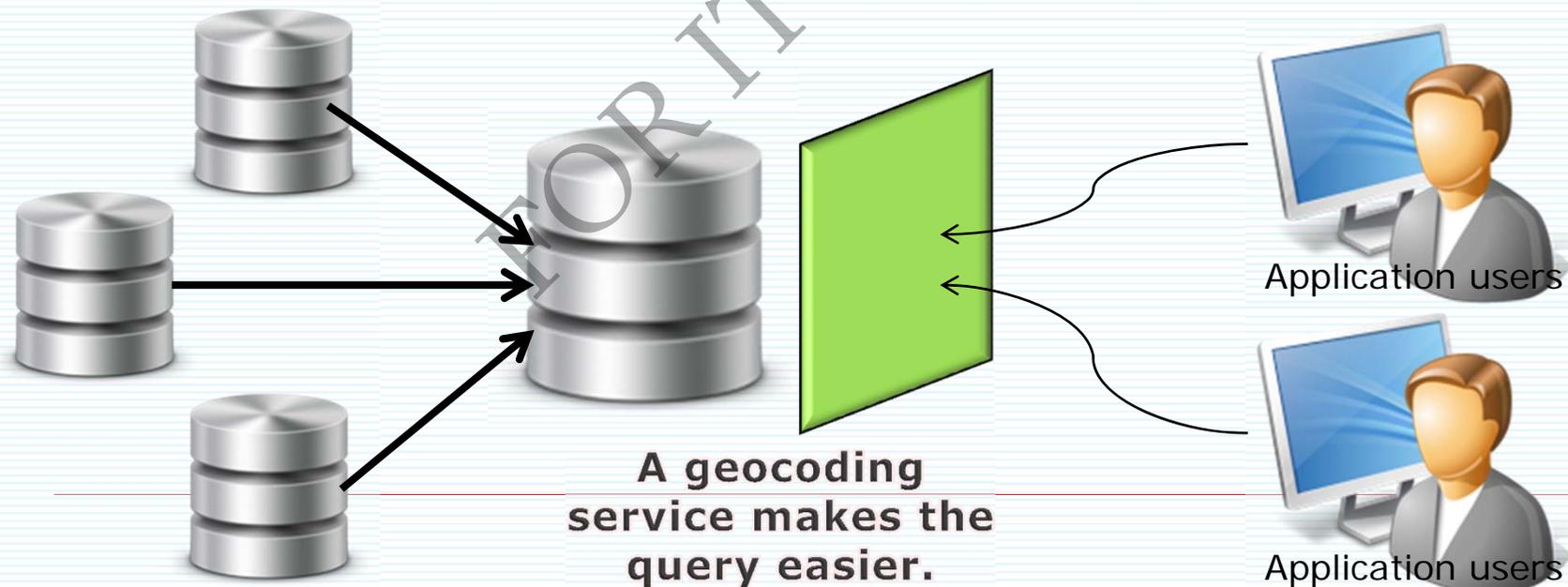
NGIS development

- ❑ 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	<input type="text"/>
縣市	臺北市 ▾
門牌	南門市場 <input type="text"/>
坐標系統	EPSG:4326 (WGS84) 國際通用 ▾
模糊比對程度	2,2,2,2 <input type="text"/> ?
路、街是否視為相同	否 ▾
號之、之號是否視為相同	否 ▾
<input type="button" value="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

The screenshot displays the '通用版電子地圖' (General Electronic Map) interface from the National Land Surveying Center (NLSC). The interface includes a search bar with options for '地標/地名定位', '門牌定位', '圖幅編號定位', and '坐標定位'. A search query '國土測繪中心' is entered. The map shows a street grid in Taipei with various landmarks and labels. A '主功能選單' (Main Function Menu) is visible on the left, and a '通用版圖例' (General Legend) is on the right. The legend lists various map features such as '機場', '收費站', '休息站、服務區', '港埗', '交流道', '鐵路', '台北捷運', '高雄捷運', '客運', '高鐵', '監獄、看守所', '體育場、體育館', '游泳池、海水浴場', and '紀念堂、孔廟、古蹟'. The map also shows a scale bar (1:5,000) and a coordinate system (TWD97) with values E = 303688 and N = 2769592. The NLSC logo and copyright information (Copyright 2011) are visible in the bottom right corner.

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?

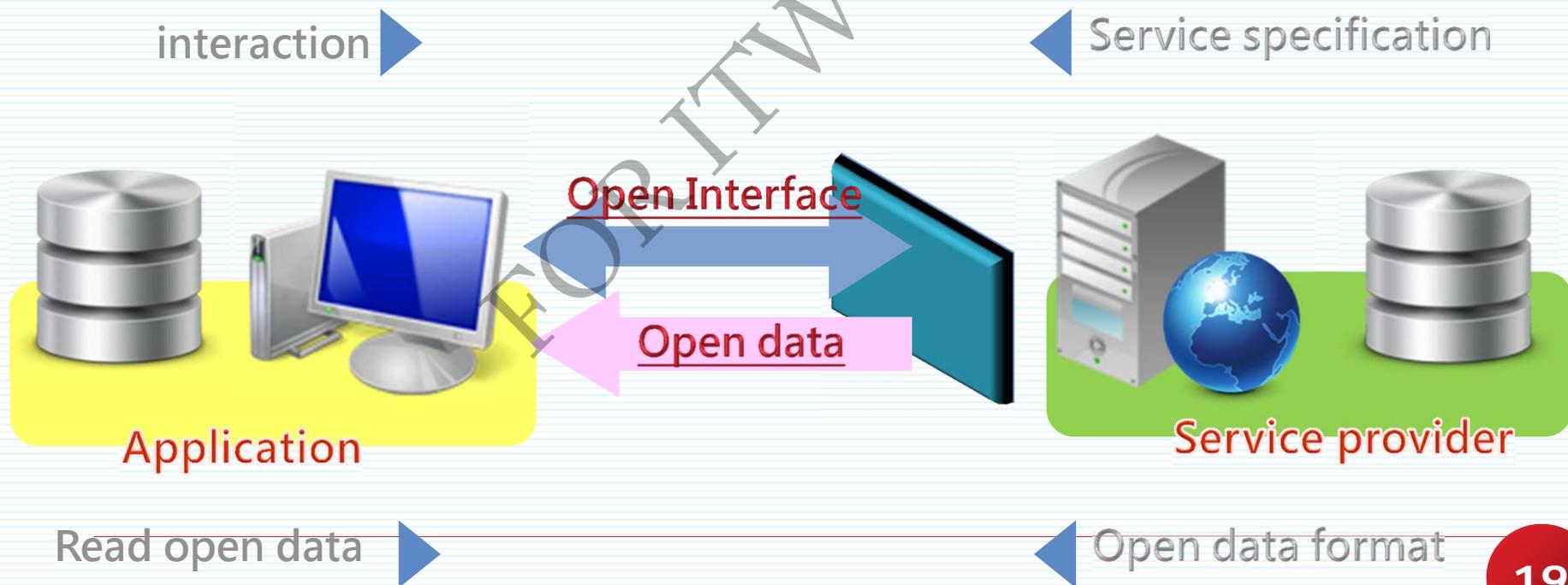


Common technical standards

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

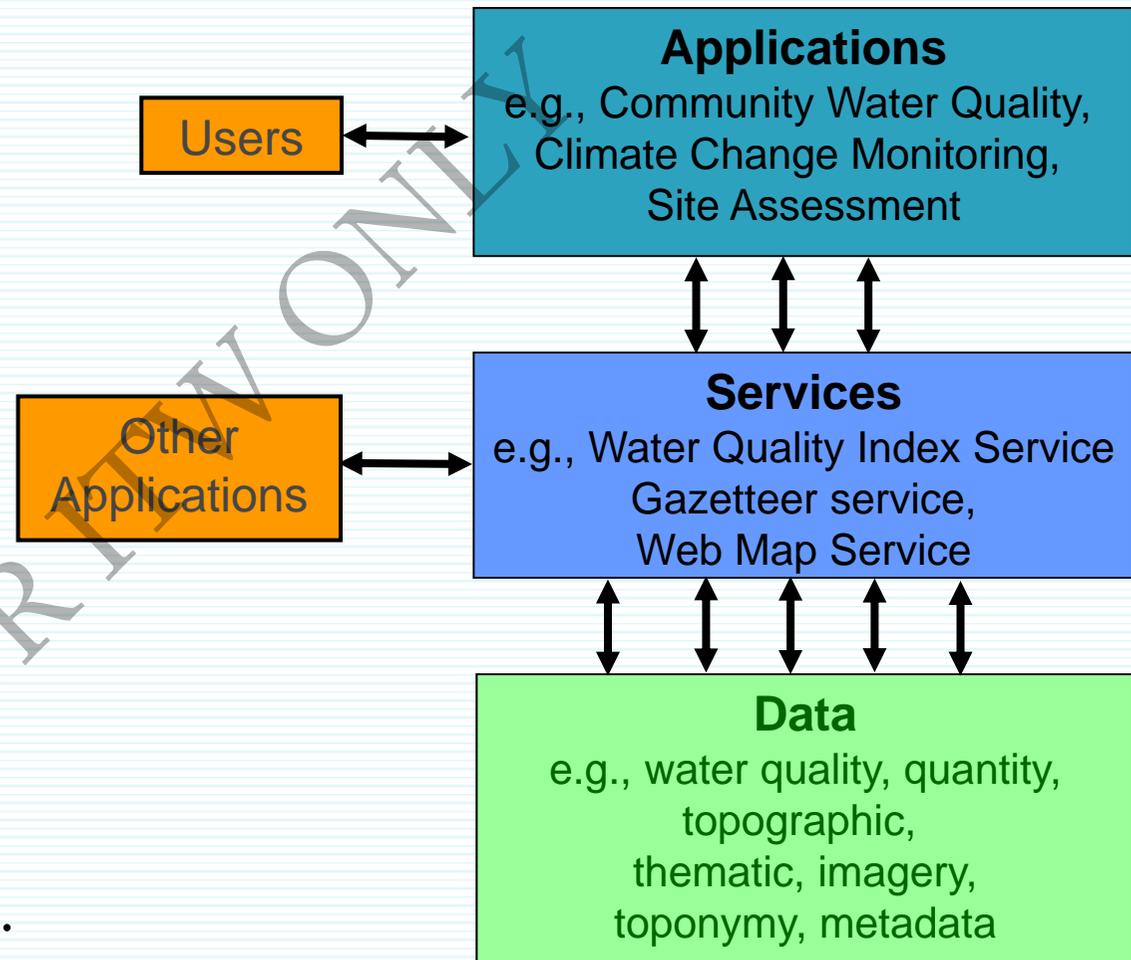
- Use "Open" technology to facilitate the distribution of geospatial data.
 - Open data format, e.g., GML
 - Open web service, e.g., WMS, WFS.



The SOA approach

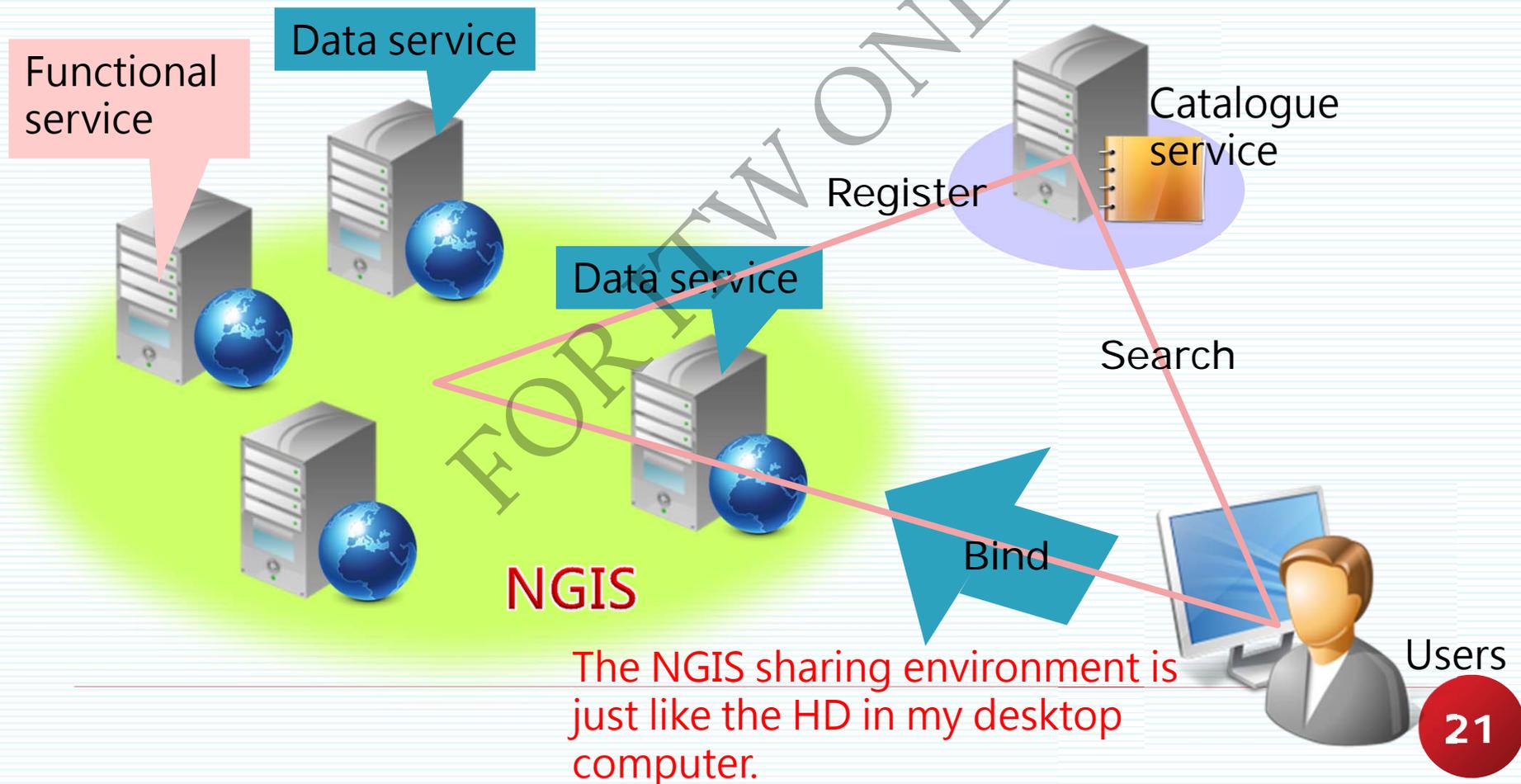
- ❑ Organization
 - Produce & maintain data.
 - Design service.
 - Create applications.
 - Share data via service.

- ❑ 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

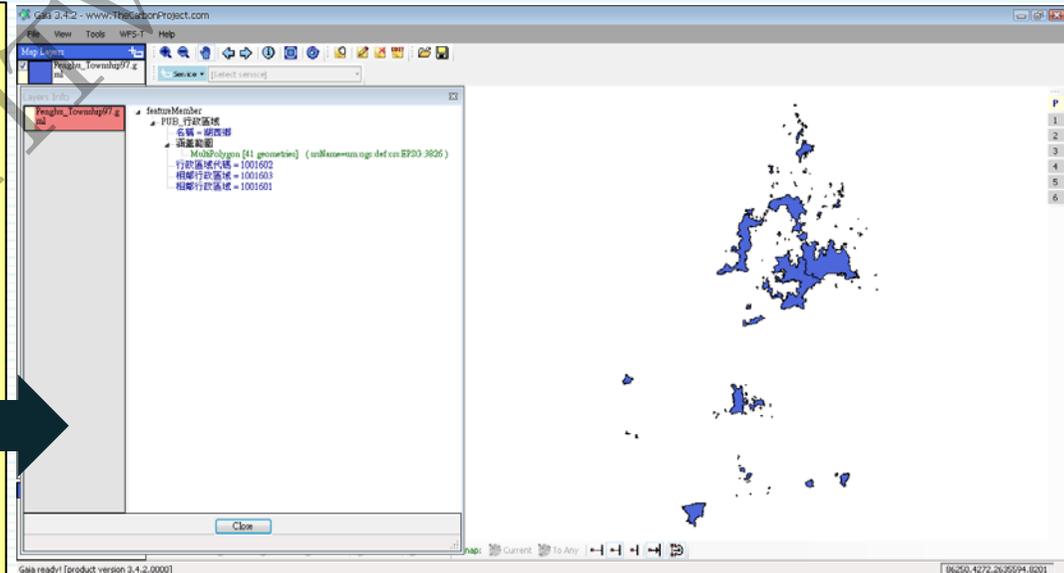
- The NGIS standardization framework was established in 2004.
 - Based on the ISO/TC211 and OGC standards.
 - Common standardized strategies and regulations.
 - Promotion of domain data (content) standards.
 - Determine the priority according to the importance of data.
 - OpenGIS distribution process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

OpenGIS data sharing environment

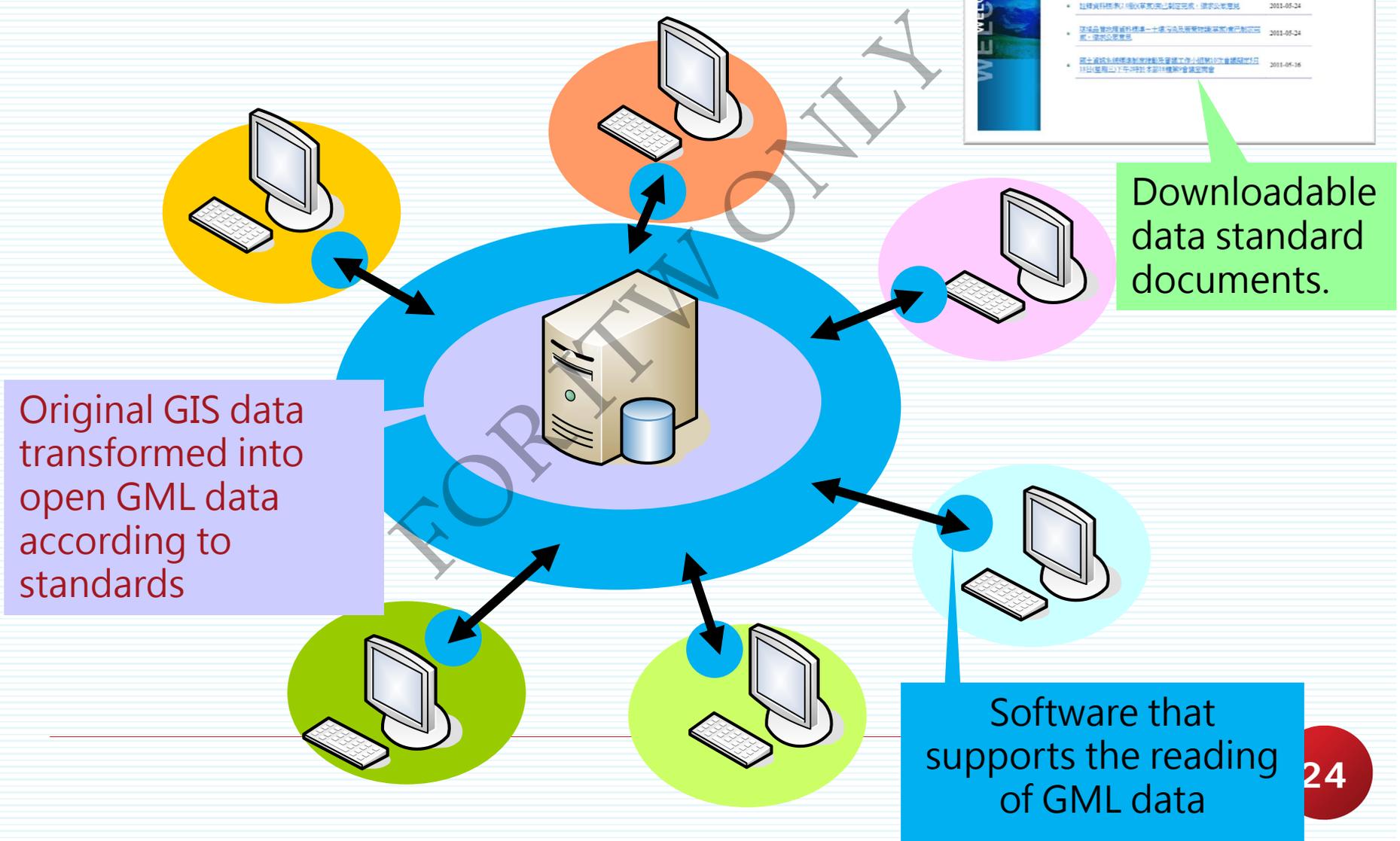
- ❑ To resolve the heterogeneous obstacles, OpenGIS technology is used.
 - Data is encoded in open format (e.g., GML) according to the data standard.
 - Using GML-aware software to read and use data.

```

<gml:featureMember>
  <pub:PUB_行政區域>
    <pub:名稱>湖西鄉</pub:名稱>
    <pub:涵蓋範圍>
      <gml:MultiPolygon
        srsName="urn:ogc:def:crs:EPSG:3826">
        <gml:polygonMember>
          <gml:Polygon
            srsName="urn:ogc:def:crs:EPSG:3826">
            <gml:exterior>
              <gml:LinearRing>
                <gml:posList srsDimension="2"
count="210">119869.490112 2603940.991882(此
處省略一群坐標記錄)</gml:posList>
              </gml:LinearRing>
            </gml:exterior>
          </gml:Polygon>
        </gml:polygonMember>
      </gml:MultiPolygon>
    </pub:涵蓋範圍>
    <pub:行政區域代碼>1001602</pub:行政區域代碼>
    <pub:相鄰行政區域>1001603</pub:相鄰行政區域>
    <pub:相鄰行政區域>1001601</pub:相鄰行政區域>
  </pub:PUB_行政區域>
    
```

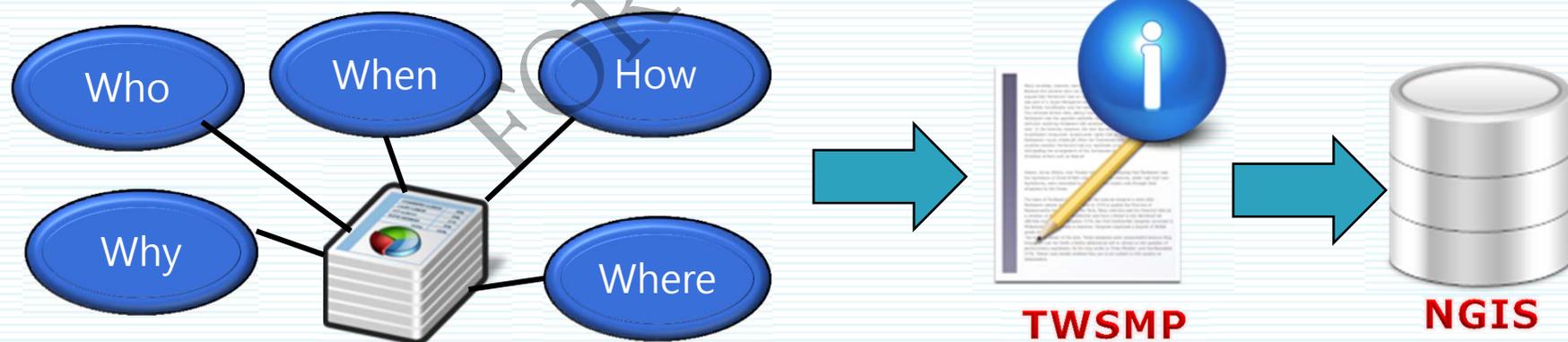


Data distribution scenario



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

Data discovery and metadata

TGOS
最豐富的台灣地理資訊查詢平台

圖資查詢 Search

首頁 > 圖資查詢

圖資查詢

一般查詢 | 進階查詢

全文檢索: 查詢

總筆數: 33678 總筆數: 12筆

資料名稱	子階數	父階	更新時間	權責單位
98年度通用版電子地圖建置案(第2作業區)	無	無	2011/6/8	內政部國土測繪中心
96年度通用版電子地圖建置案	無	無	2011/6/8	內政部國土測繪中心
97年度通用版電子地圖建置案(第2作業區)	無	無	2011/6/2	內政部國土測繪中心
99年度通用版電子地圖建置案(第1作業區)	無	無	2011/6/8	內政部國土測繪中心
97年度通用版電子地圖建置案(第1作業區)	無	無	2011/6/2	內政部國土測繪中心
98年度通用版電子地圖建置案(第1作業區)	無	無	2011/6/7	內政部國土測繪中心
99年度通用版電子地圖建置案(第2作業區)	無	無	2011/6/8	內政部國土測繪中心
99年度基本圖修測資料(99年通用版電子地圖建置案第3作業區)	無	無	2011/12/9	內政部國土測繪中心
99年度基本圖修測資料(99年通用版電子地圖建置案第1作業區)	無	無	2011/9/14	內政部國土測繪中心

Search result

您滿意此項服務嗎? 您可在此填寫留言或意見...

檢視詮釋資料資訊

資料名稱: 99年度通用版電子地圖建置案(第1作業區)

摘要: 99年度通用版電子地圖建置案(第1作業區)

父階詮釋資料: 無父階詮釋資料

子階詮釋資料: 無子階詮釋資料

WMS: [99年度通用版電子地圖建置案\(第1作業區\)](#)

圖資: [99年度通用版電子地圖建置案\(第1作業區\)](#)

[-] 詮釋資料資訊 MD_Metadata

檔案識別碼 fileIdentifier : TW-09-301000100G-613981

語言 language : chi

字元集 characterSet : utf8

[-] 連絡資訊 contact

CI_ResponsibleParty

個人姓名 individualName : 陳鴻智

單位名稱 organisationName : 內政部國土測繪中心地形及海洋測量課

角色 role : originator

時間 dateStamp : 2010/12/1

詮釋資料標準名稱 metadataStandardName : TWSMP

詮釋資料標準版本 metadataStandardVersion : 1.0

[-] 空間展示資訊 spatialRepresentationInfo

向量空間展示資訊 MD_VectorSpatialRepresentation

向量物件數目 geometricObjects

MD_GeometricObjects

幾何物件型別 geometricObjectType : complex

Metadata

TGOS Application platform

The screenshot displays the TGOS Application platform interface. At the top, the TGOS logo and '圖台' (Map Platform) are visible. A toolbar contains icons for '鷹眼圖' (Eye), '圖層套疊' (Layers), '定位工具' (Location), '測量工具' (Measurement), '繪圖工具' (Drawing), '我的地圖庫' (My Maps), and '列印' (Print).

The main map area shows a detailed view of Taoyuan County, Taiwan, with various road networks and geographical features. The map is overlaid with several layers, including '道路標記' (Road Markings) and '100年 詮釋資料' (100th Anniversary Metadata).

On the right side, a '圖層套疊' (Layers) panel is open, showing a list of WMS layers under the heading '自然環境組WMS圖層(314) 載入所有WMS'. The layers include:

- 含沙量測站位置圖
- 防汛備料地點
- 抽水站位置圖
- 河川(支流)
- 河川水位測站位置圖
- 河川局管轄範圍圖
- 河川流域範圍圖
- 河川流量測站位置圖
- 河川斷面樁位置圖
- 河川斷面線位置圖
- 河川(河道)
- 近海水文氣象站位置圖
- 近海水文氣象觀測站

Below the layer list, a 'WMS服務狀態檢測說明' (WMS Service Status Detection Explanation) section indicates:

- 當日凌晨WMS服務檢測正常 (Green icon)
- 當日凌晨WMS服務檢測異常 (Yellow icon)

At the bottom left, the coordinate system is specified as '座標系統: TWD97(E121)市' with coordinates 'X: 803598.9, Y: 2755460.6'. A scale bar shows 10 km and 5 mi, with a reference scale of 1:250000. A '定位工具' (Location Tool) icon is visible at the bottom right.

Hazard reduction related data

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

防救災圖資專區

101.04.18

內政部資訊中心為使防救災圖資能充分、有效、即時獲得，特彙整各防災機關已建置完成之成果圖資與相關網站，羅列於下供各界參考應用。

此類圖資清單目前僅供救災政府單位應用，尚未提供其他用途使用，不便之處，敬請見諒。

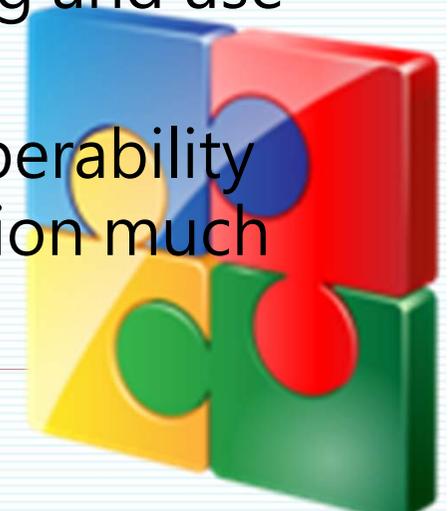
一、內政部消防署	
1. 簡易避難疏散圖 (村里)	
2. 易形成孤島區域 (全國因道路橋梁中斷、土石流、淹水及風災等災害形成孤島之高災害危險潛勢地區)	
3. 直升機起降點位置	
4. 消防分隊位置	
5. 危險物品場所位置	
二、內政部資訊中心	
1. 門牌點位資料	
三、內政部統計處	
1. 人口統計-各項人口統計	(29主題共447項統計資料)
2. 各級學校分布圖及統計	(22主題共114項資料)
3. 醫療院所分布圖及統計	(98年7縣市)
4. 護產機構分布圖	(98年7縣市)
5. 社會福利統計	(5主題共25項資料)
6. 工商企業分布圖及統計	(統計資料為100年6月、分布圖為98年7縣市)
7. 共用性空間統計單元圖層	(共用性空間統計單元圖層共54項)
8. 收容場所分布圖：場所、設施點位、容納人數	(由內政部社會司提供)

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 geosource in NGIS.
- ❑ Standardization has improved the interoperability of geospatial data and made the integration much easier.



Thank You

FOR THE W ONLY

