

# The Current Development and Future Prospective of Mapping and Circulation National Land Map Data in Taiwan

Presenter : Tsai, Wen-Yu

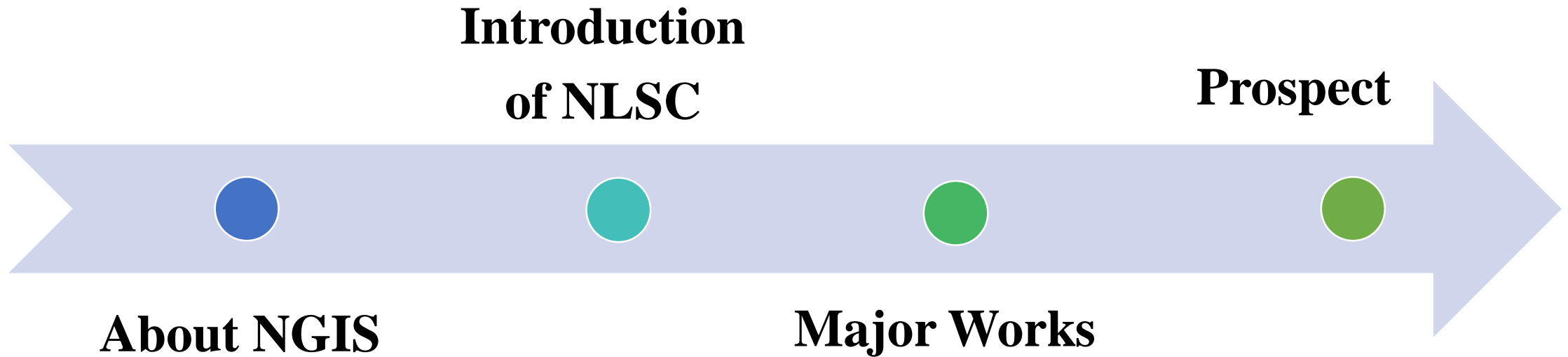
# About the presenter



- Specialist in Survey Information section of NLSC in Taiwan.
- Graduated from the Surveying Engineering Department of National Cheng Kung University.
- Among 20 years of service in the NLSC, engaged 15 years in field measurement for Cadastral Resurveying, also do some control point maintenance, and dedicated to Information Security and maps management last 2 years.



# Outline





# About NGIS

- NGIS is a national geographic information system.
- The system incorporates graphic and attribute (text and symbolic) information on ground and underground features. Units of governments can overlap theme maps to obtain, process and analyze geospatial information based on their administrative demand.
- The Council for Economic Planning and Development under Executive Yuan led the National Geographic Information System Steering Committee (NGISSC) in 2006 and has actively assisted in integration, communication and negotiation among various government agencies.
- NGIS has **7 applications-oriented teams** & **9 major spatial database**.



# The Council for Economic Planning and Development

## NGIS Steering Committee

7 applications-oriented teams

Data Warehouse and Standard Working Group

Application of GIS to National Development and Planning Workgroup

Promotion of Talent and Technology Development Workgroup

Industrial Applications of GIS and Planning of GIS Workgroup

Application of GIS to Disaster Prevention and Relief Workgroup

Application of GIS to Transportation and Tourism Workgroup

Sustainability Assessment and Applications Workgroup

### 9 Major Spatial Databases

Natural Environment Database

Natural Resources and Ecological Database

Environmental Quality Database

Social Economic Database

Transportation Network Database

Land information Database

Land-use Planning Database

Public Pipeline Database

Basic Topographic Database





The background image shows a sunset over a large body of water. In the distance, a line of wind turbines is visible against the horizon. In the foreground, many people are wading in the shallow water, some appearing to be engaged in an activity like fishing or aquaculture. The sky is filled with soft, colorful clouds, and the sun is low on the horizon, creating a warm, golden glow. A decorative graphic element consisting of a blue and black border is visible on the left side of the slide.

# Introduction of NLSC

- The National Land Surveying and Mapping Center, Ministry of the Interior (NLSC) is the national surveying and mapping agency in Taiwan.
- We work for NGIS Land Information Database, Land-use Planning Database and Topographic Database.

Planning , promoting and actualizing the **Basic Survey** and **Application survey**

Supplying, managing and maintaining **Survey products**

Developing & Researching on **Survey technology**

Planning and compiling **Survey policies**

Cultivating professional **survey personnel**







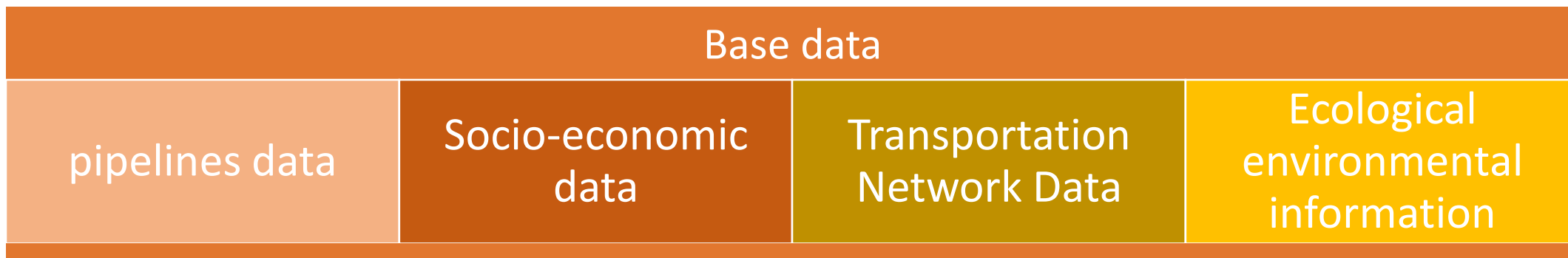
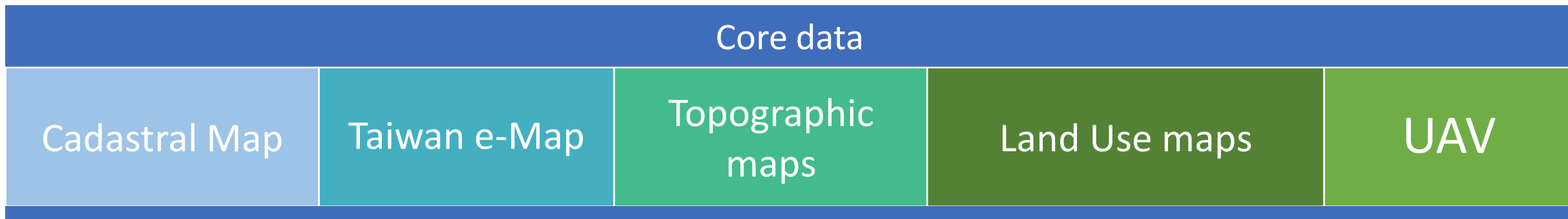
**One National  
One Map**



# Major Works



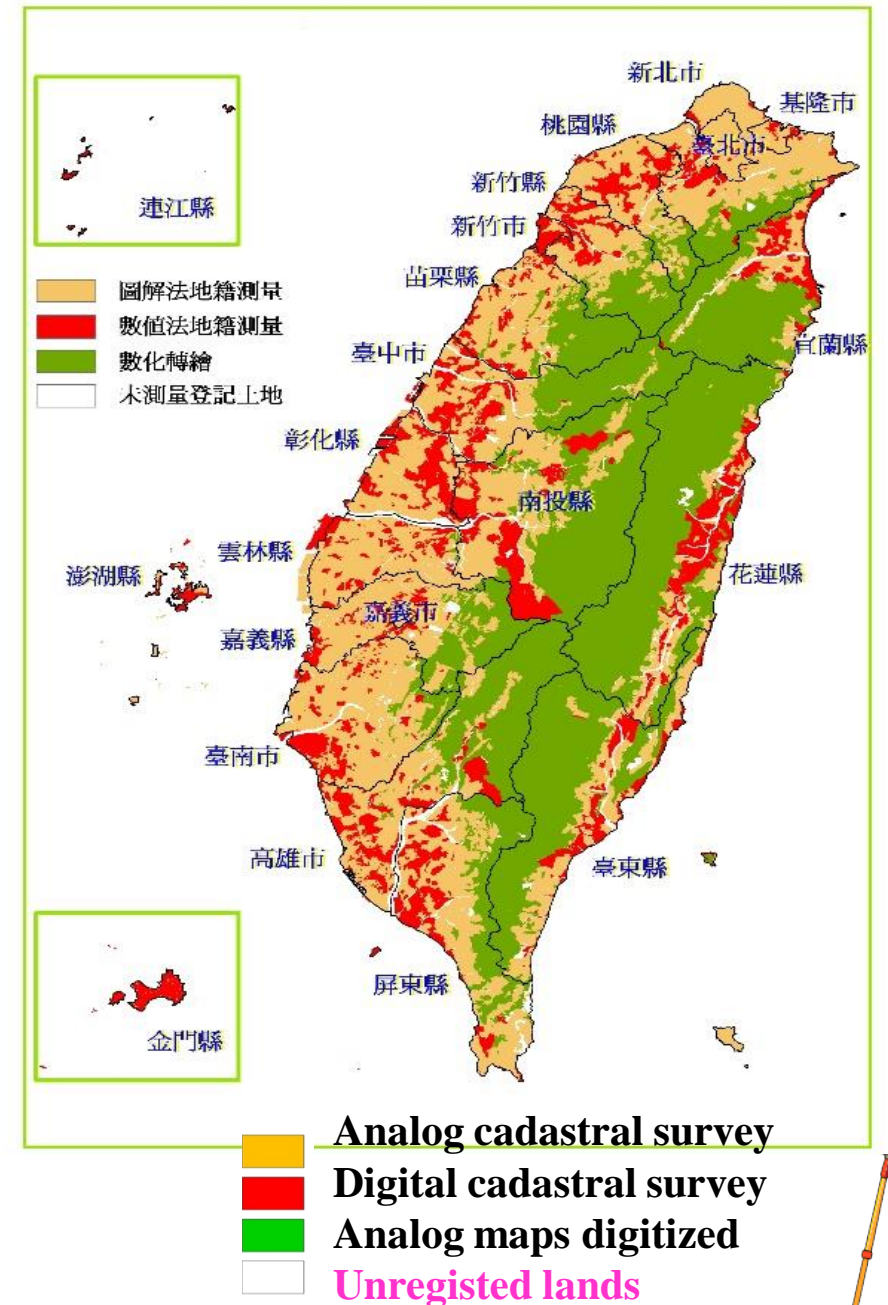
■ **Core and base map data measuring and update maintenance**





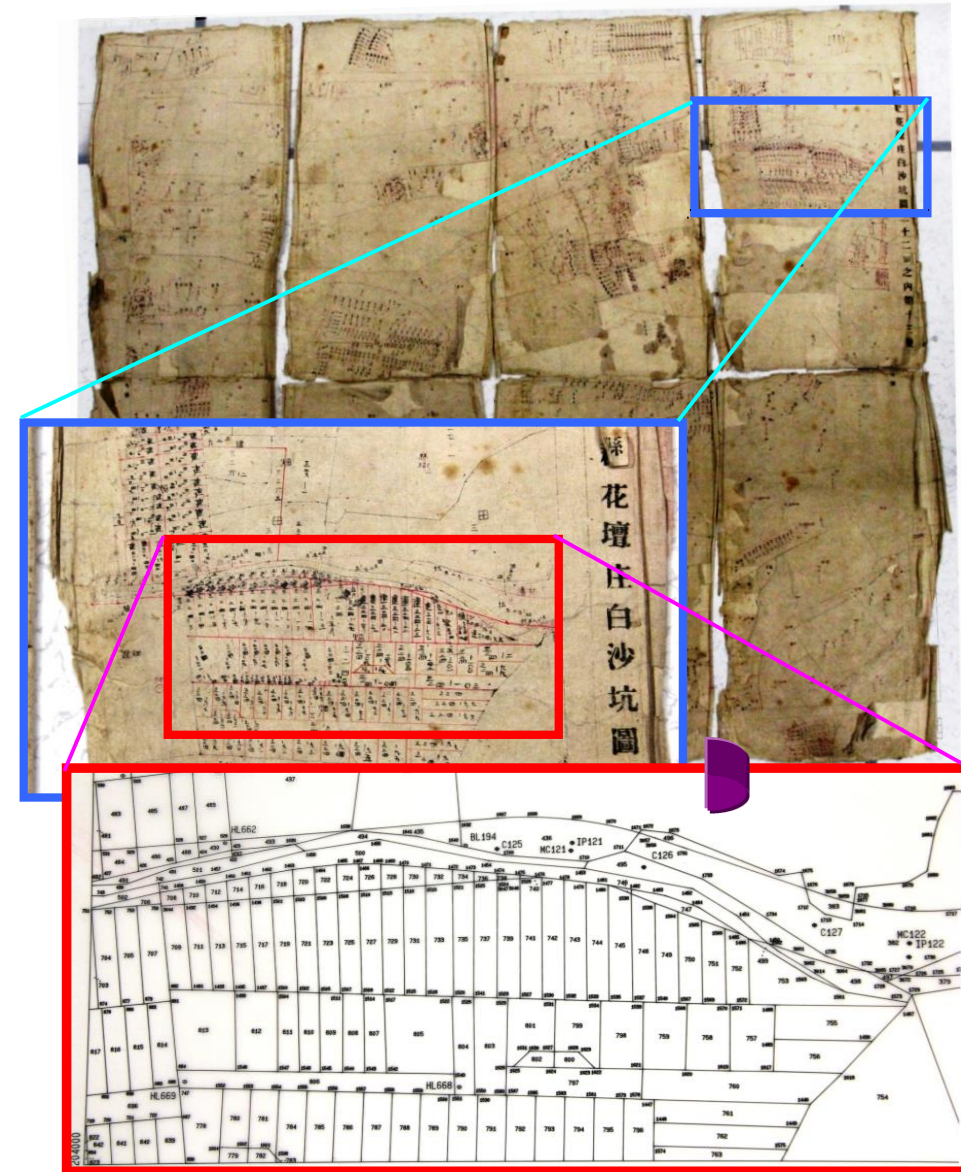
# Cadastral Survey

- Cadastral map currently used in Taiwan fall under 3 categories :
  - Graphed maps, digitized maps, digital maps
- At the end of 2014, 98% of territory have been surveyed and registered.
- The remaining 2% lands that have yet to be surveyed and registered are mostly in the river ranges.



# Cadastral Resurvey

- Update cadastral information
  - district with graphed or digitized maps
- Cadastral resurvey projects began in 1973
  - Digital-based method implemented since 1989.
  - Cadastral resurvey project is proceeding as planned.





# Taiwan Electronic Map (Taiwan e-Map)

- The only Electronic Map made by government.

- 10 categories and 23 layers

Road	Block	Mark	Administrative boundaries	Control point
Doorplate	Water	Building	Aerial photograph	Rail

- Accuracy 1.25m
- Updated every two years
- Free for everyone
- Has English version





High accuracy of position and resolution of orthophoto

- accuracy of position is higher than 1.25 meters
- resolution of orthophoto is higher than 25 centimeters

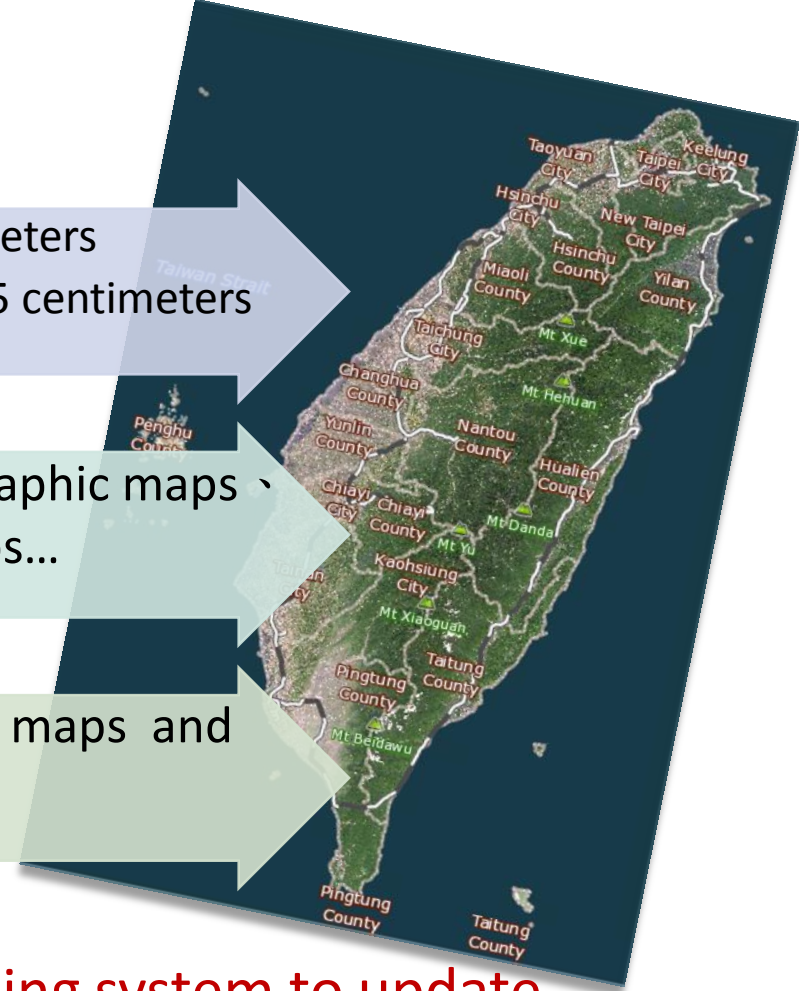
Integrate useful existent materials

- collect aerial photos 、 DTM 、 topographic maps 、 doorplate data 、 traffic network maps...

Stereoscopic measurement and field investigation

- use photogrammetry method to plot maps and go to field to register attributes

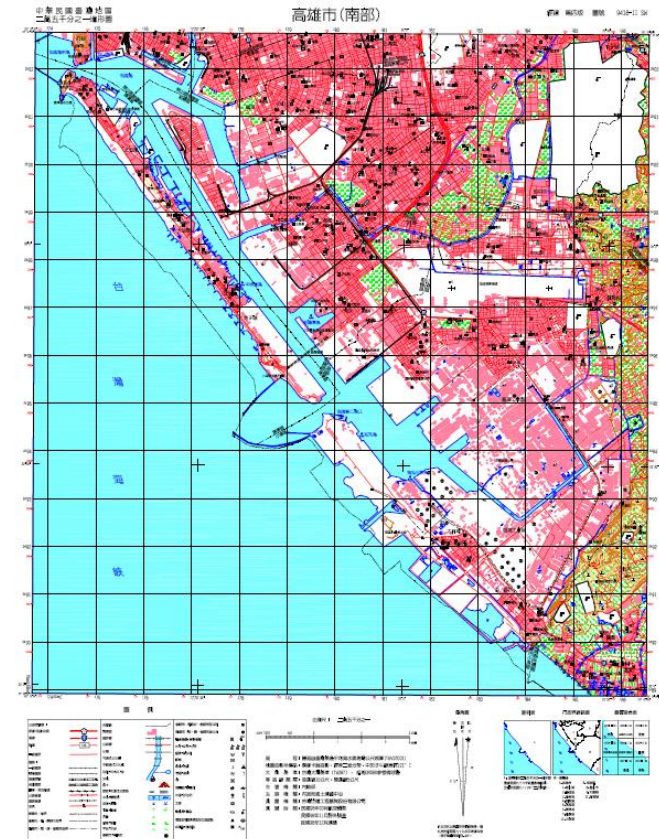
- Import unmanned aerial vehicle systems and mobile mapping system to update map data.



# Topographic maps

- Scale 1/5,000 、 1/25,000 、 1/50,000 、 1/100,000
- The maps at scale of 1:5,000, called base maps, are made by photogrammetry, the accuracy of position is higher than 2.5 meters and the accuracy of elevation is higher than 0.5 meter at even bare places.
- The maps at scale of 1:25,000 and 1:50,000 are both made from the generalization of base maps.
- 10 Layers

Control point	Artificial Structure	Water	Public Utility Network	Land Cover
Boundary Line	Transportation	Landform	Marginal Data	Landmark



- Improved operation mode to get more accurate results.

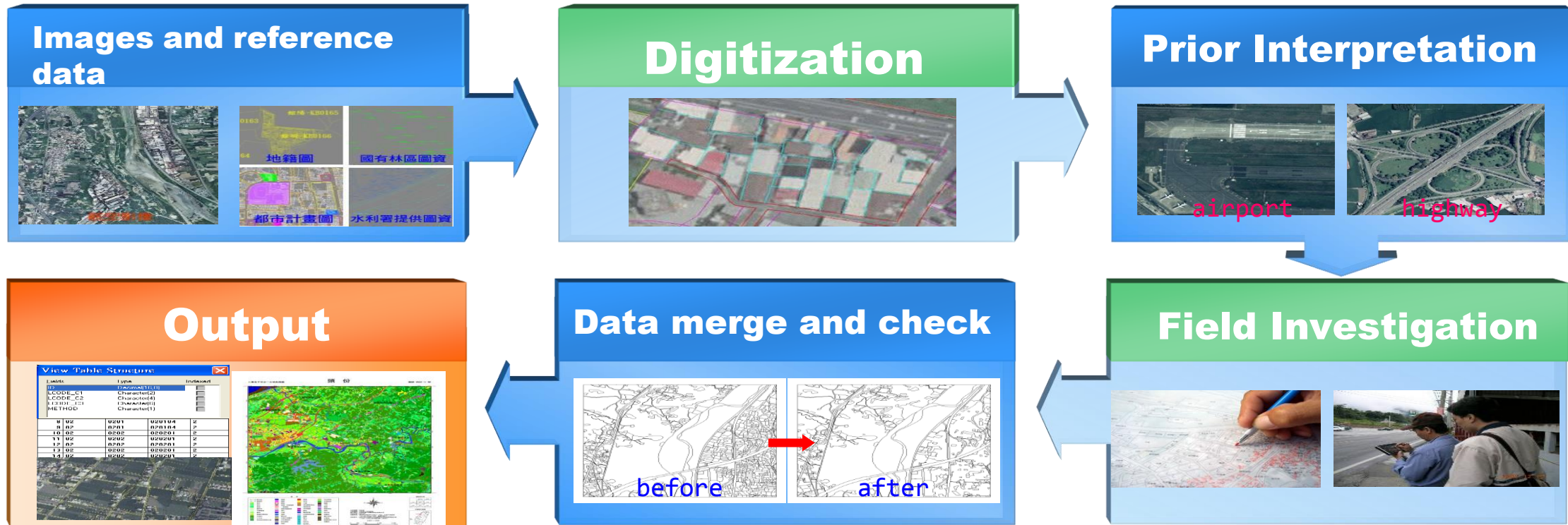
	Traditional operation	New operation
Measurement methods	Aerial perspective drawing + Fieldwork	<ol style="list-style-type: none"> <li>1. Do the control measurement with the “<b>e-GNSS real-time kinematic positioning system</b>”.</li> <li>2. Integrate Existing Layer Information.</li> <li>3. Use LIDAR DEM to map contour and other terrain data.</li> </ol>
Cost	NT\$53,000/sheet	NT\$30,000/sheet (Save 43%)





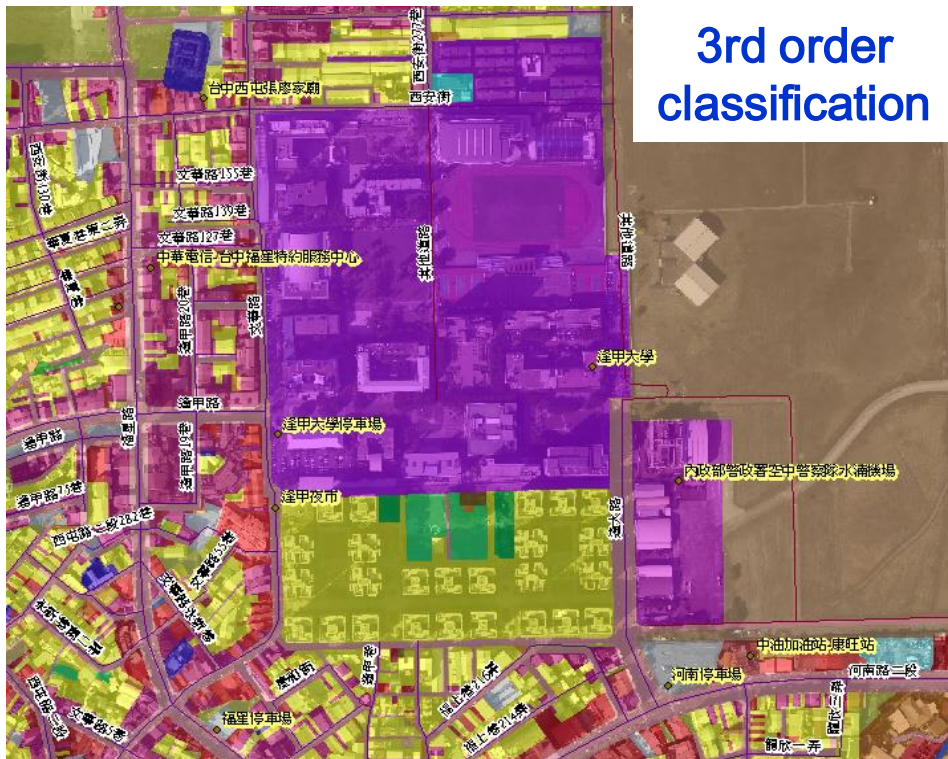
# Land Use maps

- By taking advantage of aerial remote sensing imaging technology, auxiliary GIS data and some ground surveying, the land use status will be recorded in detail as geometric space information.



## • Land use category

- CLASS I : 9 types
- CLASS II : 41 type
- CLASS III : 103 types



3rd order  
classification

Class I	Class II	Class III
Agriculture	4	11
Forest	3	12
Transportation	4	12
Water	7	17
Building	4	12
Public Utility	6	14
Amusement	2	6
Mineral Utility	3	6
Others	8	13

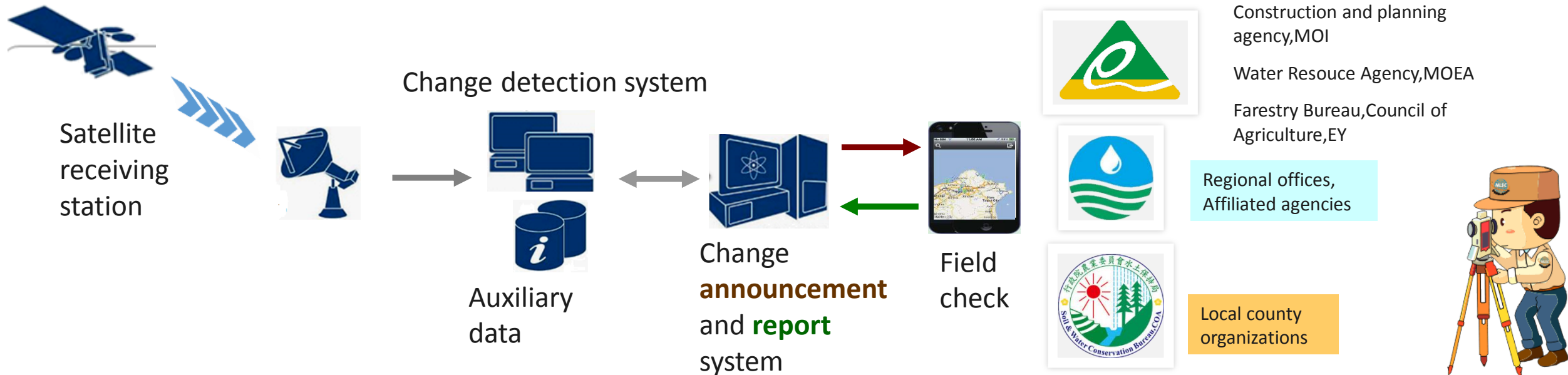
- 2008 the nationwide investigation completed.
- Update Cycle: 2 years.

Public Use
  Construction
  Amusement and rest
  Business utility



# National Land Monitoring

- The National Land Use Monitoring Program uses satellite imagery to prevent environmental destruction caused by illegal development.
  - observe the unauthorized land use changes using multi-temporal satellite images
  - through a Web-based geographical information system (GIS), the area's map coordinates and government administrative districts are identified
  - report suspicious changes to local government agencies and request an on-site survey





✓ Change analysis



✓ The Web-based GIS data

檢索點資訊	
目的專案	查詢單位
檢索圖碼 9622-4-050	圖碼點編號 H0910301047
參考地段	參考地號
面積(m <sup>2</sup> ) 904	備註
中心點坐標 TWD67(121): 273522.93, 2753363.99	
WGS84: 121.24000, 24.89000	

下載圖資點

圖資下載: 全部圖資下載, 彩色影像下載, 衛星影像下載, 向量地圖下載

圖片下載: 彩色影像下載, 向量地圖下載, 衛星影像下載, 地圖圖下載

其他下載: Google Map KML下載, 下載Google Earth

✓ field investigators

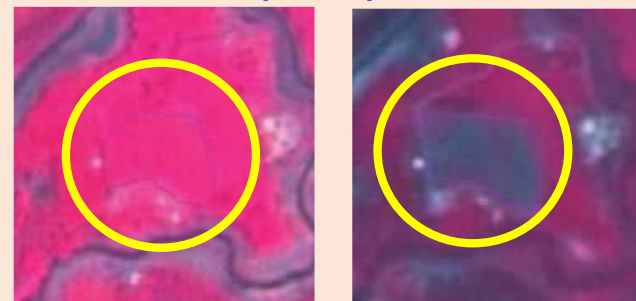


# Minority change type

◆ Newly-built



◆ Recently-exploited



◆ Coast line change detection

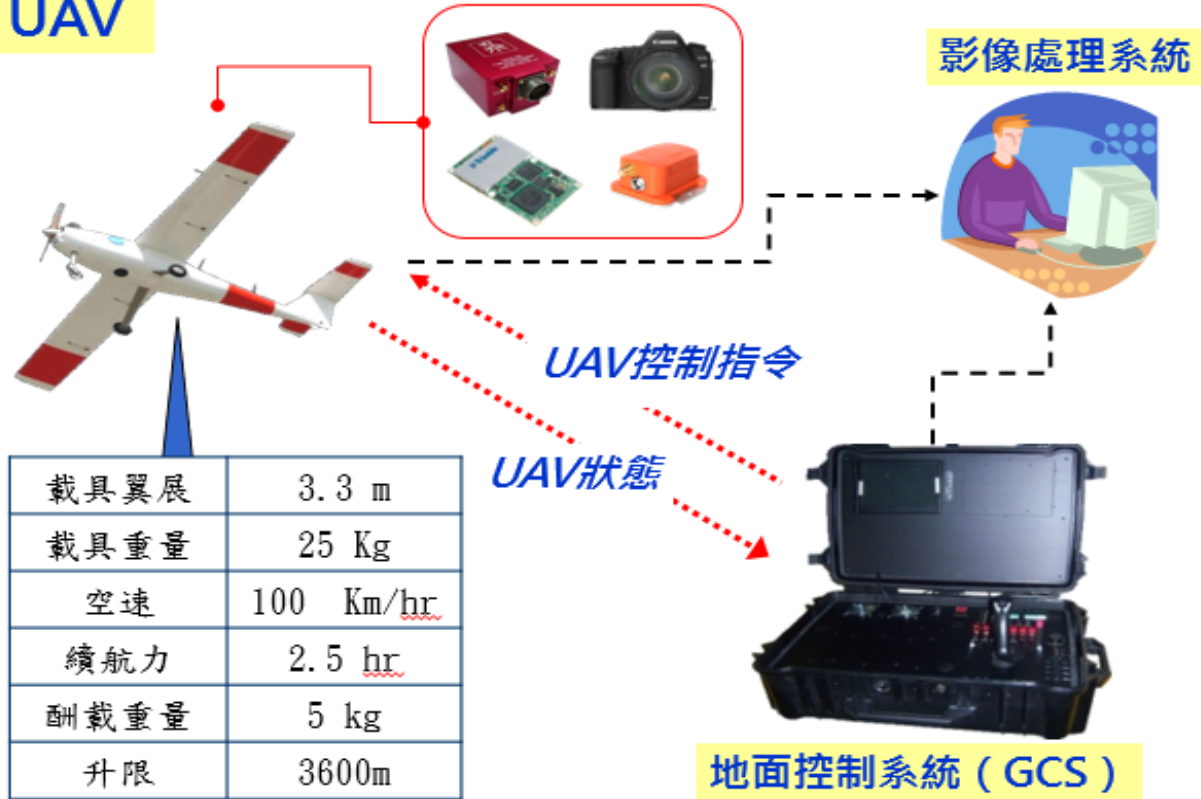




# Unmanned aerial vehicle system(UAS)

2011 NLSC built the Unmanned Aeroplane

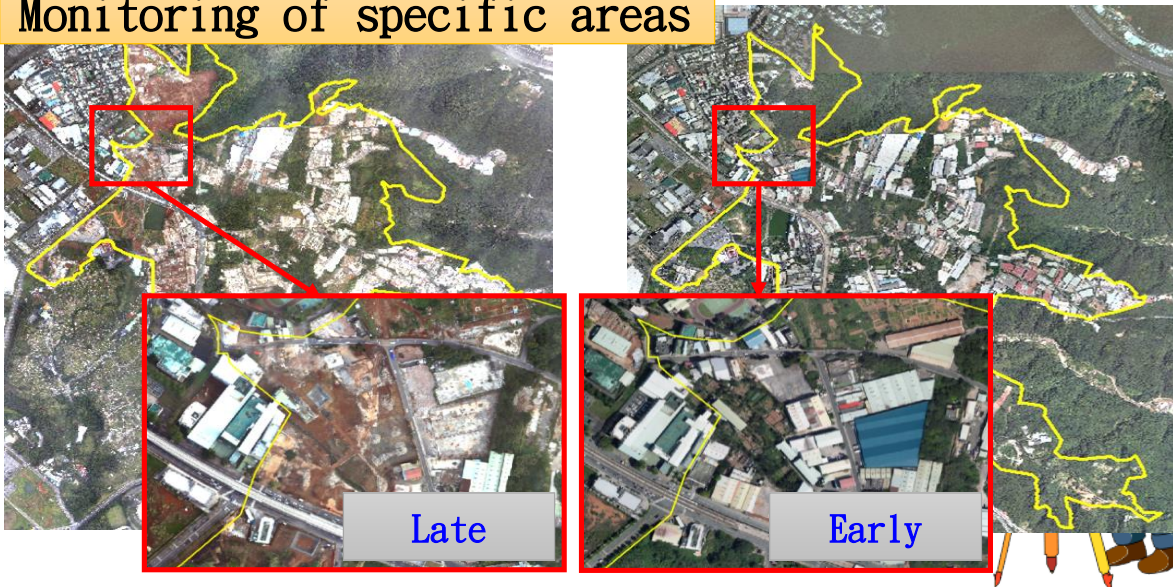
UAV



Partial update



Monitoring of specific areas





# Assist in disaster prevention and rescue work





# Development Service System for Public



The screenshot shows a website interface with a navigation bar at the top containing '核心知識', '技術支援', '測繪資料檢索', '圖資查詢展示', and '相關連結'. The main content area features a central '國土測繪' (National Land Surveying and Mapping) hub with icons for '通用版電子地圖', '國土利用調查', '地形圖', '空間資料庫', '段籍圖', '平面控制點', '高程控制點', and '重力測量點'. To the right, there is a '系統功能簡介' section with a '整體目標' and a 'News' section with several news items dated from 2015/04/28 to 2015/05/06. At the bottom, there is a footer with contact information and a '2014 金圖獎' award badge.

## National Land Surveying and Mapping Information Integrated Circulation Warehouse Services Website

Provide the service of search and purchase surveying and mapping data.



The screenshot shows a website interface for the '國土測繪圖資網路地圖服務系統'. The top navigation bar includes '系統簡介', '地圖', '圖資說明', '下載專區', '常見問答集', and '滿意度調查'. The main content area features a '2014 金圖獎' award badge and a '2015.04.25 行政院環境保護署 環教旅遊地圖 介接本服務' announcement. Below this, there are icons for '系統簡介', '地圖', '圖資說明', '下載專區', '常見問答集', and '滿意度調查'. A '最新消息' (Latest News) section on the right lists several news items with dates and brief descriptions. At the bottom, there is a footer with contact information and a '2014 金圖獎' award badge.

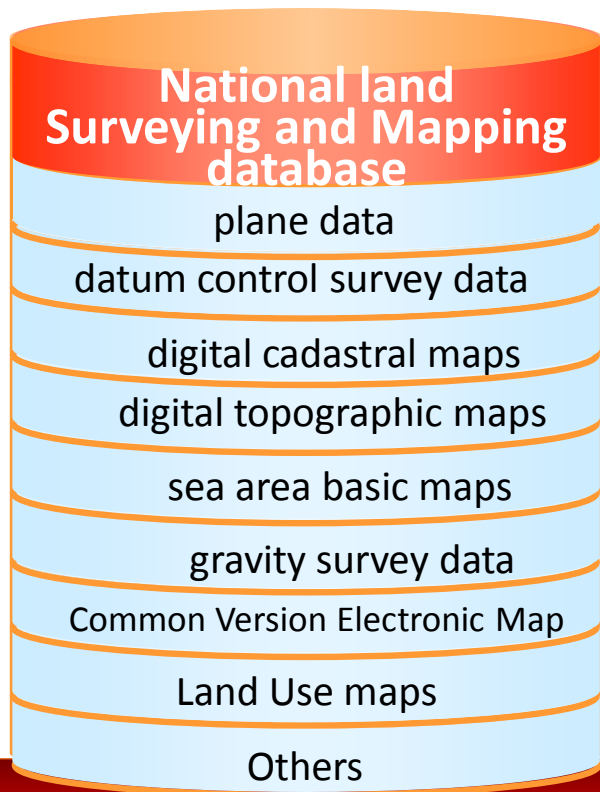
## National Land Surveying and Mapping Information Web Map Service System

provide free WMS and WMTS services. Provide overlap layers and Web Map API service.



# National Land Surveying and Mapping Information Integrated Circulation Warehousing Services Website

- This website bases on national land surveying spatial database, connecting the purchase system and electronic toll collection platform. People can easily search and purchase surveying and mapping data on this website.





快速定位

行政區 地段地號 坐標 道路交叉口 門牌定位

地標 圖號圖名

縣市 鄉鎮市區

台中市南屯區 (212842, 2672071)  
黎明, 342 - 0

- 通用版電子地圖  
\_95213036\_何厝莊(2009)
- 台中市南屯區黎明地段籍圖  
\_BC02100(2014)
- 台中市南屯區段籍圖(2013)
- 921震災後苗栗台中地區三等控制點第二階段檢測成果(2000)

\* 僅提供套疊最新圖資!

TWD97-TM2(121) : E=194085, N=2597918  
市標 WGS84-Degree : E=120.45259, N=23.48339

overlay

Attribute Table

View the all Map data at this location

Buy the maps

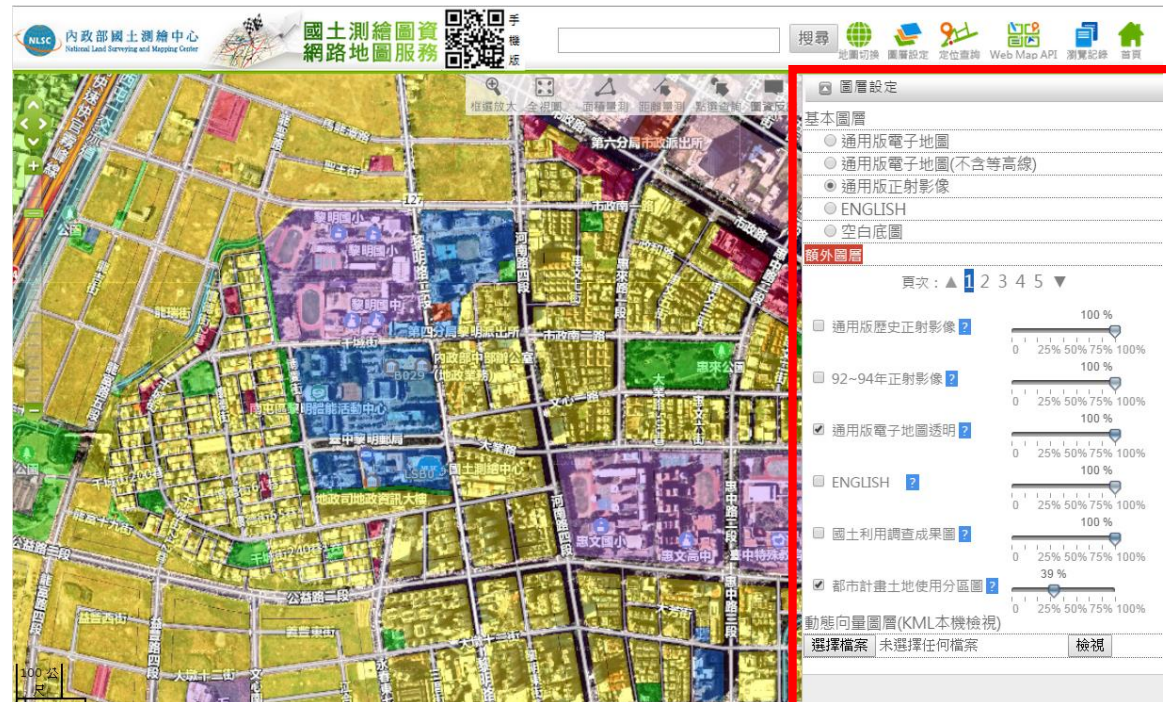
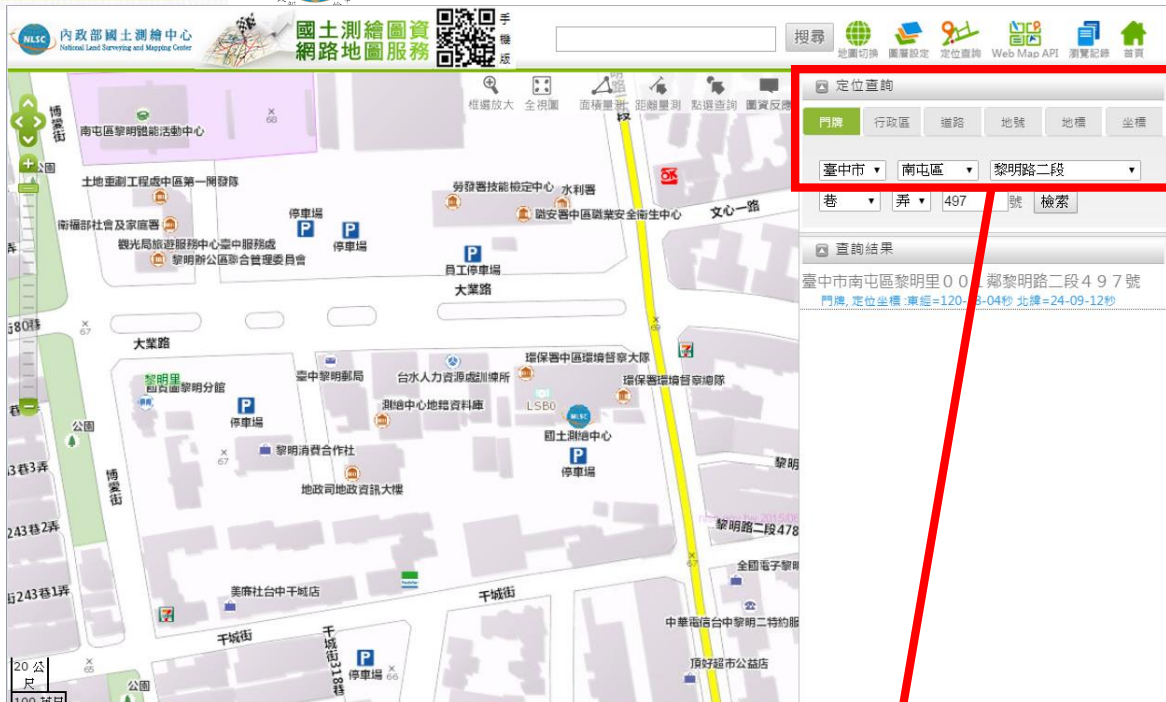




# National Land Surveying and Mapping Information Web Map Service System

- Integrate the core and basic maps, such as Common Version Electronic Map, Land Use Map and others.
- Publish WMS 、 Web Map Tile Service(WMTS) and Web Map API service.
- Can be used by mobile.





## 6 positioning methods :

- Doorplate
- Administrative region
- Road
- Intersection
- Landmarks
- Coordinate
- Land lot number

The system now has 24 layers for overlaying :



New English Map Layer





Users of aforementioned map data can use the OGC WMS and WMTS compatible software in conjunction with the system for map data overlaying without the need for any application.

WMS : [http://maps.nlsc.gov.tw/S\\_Maps/wms](http://maps.nlsc.gov.tw/S_Maps/wms)

WMTS : [http://maps.nlsc.gov.tw/S\\_Maps/wmts](http://maps.nlsc.gov.tw/S_Maps/wmts)

Screenshots of other systems which are connecting our services:



**內政部 不動產交易實價查詢服務網**

首 頁 不動產買賣 預售屋買賣 不動產租賃

縣市區域: 縣市 鄉鎮市區 房地(土地+建物) 房地(土地+建物)+車位 土地 建物 車位 屋 齡: [ ] [ ]

建物型態: 請選擇 交易總價: [ ] ~ [ ] 萬元 使用分區: [ ] [ ] 搜尋

交易期間: 103 年 5 月 ~ 104 年 5 月 交易單價: [ ] ~ [ ] 萬元

道路名稱: [ ] (可輸入任意字數) 移轉總價: [ ] ~ [ ] 坪 建物格局: [ ] [ ] [ ] 搜尋範圍 均價計算

功能說明

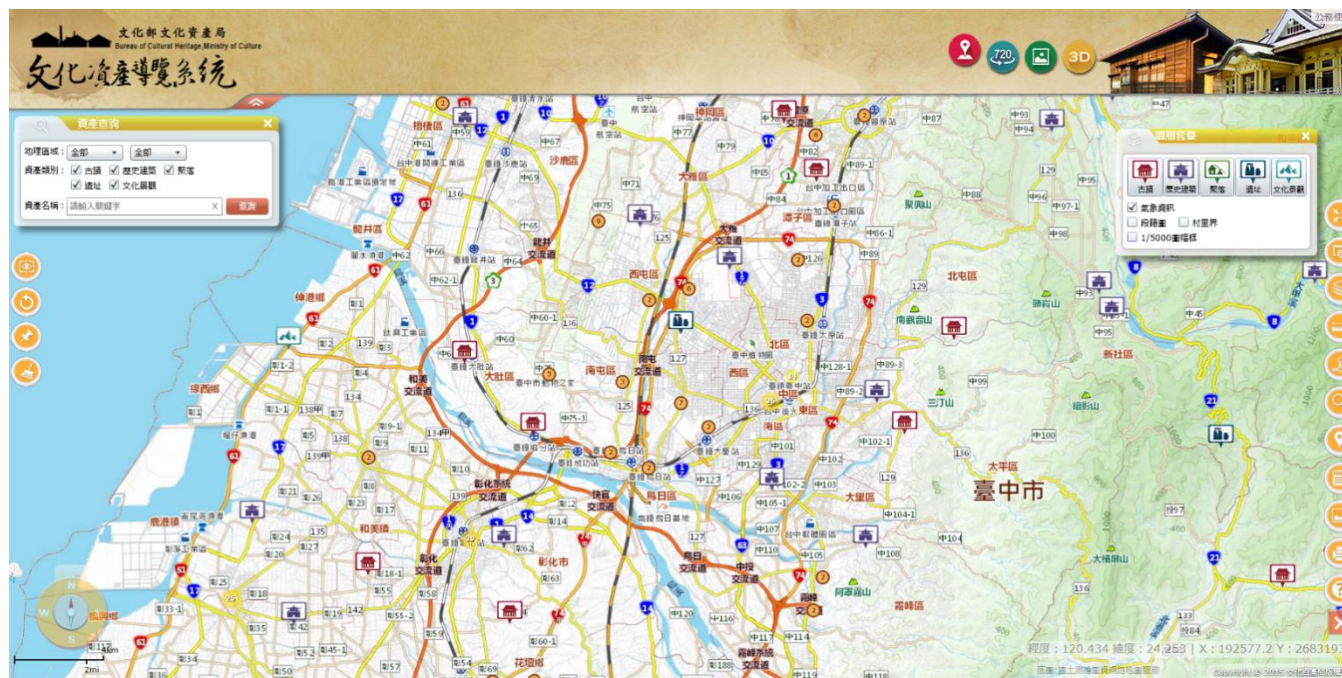
查詢功能 圖形控制 查詢流程 地圖模式 下載

◆條件查詢區(上方): 輸入選擇查詢條件, 點選搜尋進行資料查詢。

1. 縣市區域: 依查詢條件選擇該縣市及區域, \*(必選)
2. 建物型態: 選擇查詢建物類型。
3. 交易期間: 依查詢條件選擇交易期間。
4. 道路名稱: 依選取縣市及鄉鎮市區, 輸入任意字數可搜尋相關路名。
5. 不動產類別: 依查詢條件選擇類別, 包括房地(土地+建物)、房地(土地+建物)+車位、土地、建物、車位。
6. 圖台框選範圍: 選取縣市區域(必填), 並勾選至少一種建物型態, 即可於圖上台框選範圍進行搜尋作業。
7. 交易總價: 依查詢條件設定交易總價範圍, 以『萬元』為單位。
8. 交易單價: 依查詢條件設定交易單價範圍, 以『萬元』為單位。  
注: 查詢結果, 建物型態為透天厝、農舍、工廠、倉庫或車位者不顯示單價。
9. 移轉總面積: 依查詢條件設定交易標的面積範圍, 可以『坪』或『m<sup>2</sup>』為單位。
10. 搜尋範圍均價計算: 利用搜尋條件的資料中, 將此範圍做完整的運算並取出範圍平均的價格。  
注: 均價查詢功能, 建物型態為透天厝、農舍、工廠、倉庫或車位者不納入均價計算。
11. 使用分區: 根據都市土地/非都市土地, 依其使用計畫制定不同的使用分區類別作為過濾條件進行查詢。

住宅存量資訊, 請至內政部不動產資訊平台之住宅資訊動態看板參閱

本系統建議最佳瀏覽器採用 Firefox、Chrome、Opera  
不動產實價查詢服務專線: 1996(免付費電話), 高屏服務時間:  
週一至週五 08:00~17:30, 電子郵件信箱 q11@quantasoftware.com.tw



**文化部文化資產局 文化資產管理系統**

資產查詢

地理區域: 全部 全部

資產類別:  古蹟  歷史建築  聚落  遺址  文化景觀

資產名稱: 請輸入關鍵字 查詢

查詢結果: 120 720 3D

臺中市

經度: 120.434 緯度: 24.253 | X: 192577.2 Y: 2683193.3





# Prospect

# Prospect

- One Nation One Map
  - Dynamic Update Taiwan e-Map Included in the administrative process.
    - Import Multiple Mapping System and new technology.
- Build national base charts of marine area
  - Secondary update the Electronic Navigation map
- Develop land use monitoring.
- Publish WFS and API service.





Thank you for your listening