



Ministry of Science and Technology
Geo-Informatics and Space Technology Development Agency (Public Organization)



The development of Thailand Spatial Data Infrastructure (NSDI)

Present by

WIENTIAN KODCHABUDTHADA

Assistant Executive Director

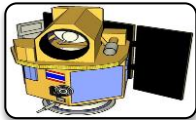
Geo-Informatics and Space Technology Development Agency (Public Organization) :

GISTDA, Thailand

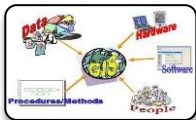


VISION and MISSION of GISTDA

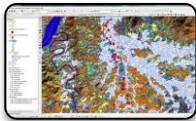
“GISTDA : Delivering Values from Space”



To develop space technology and geo-informatics applications to be beneficial to the general public



To develop the satellite data base and the derived natural resources information center



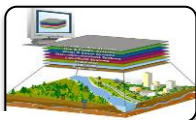
To provide data services relating to space technology and geo-informatics



To provide technical services and develop human resources in satellite remote sensing and geo-informatics



To conduct researches and development as well as to implement other activities related to space technology, including the development of small satellites for natural resources survey



To be the core organization to establish common standards for remote sensing and geo-informatics systems

Geo-Informatics and Space Technology Development Agency (Public Organization)

- Under Ministry of Science and Technology
- Provide a service from Satellite Data to Application
- Including Consultation and Capacity Building



Headquarters
(Government Complex- Chaeng Wattana)



Earth Observation Center
(Lad Krabang)



Institute of Space Knowledge Development
(Bangkhen)

Sirindhorn Center for Geo-Informatics



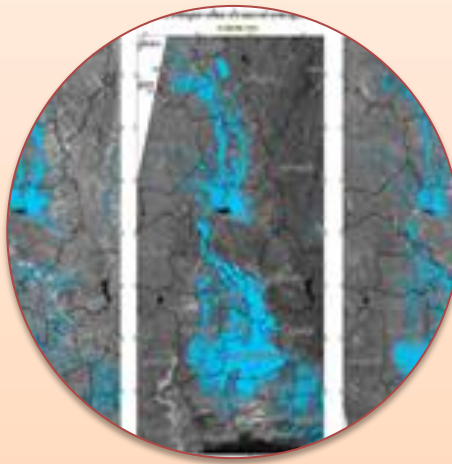
Space Krenovation Park (Sriracha)





Upstream

- Ground Receiving Station
- Resell of Satellite Data
- Coastal Radar System
(Gulf of Thailand)
- Develop/ Implement software for Receiving station



Midstream

- Process Satellite Data
- Value-Added Product
- DEMs
- Mobile Mapping System
- Specific applications such as Disaster, Emergency Response, Coastal Management, Natural Resource Management



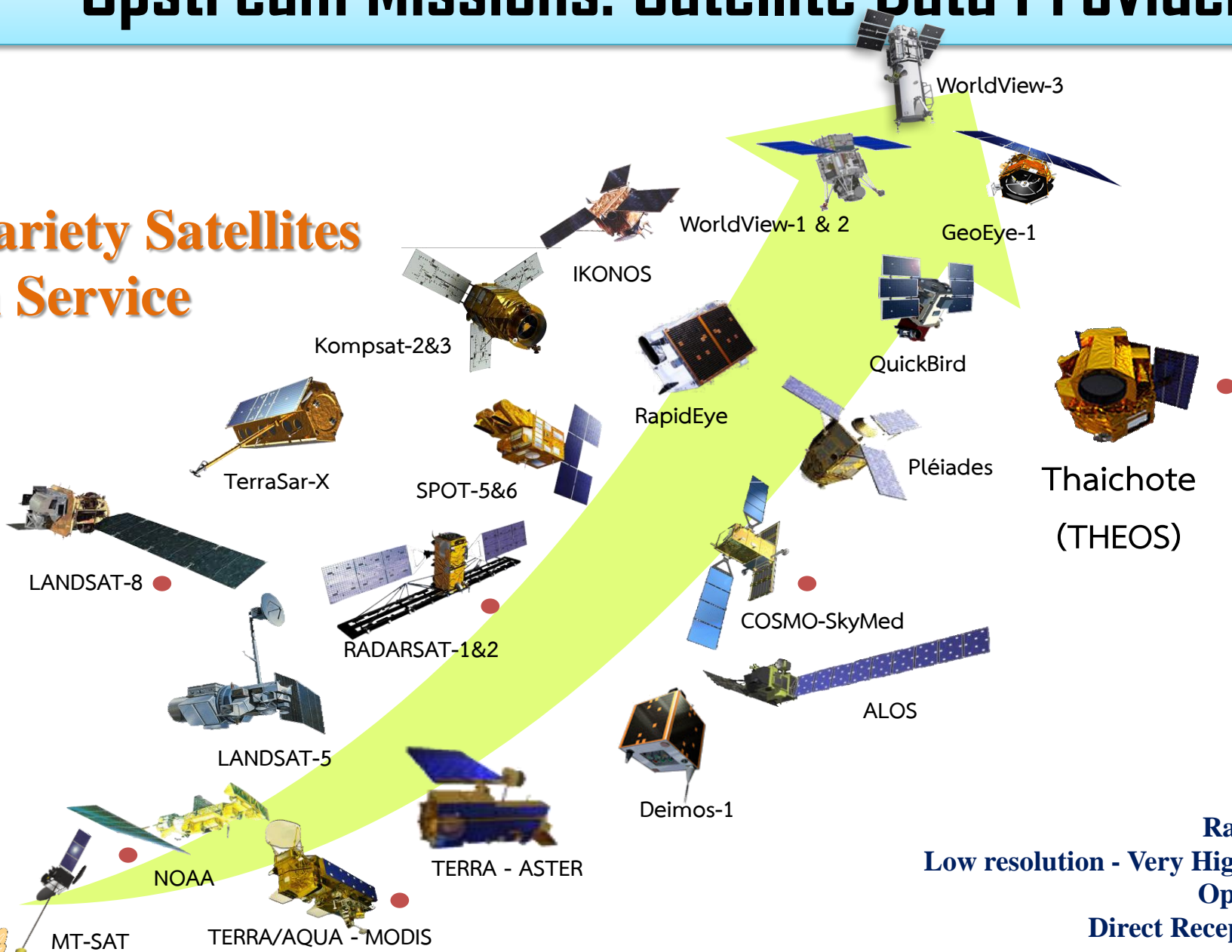
Downstream

- Service to Provincial
- Solution to Private sectors
- TMS
- NSDI
- Collaboration with Public and Private sectors
- Sirindhorn International Center for Geo-informatics

GISTDA Mission/ Service

Upstream Missions: Satellite Data Provider

Variety Satellites in Service



Ranging from :
Low resolution - Very High Resolution
Optical - Radar
Direct Reception - Resell

Thaichote

The first and only EO Satellite of Thailand “Thaichote”, formerly named “THEOS” is operated by Thai (GISTDA), launched on 1 October 2008 by Dnepr Rocket at Yasny base, Russia.



PAN: 2 m. resolution, 22*22 km.
MS: 15 m. resolution, 90*90 km.
4 bands: R, G, B, NIR

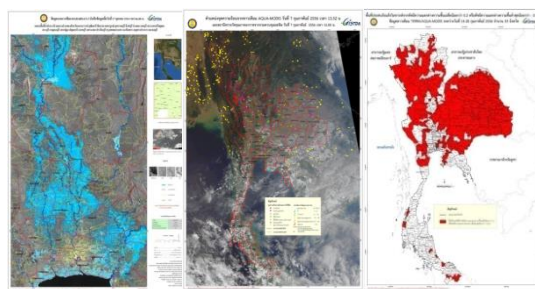
Midstream Missions: Products & Services

*Delivery Channels through
GI Applications*

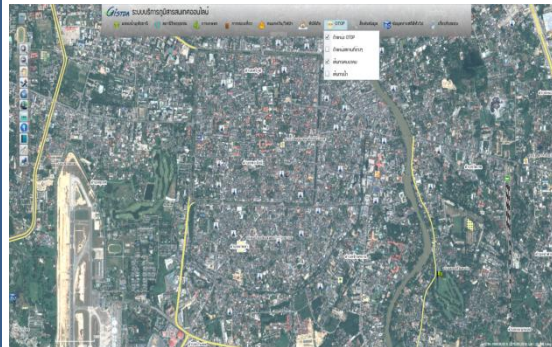
Applications



Agriculture (GISAgro)



Disaster Monitoring



Web Map Service

flood.gistda.or.th

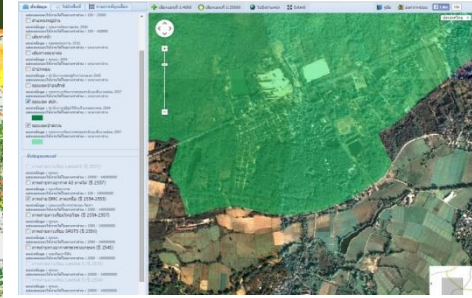
drought.gistda.or.th

fire.gistda.or.th

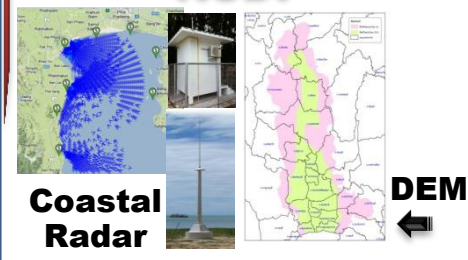
ocean.gistda.or.th

Thailand Monitoring System (TMS)

GISchangwat.gistda



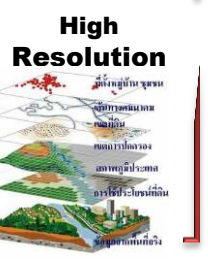
NSDI



Coastal Radar

DEM

Mobile Operation & UAV



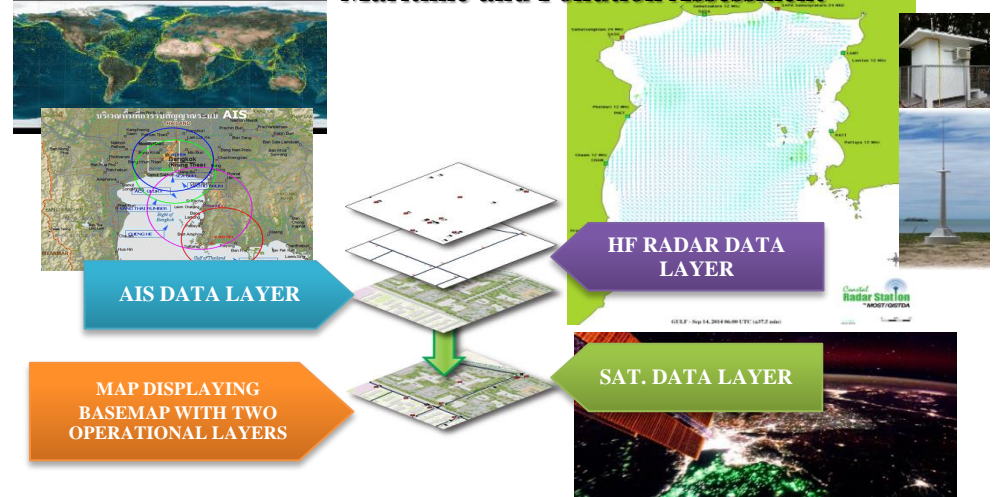
High Resolution

Rice Production Monitoring



rice.gistda.or.th/ricefield/

Maritime and Pollution Assessment



Downstream Missions: Capacity Development & Business

✓ Training Courses by GISTDA

Such as....

- GIS for Beginners
- Satellite Image Processing and Interpretation
- Advanced Modeling in GIS
- Internet GIS and Web Map Server
- GIS Programming using Python
- Surface Analysis and 3D Visualization

...for Local and International Users

Sirindhorn Center for Geo-Informatics (SCGI) at SKP, Sri Racha, Chon Buri Province (inaugurated 20/03/2015)



Capacity Development



Executive Program

Training



Public Awareness

Museum & Learning Center



Training Center



Dormitory Building



Space Inspirium



Why GISTDA....

- ❑ **GISTDA was assigned to be the secretariat of the National Committee on Geo-information: NCGI**

by MOST is secretary and GISTDA is assistant secretary

- ❑ **GISTDA has direct mission, enough resource, and suitable technology.**

For example : Prototype of GI portal/platform,

Knowledge and specialist about Geo-informatics technology,

Hardware and software,

Budget, etc.

National Committee on Geo-information : NCGI

Sub-committee on Policy Directive & Evaluation

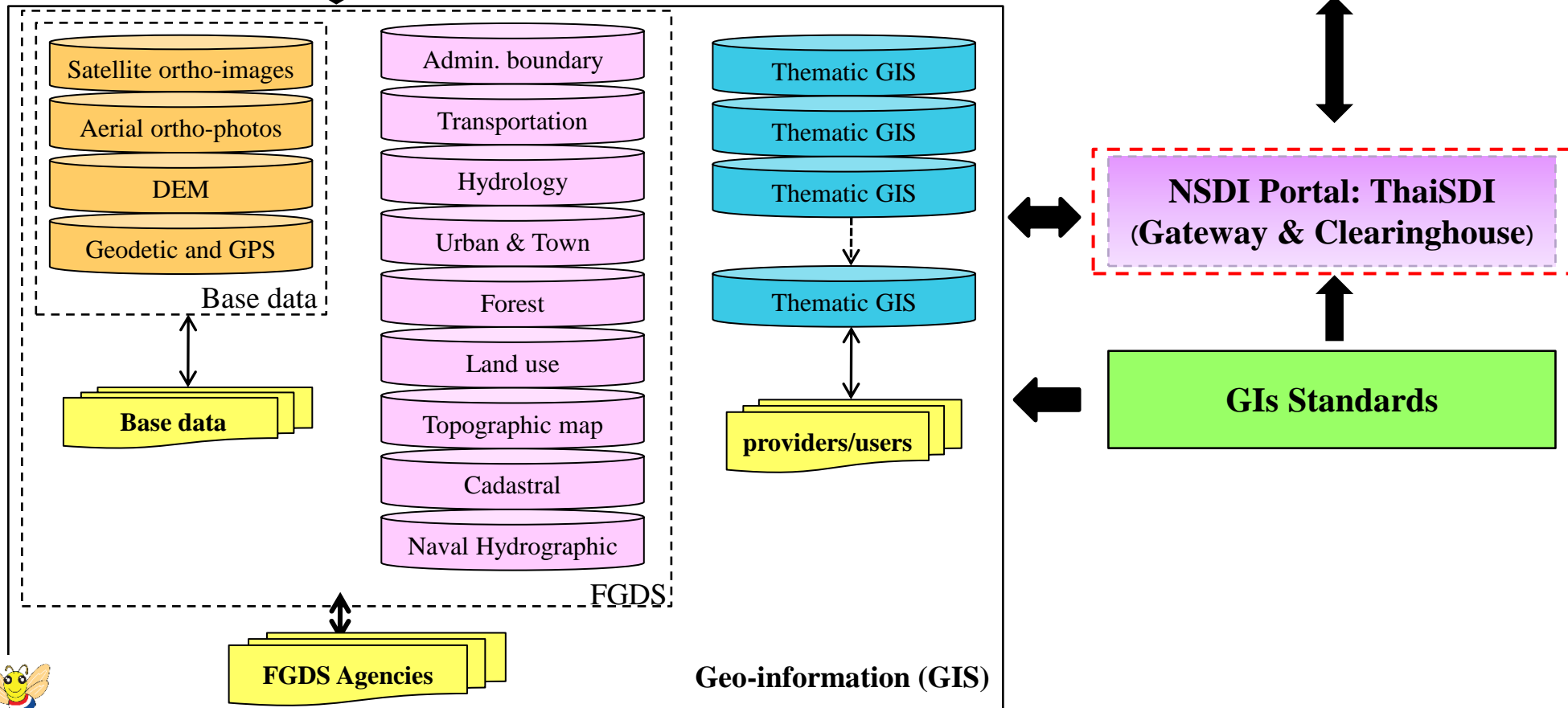
WG on NSDI Action Plan Development

Thailand's NSDI Development and Implementation Framework

NSDI Development and Implementation Action Plan 2011-2015

Capacity Building/ Outreach

Government, Social & Citizens



National Committee on Geo-information : NCGI 2015

Cabinet

NCGI

**Committed Secretariat
(MOST, GISTDA)**

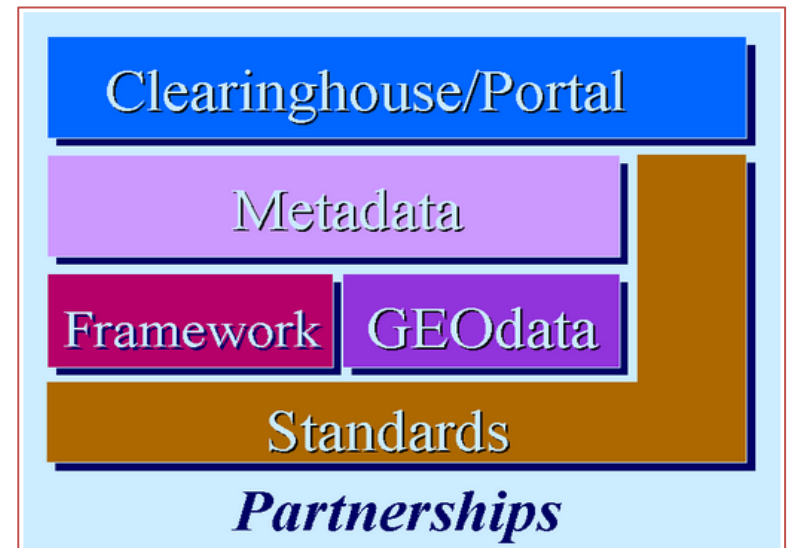
**NSDI Development and Implementation
Action Plan 2011-2015**

NCGI 2016

- Signed by Prayuth Chanocha, Prime Minister of Thailand on 13 September 2015
- Announced at Thai Government Gazette on 23 September 2015
- To drive the policy and Implementation about Geo-informatics, Mapping, and Remote Sensing under GIS Standard for data deduplication and data integration among agencies, also the collaboration to meet the need of user

Thailand NSDI Elements

- Partnerships & Institutional Framework
- Standards
- Fundamental Geographic Data Set: FGDS
- Metadata
- Clearinghouse / Portal



1. Partnerships & Institutional Framework

- ❑ **Management, Resource, Driving**
- ❑ **Institutional framework, collaboration, Stakeholder, and responsibility**
- ❑ **Policy and Implementation**
- ❑ **Rule, Regulation, law**

Policy, Regulation, and Institution framework that leads to collaboration and implementation of Geo-Informatics development

*Users, Providers, Administrators, Custodians, Value Added Resellers, Corporate or Individual
Public or Private
Partnerships, Collaboration*

2. National Standardization

- ❖ **Thai Industrial Standards Institute (TISI)** has mission to develop national standards of products and services to be in line with the requirements and international practices. In 2005, a standard was announced by TISI.
 - National standard: Metadata (TISI.19115-2005) (adopted ISO/TC211)
- ❖ **Geo-Informatics and Space Technology Development Agency (GISTDA)** is core organization to establish common standards for remote sensing and geo-informatics systems.
 - Study on National Standard (ISO/TC211) and 23 standards were announced
- ❖ **National Committee on Geo-information: NCGI** established sub-committee to study and develop GI Standard and announced 14 standards in 2012.
 - NCIG standard: 14 standards in 2012 (adapted ISO/TC211)



3. Fundamental Geographic Data Set: FGDS

□ 13 FGDS Layers which defined by National Committee on Geo-information: NCGI

1. Aerial photos

2. Satellite images

3. Geodetic control monuments

4. DEM

Base Data

5. Administrative boundary

6. Transportation network

7. Hydrology

8. Urban and town

9. Land use

10. Forest boundary

11. Topographic map (image)

12. Cadastral

13. Naval hydrographic

✓ National map scales: 1:4,000 / 1:10,000 / 1:25,000 / 1:50,000 / 1:250,000

✓ **FGDS is very essential and will create direct, tangible benefit in supporting GIS development in both public and private agencies.**

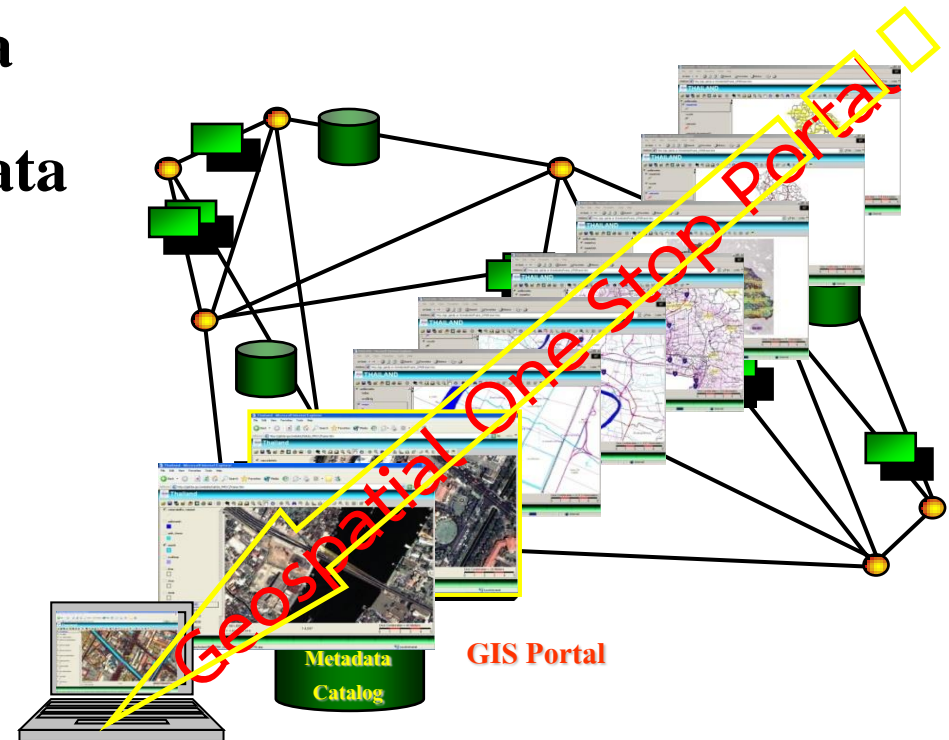
4. Metadata

- ❑ For search and access by Spatial Data Clearinghouse (Discovery Metadata)
- ❑ For managed and Detailed data
- ❑ GISTDA developed Metadata program, name's Metadata Editor and try to promote Metadata Online

data that provides information about other data to facilitate in the discovery of relevant information.

5. Clearinghouse / Portal

- FGDS and other Geo-informatics data Searching service
- Display all Geo-informatics data
- Analyzing and Processing the data
- Online Maps
- Metadata
- WMS, WFS, WCS



*Online platform That can access and download map data as portal,
Also metadata service for searching and describe the data*

Outreach and Capacity Building

National Spatial Data Infrastructure (NSDI)

- ❖ Arrange workshop “Data preparing and sharing through web map service for local institution ” for local official and local network of Regional Centers of Geo-informatics and Space Technology (5 Centers).
 - More than 4 times per year
 - Participants not less than 300 persons per year
- ❖ Arrange the conference, seminar, and Training to enhance awareness and promote utilization of spatial data among agencies to support public and private sectors applications of geospatial data, also evaluate and summary annual output and outcome



SDI in ASEAN

Country	Operator	Agency's type
Malaysia	Malaysian Center for Geospatial Data Infrastructure (MaCGDI), Ministry of Natural Resource and Environment	Government
Singapore	Singapore Land Authority (SLA), Ministry of Law	Government
Philippine	Department of Environment and natural Resources (DENR)	Government
Indonesia	Indonesia National Spatial Data/ NTT DATA	Government collaborate with Private Sector
Brunei	Survey Department, Ministry of Development	Government
Cambodia	Cambodian Ministry of Land Management, Urban Planning and Construction	Government
Laos	National Geographic Department, Prime Minister Office	Government
Vietnam	Ministry of Natural Resources and Environment (MONRE)	Government
Myanmar	The UN Country Team and Humanitarian Country Team	UN

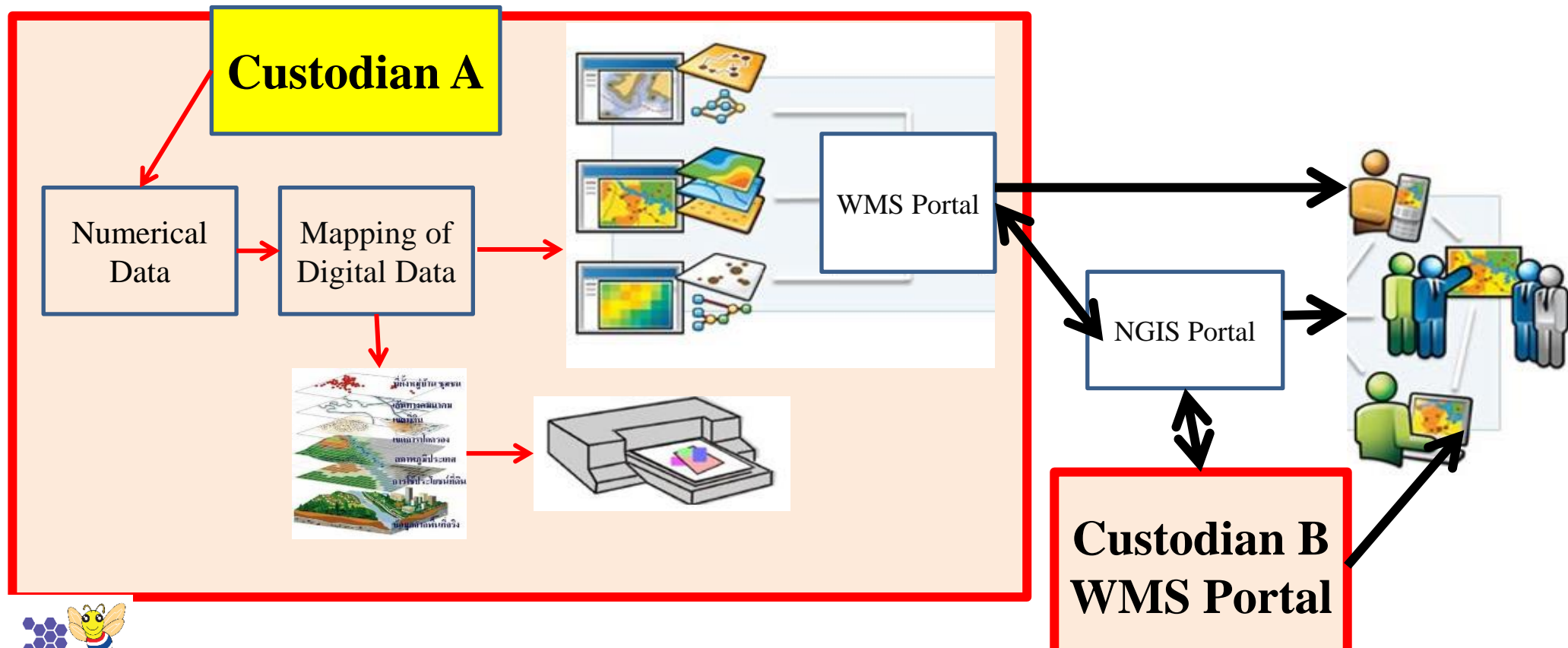
But...

The problem of Thailand's NSDI Development

- Conflict of agencies policy,
- Differentiate of data standard,
- Limitation of data sharing,
- Lack of expert and human resource,
- Lack of infrastructure,
- Lack of budget, etc.

Online Mapping Service Technology

A **Web Map Service (WMS)** is a **standard protocol** for serving georeferenced map images over the Internet that are generated by a map server using data from a GIS database. The specification was developed and first published by the Open Geospatial Consortium in 1999. (Source: http://en.wikipedia.org/wiki/Web_Map_Service)



Web Map Service (Cont.)

Please notice:

1. The Concordance of positioning accuracy of each map layers.
2. Software for mapping service (WMS)
 - Commercial Software : high cost
 - Open source Software : need developer and programmer
 - No package software that ready to use, as Plug and play
3. The difference of data production standard.
4. Gap of rule and regulation, which don't cover the serving of online digital data.

NGIS

National Geo-Informatics Infrastructure Services Portal: NGIS Map Portal



<http://www.ngis.go.th/home/>

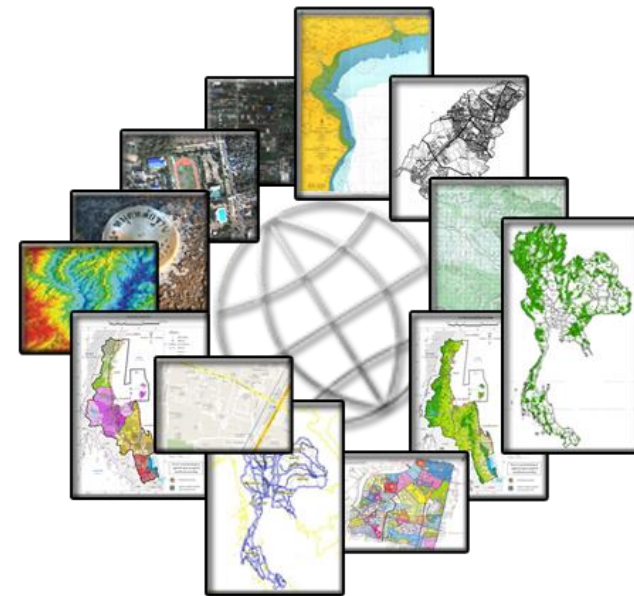
National Geo-Informatics Infrastructure Service Portal (NGIS Map Portal)

Concept of NGIS Map Portal...

1. NGIS is not NEW
2. Implement from the government policy
 - Statement of the Prime Minister on 6 January 2015
 - Cabinet resolution on 20 January 2015

NGIS Map Portal purpose to....

- Share** Map/Image
- Integrate** Map/Image
- Access** from anywhere and anytime



Output

2019

- Service all types of data (WMS, WFS and Catalogue Service) through **NGIS Portal** to all sector
- Data analyzing (Web Processing Service), own map creating
- Service FGDS of all Thailand in WFS format

2018

- Service all of data in WMS and WFS through **NGIS Portal** to all government agencies
- Catalogue Service searching through **NGIS Portal**
- Service FGDS of 40 provinces in WFS format through **NSDI Portal**

2017

- Service map images of all data producer in WMS format through **NGIS Map Portal**
- Service FGDS of 15 provinces in WFS format through **NSDI Portal**

2016

- Service map images in WMS format through **NGIS Map Portal**
- Service FGDS of a province in WFS format through **NSDI Portal**

National GIS Portal Framework

NGIS Portal

NGIS Portal

- National GIS Portal that can provide all types of data and service (WMS, WFS, and WCS).
- Also, Metadata servicing, data analyzing, Map creating, application developing on portal

NGIS Map Portal



NGIS Map Portal :

- Established under Roadmap of integrated the utilization of Mapping, Satellite image and remote sensing
- From cabinet resolution on 20 January 2015
- Promoted the data service in WMS

GI Portal

GISAgro

GISTDA Terminal

TMS

Other

PM

- PM Agro
- PM Social
- PM Space
- PM GGP

NSDI Portal



NSDI Portal:

- Portal for FGDS data or other data service that produce by GI Standard or FGDS Standard in WMS, WFS, WCS format, include metadata service.

FGDS

การรวบรวมและเชื่อมโยงข้อมูลมาตรฐาน

หน่วยงาน FGDS	FGDS	ชั้นข้อมูล FGDS
1. กรมการปกครอง		ภาคจัดการพื้นที่
2. กรมชลประทาน		ภาคข้อมูลภาค
3. กรมทรัพยากรน้ำ		รวมข้อมูลระดับ
4. กรมทรัพยากรน้ำบาดาล		รวมข้อมูลระดับ
5. กรมทางหลวง		รวมข้อมูลระดับ
6. กรมทางหลวงชนบท		รวมข้อมูลระดับ
7. กรมที่ดิน		รวมข้อมูลระดับ
8. กรมเจ้าท่า		รวมข้อมูลระดับ
9. กรมประมง		รวมข้อมูลระดับ
10. กรมแผนที่ทหาร		รวมข้อมูลระดับ
11. กรมพัฒนาที่ดิน		รวมข้อมูลระดับ
12. กรมปศุสัตว์		รวมข้อมูลระดับ
13. กรมส่งเสริมการเกษตร		รวมข้อมูลระดับ
14. กรมส่งเสริมการค้าระหว่างประเทศ		รวมข้อมูลระดับ
15. กรมส่งเสริมการค้าระหว่างประเทศ		รวมข้อมูลระดับ
16. กรมส่งเสริมการค้าระหว่างประเทศ		รวมข้อมูลระดับ
17. สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ		รวมข้อมูลระดับ
18. สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ		รวมข้อมูลระดับ
19. สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ		รวมข้อมูลระดับ
20. สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ		รวมข้อมูลระดับ
21. สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ		รวมข้อมูลระดับ



Comparison ...

Data service & Web Map Service

	Data	Web Map Service
Raw data needed	✓	X
Data revised	✓	X
Scale zoom	✓	✓ (but have limitation)
Processed and Calculated	✓	X
Data updated	Depend on data collected	Depend on data provider updated
Attribute/ Style editing	✓	Limitation
Internet	No need	Need
Create map for printing and using	✓	✓ (but have limitation)

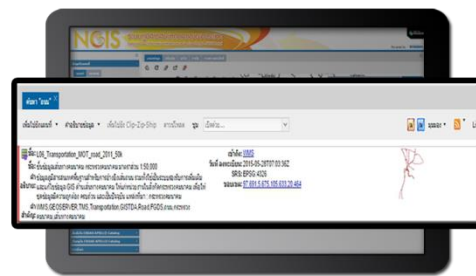
National Geo-Informatics Infrastructure Service Portal (NGIS Map Portal) (Cont.)

Function...NGIS Map Portal ?

- ✓ Search all map from all government agencies
- ✓ Select your needed map layers
- ✓ Create application on portal
- ✓ Map is accurate/ **update**/ **ready to use**
- ✓ **No cost**
- ✓ Map/Image is accurate depend on each data owner/provider standard



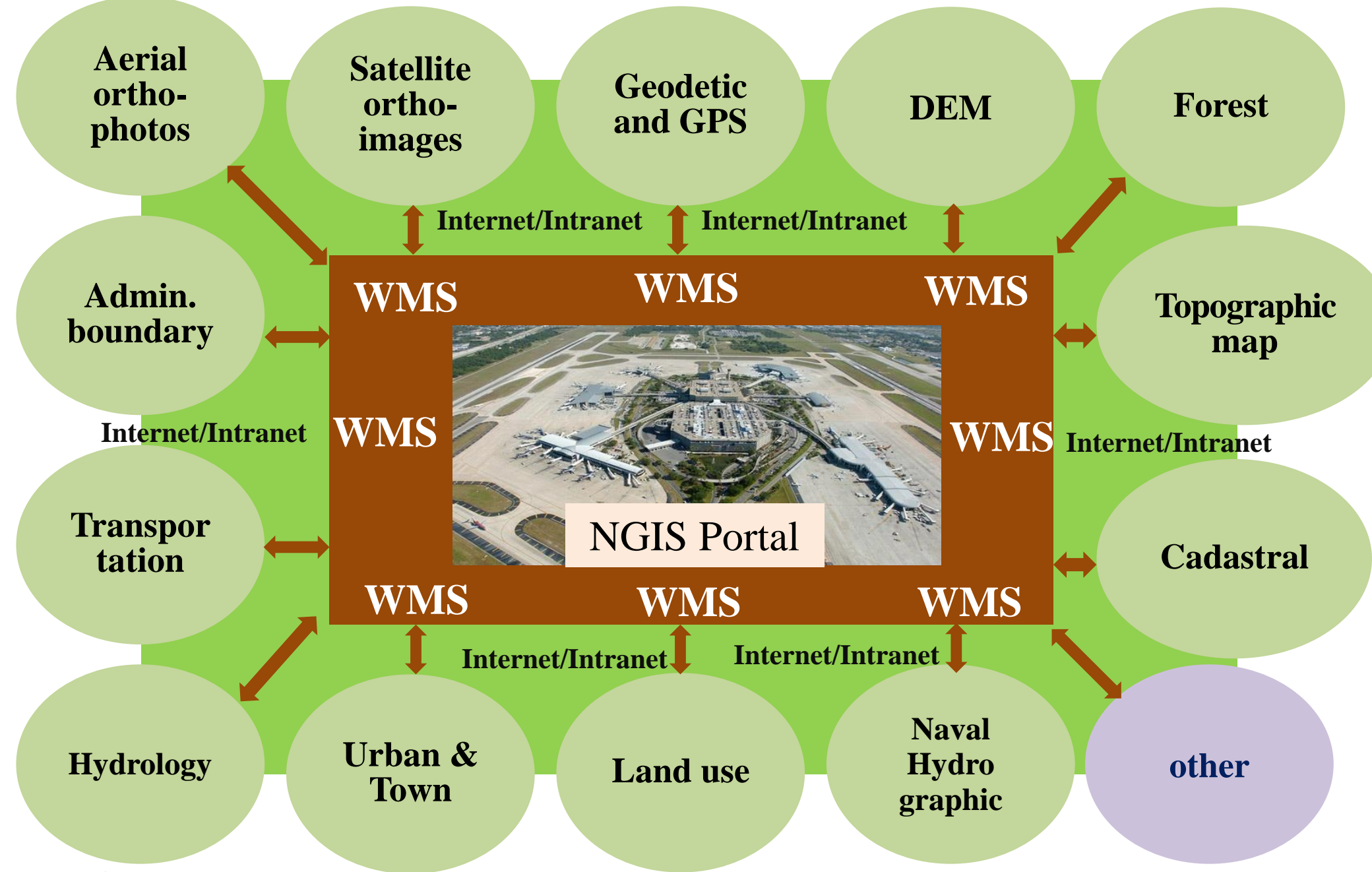
ค้นหาง่าย



สืบค้นได้รวดเร็ว



แสดงผลทันใจ



NGIS Map Portal with FGDS

Map Sharing on NGIS Map Portal

❖ 316 map layers shared through NGIS Map Portal

❖ Shared by 21 organizations

EGDS

1. Aerial photos 9 Layers
2. Satellite images 8 Layers
3. Geodetic control monuments (-)
4. DEM 4 Layers
5. Administrative boundary 11 Layers
6. Transportation network 20 Layers
7. Hydrology 23 Layers
8. Urban and town 7 Layers
9. Land use 16 Layers
10. Forest boundary 17 Layers
11. Topographic map (image) (-)
12. Cadastral 8 Layers
13. Naval hydrographic 14 Layers
14. Other 173 Layers
15. Monitoring 6 Layers

1. Royal Thai Survey Department 1 Layer
2. Department of Lands 36 Layers
3. Department of Agricultural Extension 2 Layers
4. Department of City Planning 17 Layers
5. Phetchabun province 67 Layers
6. Ministry of Transport 11 Layers
7. Ministry of Natural resource and environment 5 Layers
8. Department of Alternative Energy Development and Efficiency 35 Layers
9. Department of Mineral Resources 15 Layers
10. Directorate Intelligence 1 Layer
11. Designated Areas for Sustainable Tourism Administration 39 Layers
12. Land Development Department 2 Layers
13. GISTDA 26 Layers
14. Department of Groundwater Resource 2 Layers
15. Office of Agricultural Economics 2 Layers
16. CSRS 3 Layers
17. Royal Irrigation Department 3 Layers
18. Department of rural road 4 Layers
19. Department of National Parks, Wildlife and Plant Conservation 3 Layers
20. Department of Public Works and Town & Country Planning 1 Layer
21. Regional Centers of Geo-informatics and Space Technology 28 Layers