
Interoperability Arrangements

-- from syntactic to semantic interoperability --

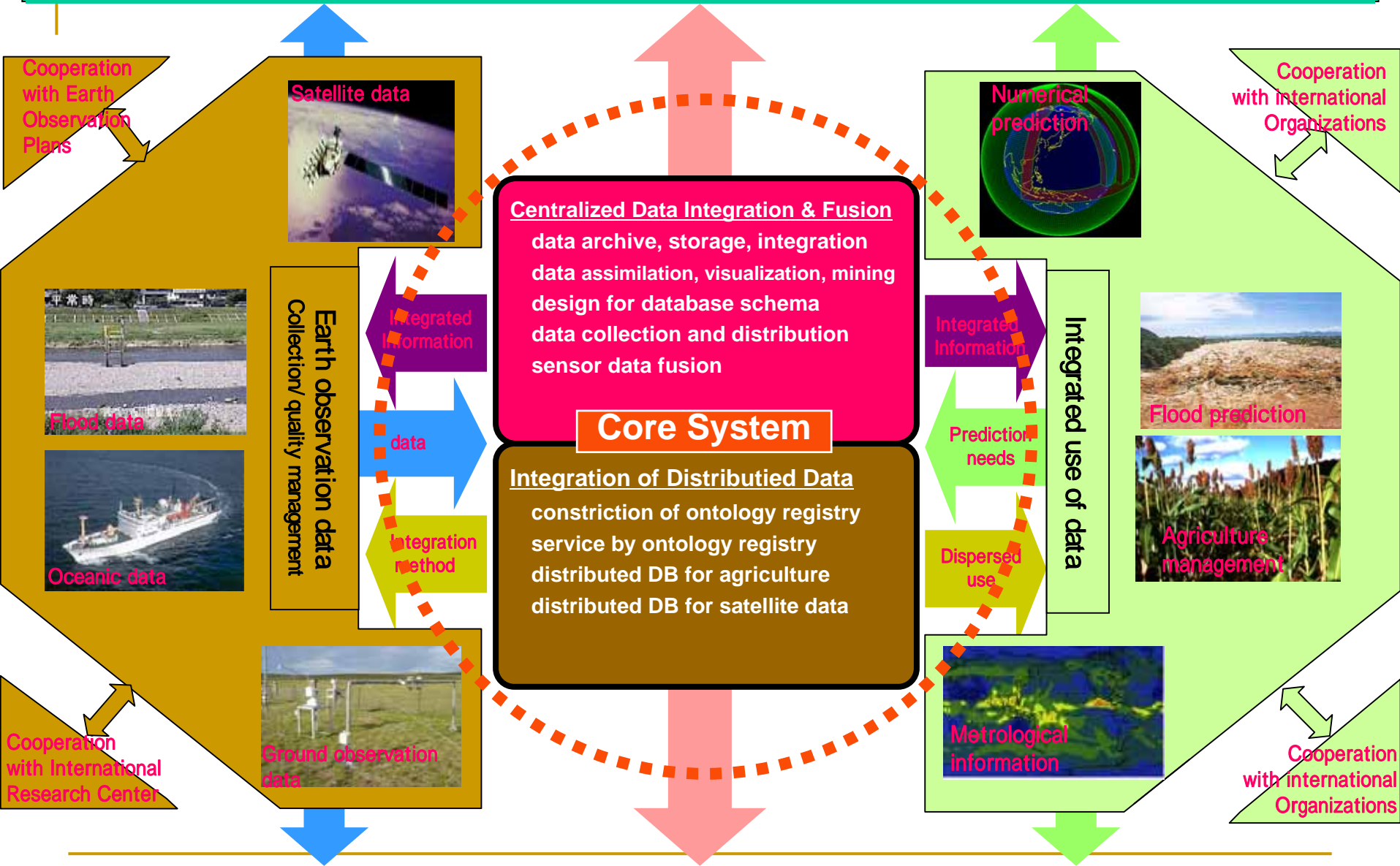
The University of Tokyo
Center for Spatial Information Science
Ryosuke Shibasaki

2nd Asian Water Cycle Symposium

Date : Jan. 09th~10th, 2007

Venue : "KOSHIBA Hall" in the Faculty of Science Building_1, in Hongo Campus, the University of Tokyo

For Social Needs



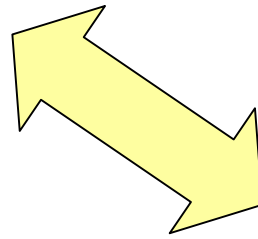
Create new Knowledge for Earth System Science

Two aspects of data interoperability

BSQ,
BIL, NetCDF,
BUFR etc.

Syntax

**Data format,
Interface definition,
HTML, XML etc.
(ISO, OGC etc.)**



Semantics

**Definition of data,
Data names,
Terminology etc.**

Air_Temp

Temp

Kion (気温)

ONTOLOGY

What is Ontology?

Philosophical word

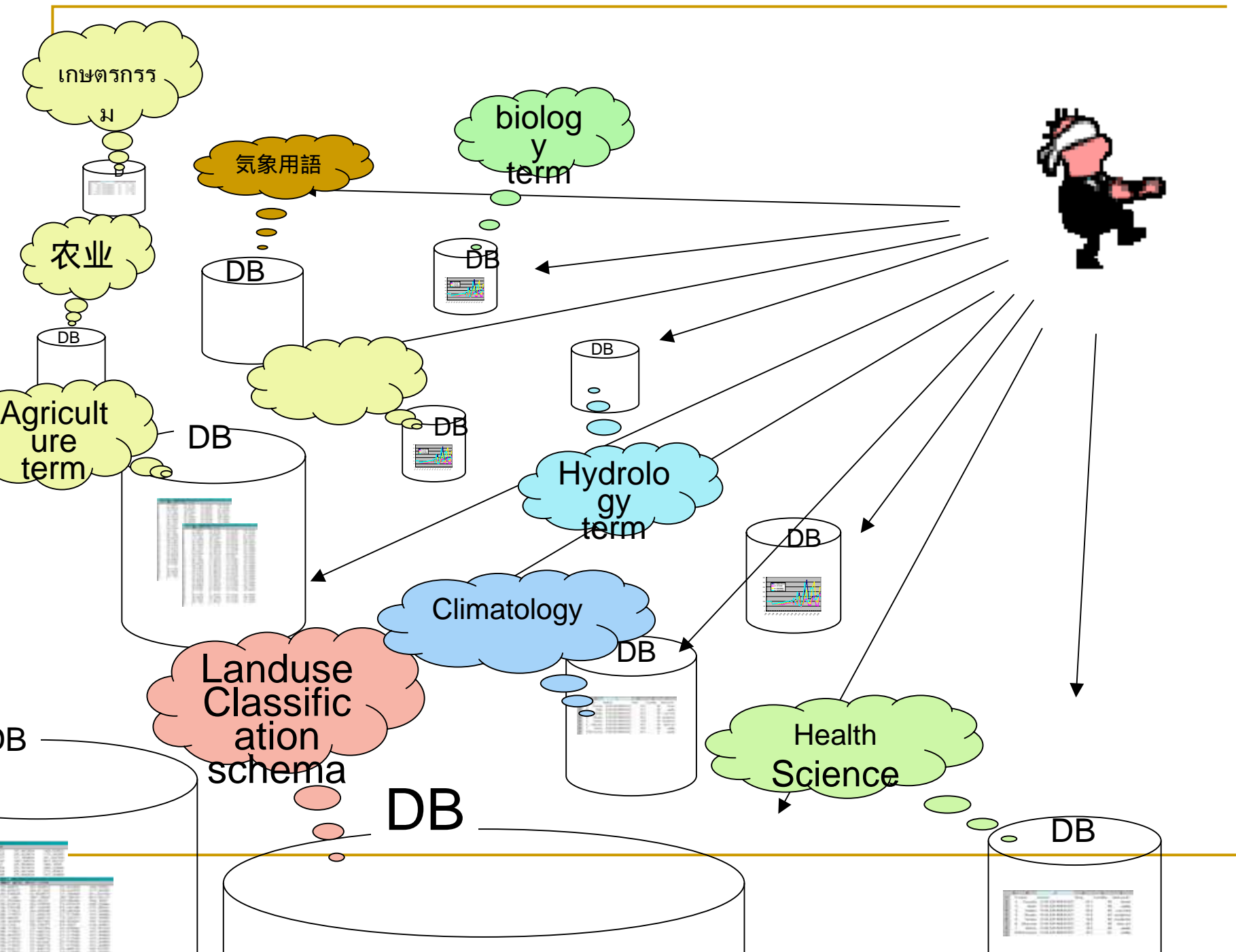
The branch of **metaphysics** that deals with the **nature of being**
in the context of knowledge sharing

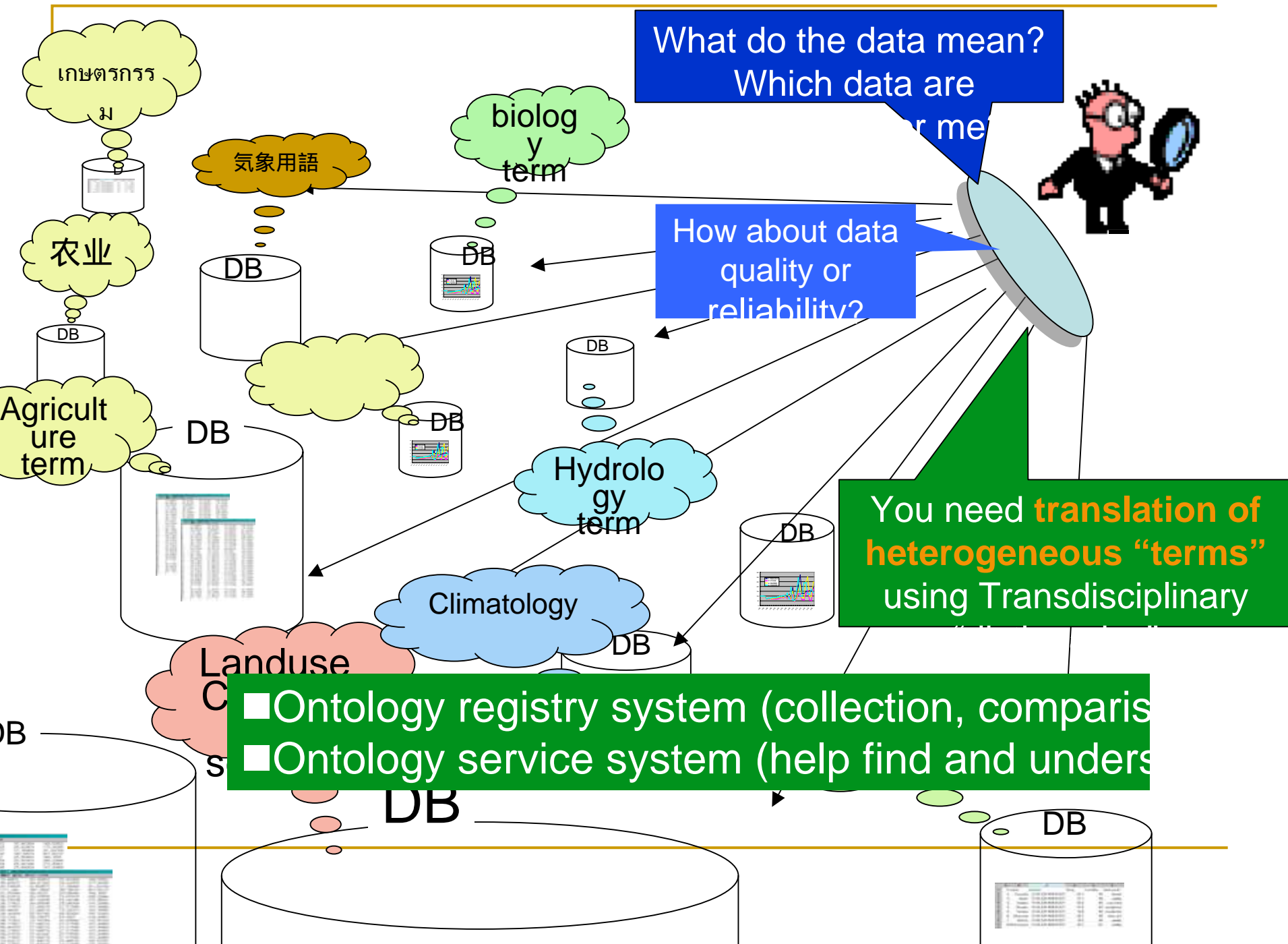
The term ontology to mean a *specification of a conceptualization*.

That is, an ontology is a **description of the concepts and relationships** that can exist for an agent or a community of agents.

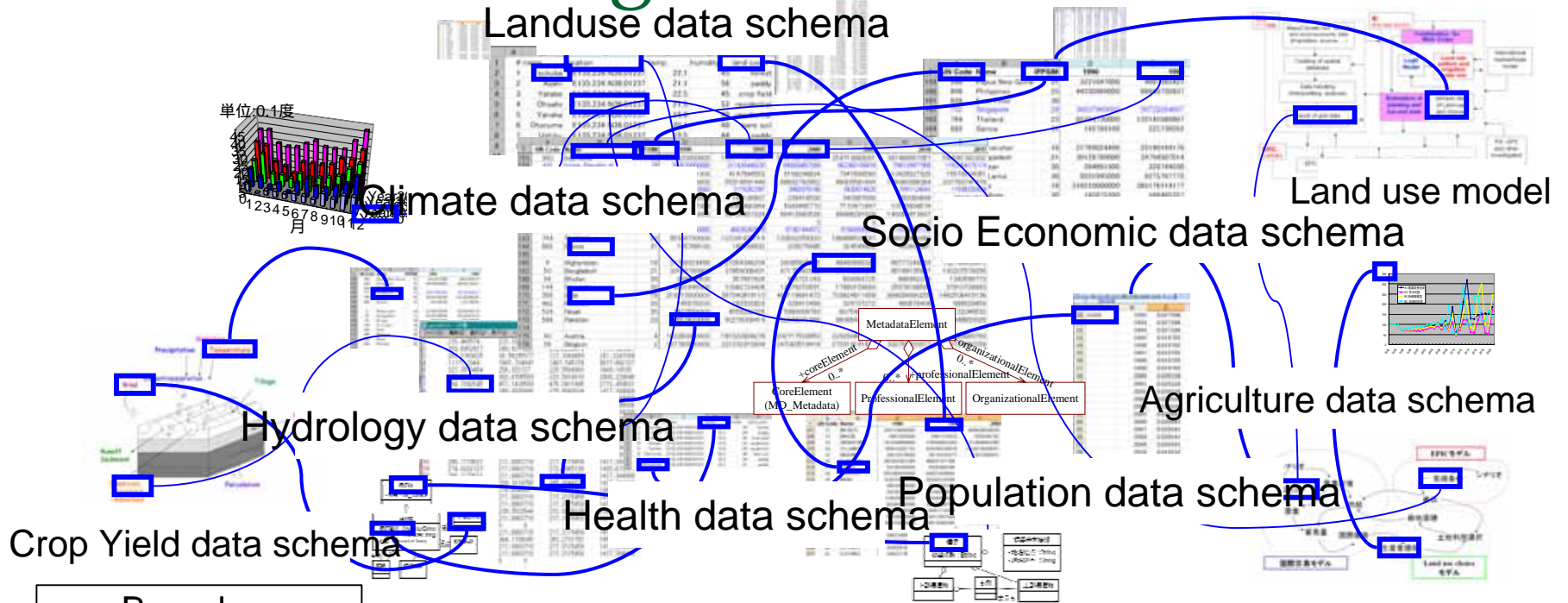
This definition is consistent with the usage of ontology as **set-of-concept-definitions**, but more general.

And it is surely a different sense of the word than its use in philosophy.





Use of Ontological Information



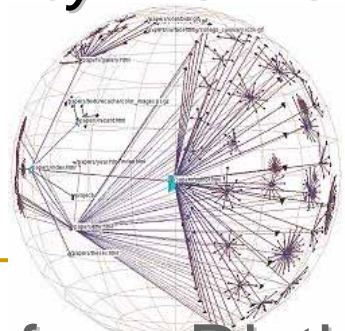
Based on dictionary of various fields, data model, or name space.

Data integration by intermediation of Ontology

Based on Gazetteer, Land use schema, Maps.

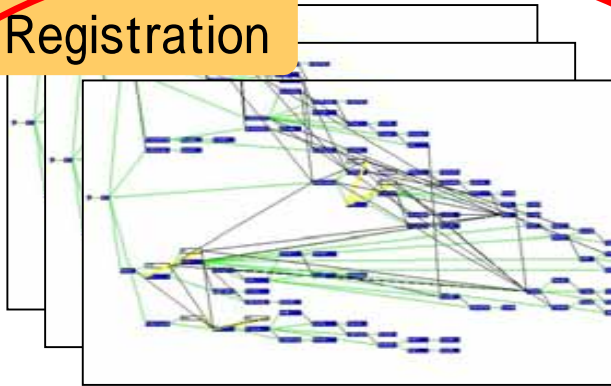
Ontology from Dictionary

Geographic Ontology



Framework for ontological information

(1) Registration

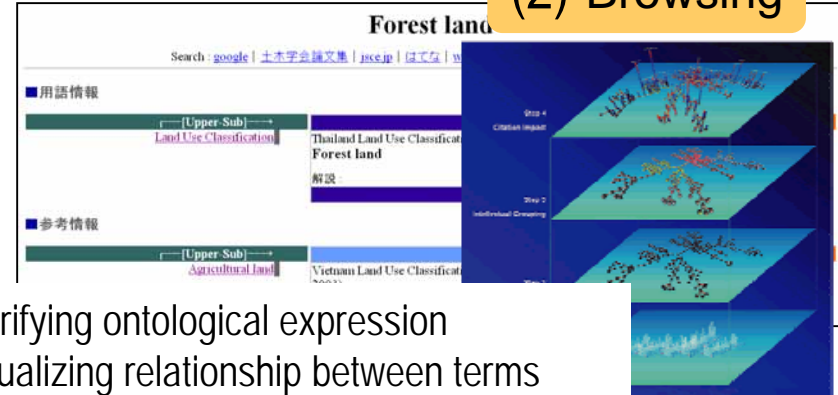


Correction and registration of Ontology

Created ontology is registered to the system again.

Ontology Registry System

(2) Browsing



Clarifying ontological expression
Visualizing relationship between terms
→ Providing reference information to users

Support of technical term

Information retrieval

Data Integration

Constriction of data model

(4) Utilization

Providing integrated ontology
Utilizing as knowledge

Modification of registered information on the system
→ newest information

(3) Modification

Data collection from existing dictionaries

Geography

Earth Science

Agriculture

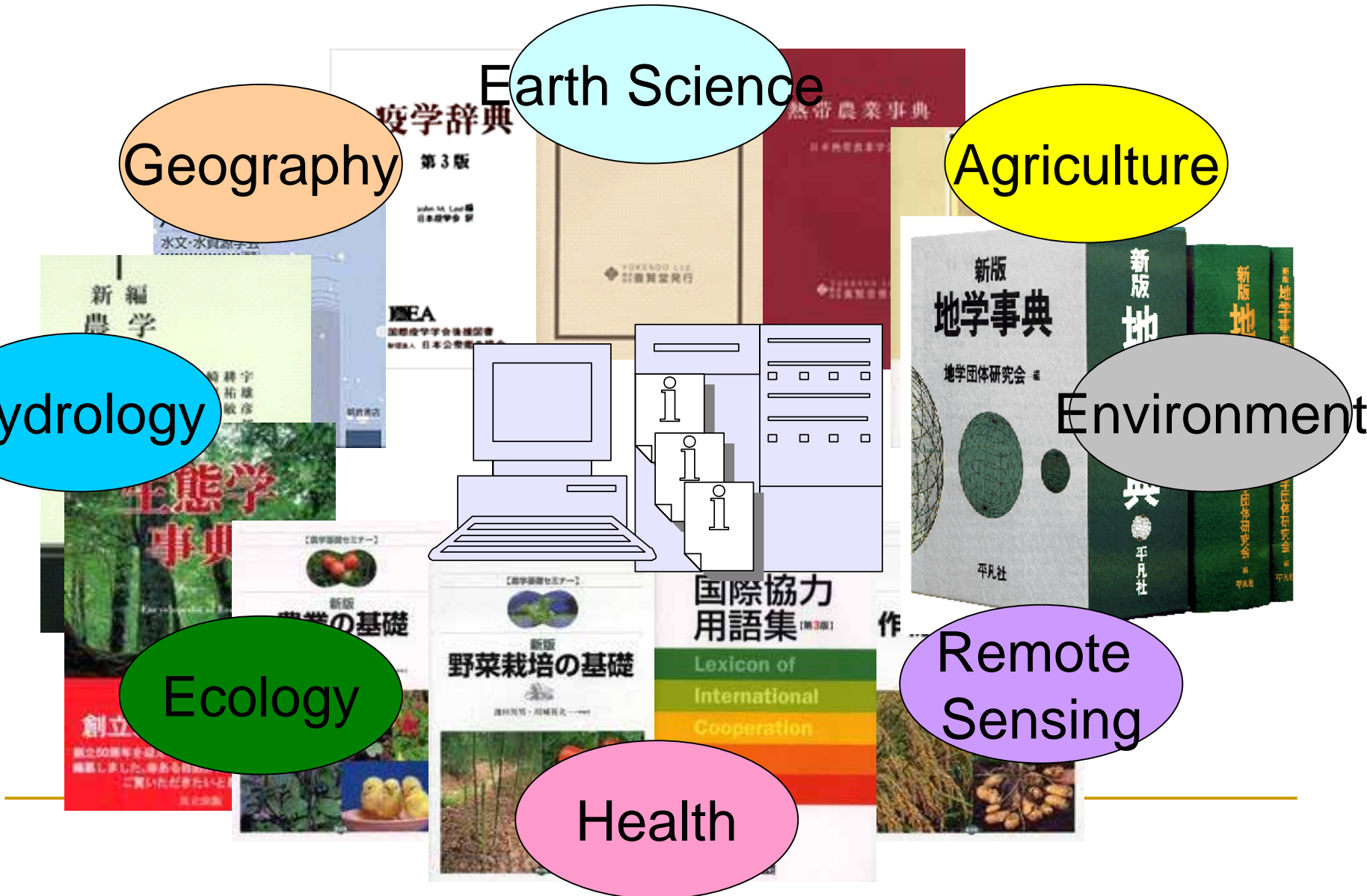
Hydrology

Environment

Ecology

Remote Sensing

Health



Digitize from paper dictionaries

る物を準備する必要がある。一例としてジオアクト製AFI型を示す(写真2)。本機の特徴は、パイプ製の土台に固定した支柱上部に、ピストンに連結した内容ロッドを固定したことで、内容ロッドに連結したコアチューブ(内径75mm)をワイシャツの力を利用して貫入させる点にある。貫入時に生じる上方への反発力に対しては、2本のアンカーを土壌中におさまし、それを土台に固定することにより逆発の反発力に対しては耐え得るよう工夫されている。

6 土壌コアサンプリング法 21

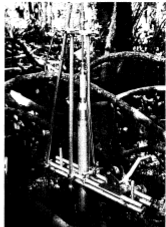


写真2 固定ピストン式シウォールサンプリャー (ジオアクト製AFI型)

調査方法

【小型エンジン付きハンドボーリング機】 掘削地点を決め、地表面の被覆物をはが取る。なるべく多くの人(2~5人)で機械を支える。しっかり支持しないと機械自体が回転し危険である。エンジンを始動し、鉛直を維持しながらゆっくり回転数を上げ、それと共に全員で下方に力を加え掘削する。1回に30~40cm程度掘削可能であるが、湿みにくくなった場合にはコアチューブ内の材料を一旦回収し、再度掘削にあたり、掘削方向が変化するのを防ぐ。採取された材料は水圧式のコア押し出し器(写真3)を用いて取り出す。

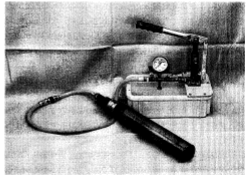
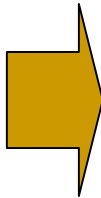


写真3 水圧式コア押し出し器

【固定ピストン式シウォールサンプリャー】 径の大きな生根は掘削の際の大きな妨げとなるため、立木の直近を避けて掘削地点を決定し、土台を設置する。サンプリャーが正しく鉛直となるよう調整し、内容ロッドを支柱上部に固定する。コアチューブを貫入させ、地表面から順次試料を採取する。掘削深度に合わせ、内容ロッドと外管ロッドを測定記録する。サンプリャーを掘削孔に挿入する際、コアチューブ先端部の掘削孔の位置を照り取ることでコアチューブ内に芯が挿入し、コアチューブ下部にセットしたピストンが上方に移動することによってコアチューブ内に芯が挿入し、コアチューブを貫入させる。コアチューブ内に採取された試料は、コアチューブの内径よりやや径の小さい径をコアチューブ上方から挿入し、ゆっくり押し出してやることにより、容易に回収できる。(藤本 謙吉 他)



```
<?xml version="1.0" encoding="utf-8" ?>
- <mediawiki xmlns="http://www.mediawiki.org/xml/export-0.3/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:oru="http://shiba.iis.u-tokyo.ac.jp/oru/xml/export-0.1/"
  xsi:schemaLocation="http://www.mediawiki.org/xml/export-0.3/ http://www.mediawiki.org/xml/export-0.3.xsd"
  version="0.3" xml:lang="ja">
```

```
- <page>
  <title>IBP</title>
- <revision>
  <timestamp>2006-07-05T01:04:07Z</timestamp>
- <contributor>
  <ip>Direct Import</ip>
</contributor>
<text>1965年から10年間行われた国際生物学事業計画で、七つの部門から構成されていた。すなわち、(1)陸上生態系の生産力、(2)生産過程、(3)陸上生態系の自然保護、(4)陸水生態系の生産力、(5)海洋生態系の生産力、(6)天然資源の利用と管理、(7)人間の適応性である。特に生態学をうたったわけではないが、生態学的な野外調査や実験を土台にして、互いに比較可能なデータをとることに努力した。これらの基礎的資料により、地球上における人間の今後の生活とそれを支える生物生産力の可能性を推定しようという考え方が根拠にあった。そのような背景はあったものの、これは国際学術連合会議(ICSU)の企画になる基礎科学的な研究を中核としたもので、より人間生活に関連した問題については次のMAB率計画で検討されることとなった</text>
<oru:attribute attr_name="読み">アイビーピー</oru:attribute>
<oru:attribute attr_name="著者">沼田</oru:attribute>
<oru:attribute attr_name="関連" />
<oru:attribute attr_name="ページ">1</oru:attribute>
<oru:attribute attr_name="画像" />
```

```
</revision>
</page>
- <page>
  <title>アウフワクス</title>
- <revision>
  <timestamp>2006-07-05T01:04:07Z</timestamp>
- <contributor>
  <ip>Direct Import</ip>
</contributor>
<text>(附着生物)陸水・海水を問わず、底面から突出している岩礫や植物遺体、あるいは水草や大型藻類などの生きている体表面に附着生活を営む生物群(Auf-wuchs)。藻類についてはとくに附着藻類群(ペリフィトン)ともいう。附着生物は底生生物*と区別される場合がある一方、周底生生物群系と呼んで、生活の場の違いに従って類別される底生生物中の一類の意に用い
```

Collection of Gazetteer



NATIONAL GEOGRAPHIC INTELLIGENCE AGENCY

GEOnet Names Server

Names Files of Selected Countries

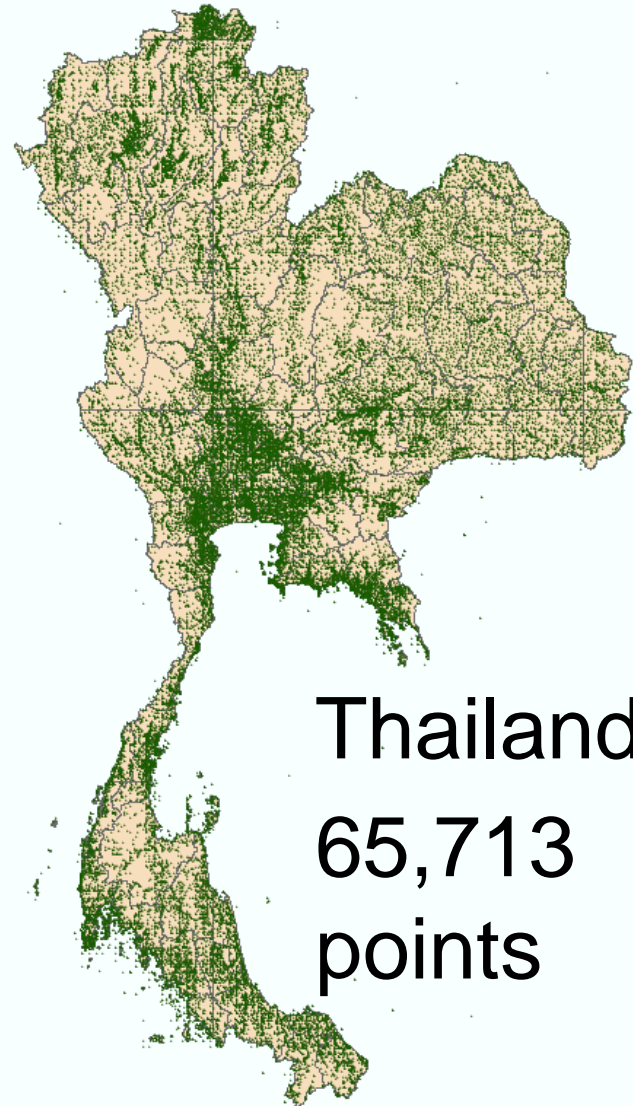
- **Geographic Area of Coverage:** Worldwide excluding the United States and Antarctica
- The files contain names for all types of features
- **Collection of files:** in country files
- Names are in **reading order**
- Data is in **tab-delimited text, UTF-8 (DORIS, ISO6)** (UNICODE) Compliant format.
- **Date Generated** indicates when the file was generated from the database.
- **Most Recent Modification Date** indicates when any entry in the file was last modified.
- **Most Recent Source Date** indicates when the source used to verify the name spelling was published.
- Files are in **compressed zip** format.
- To download a country, click on its name under the **Country File** column.
- **Download a single compressed (zip) file that contains the entire country files dataset** - ~190MB compressed, ~760MB uncompressed, generated on 2006-03-01 generated approximately once per month.

The country files are also available in our [ETD](#) site. The files have the same name, date, size, and file type.

Index

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Country File	Country Code	Date Generated	Most Recent Modification Date	Most Recent Source Date
AFGHANISTAN - (Etag) - (GEOnet Home Page)	AF	2005-03-08	2006-01	2006-03
ALBANIA	AL	2005-04-04	2005-03	2003-09
ALGERIA	AG	2005-01-17	2006-01	2005-07
ANDORRA	AN	2004-10-30	2004-05	2000-08



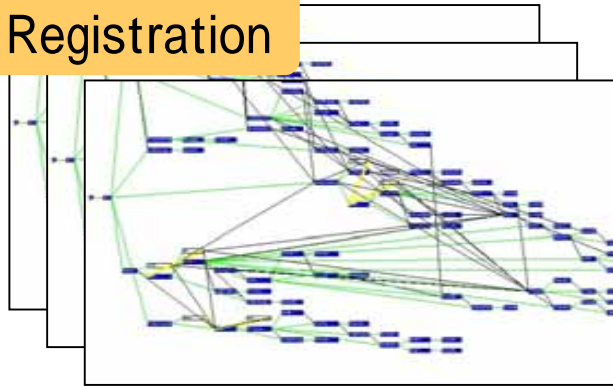
Thailand
65,713
points

- Landuse
- Landmark
-

Geography

Framework for ontological information

(1) Registration



Correction and registration of Ontology

Created ontology is registered to the system again.

Ontology Registry System

(2) Browsing

Clarifying ontological expression
 Visualizing relationship between terms
 → Providing reference information to users

Assist of Technical term

Information retrieval

Data Integration

Constriction of data model

(4) Utilization

Providing integrated ontology
 Utilizing as knowledge

Modification of registered information on the system
 → newest information

(3) Modification

Browsing of Semantic Network Dictionary System

[Top]

Dictionary of Natural Resource Management: 2434
Forest land [v](#)
Description : 1 in the timber management sense, forest land is that land designated as being capable of, and presently intended for, the growth and harvest of trees. In this sense, forest land is usually classified as productive (i.e., capable of growing trees of the desired species and within a desired time frame) or non-productive (i.e., not capable of producing a timber crop of the desired species within a desired time frame), 2 In the forest management sense, forest land is land currently, or in the recent past, or intended to be in the near future, under a forest cover of some type and successional stage, regardless of the functions possible or intended. Forest land in this sense has the capability of supporting many different functions and outputs, including recreation, aesthetics, wildlife habitat, water quality and quantity regulation, hunting and gathering opportunities for indigenous peoples, and maintenance of a wide array of ecological functions and processes, in addition to the narrower sense of provision of timber.

Link to MediaWiki Description

Get from each MediaWiki site via http

Link to MediaWiki Editing page

← [Upper-Sub] →
[Land Use Classification](#)

Thailand Land Use Classification (by LDD): 3
Forest land [v](#)
Description :

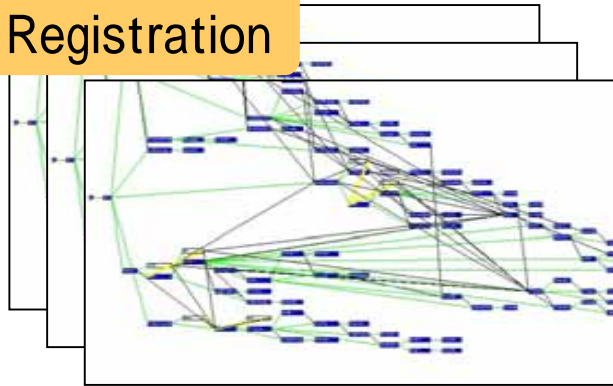
→ [Upper-Sub] →
[Evergreen forest](#)
[Deciduous forest](#)
[Forest Plantation](#)
[Agro-forestry](#)

Get semantic network from rdf statement (using Sesame)

Link to another term information

Framework for ontological information

(1) Registration

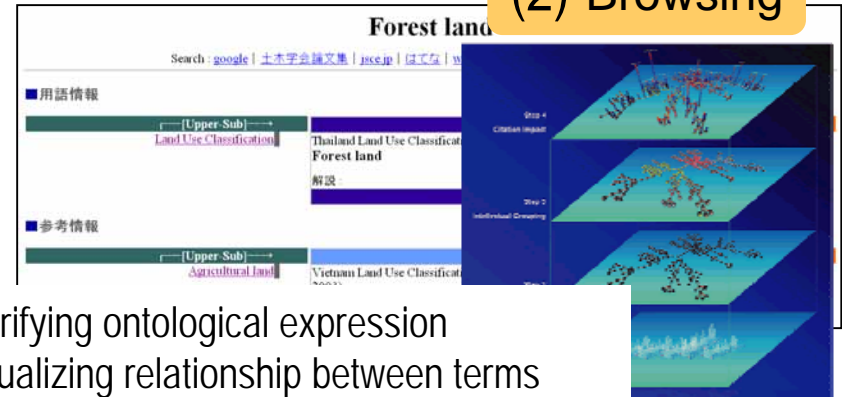


Correction and registration of Ontology

Created ontology is registered to the system again.

Ontology Registry System

(2) Browsing



Clarifying ontological expression
Visualizing relationship between terms
→ Providing reference information to users

Assist of Technical term

Information retrieval

Data Integration

Constriction of data model

(4) Utilization

Providing integrated ontology
Utilizing as knowledge

Modification of registered information on the system
→ newest information

(3) Modification

Modification by Wiki

Lake – Wikipedia, the free encyclopedia – Microsoft Internet Explorer

http://en.wikipedia.org/wiki/Lake

Sign in / create account

article discussion edit this page history

Your *continued donations* keep Wikipedia running!

Lake

From Wikipedia, the free encyclopedia

For other uses, see [Lake \(disambiguation\)](#).

This article or section does not cite its **references or sources**.
You can [help](#) Wikipedia by introducing appropriate citations.

A **lake** is a body of water or other liquid of considerable size surrounded by land. The vast majority of lakes on Earth are [fresh water](#), and most lie in the [Northern Hemisphere](#) at higher [latitudes](#). In [ecology](#) the environment of a lake is referred to as [lacustrine](#). Large lakes are occasionally referred to as "inland [seas](#)" and small seas are occasionally referred to as lakes.

The term **lake** is also used to describe a feature such as [Lake Eyre](#), which is a dry basin most of the time but may become filled under seasonal conditions of heavy rainfall.

Many lakes are artificial and are constructed for [hydro-electric](#) power supply, [recreational](#) purposes, [industrial](#) use, [agricultural](#) use, or domestic water supply.

Contents [hide]

- 1 Origin of natural lakes
- 2 Types of lakes
- 3 Characteristics

navigation

- [Main Page](#)
- [Community Portal](#)
- [Featured articles](#)
- [Current events](#)
- [Recent changes](#)
- [Random article](#)
- [Help](#)
- [Contact Wikipedia](#)
- [Donations](#)

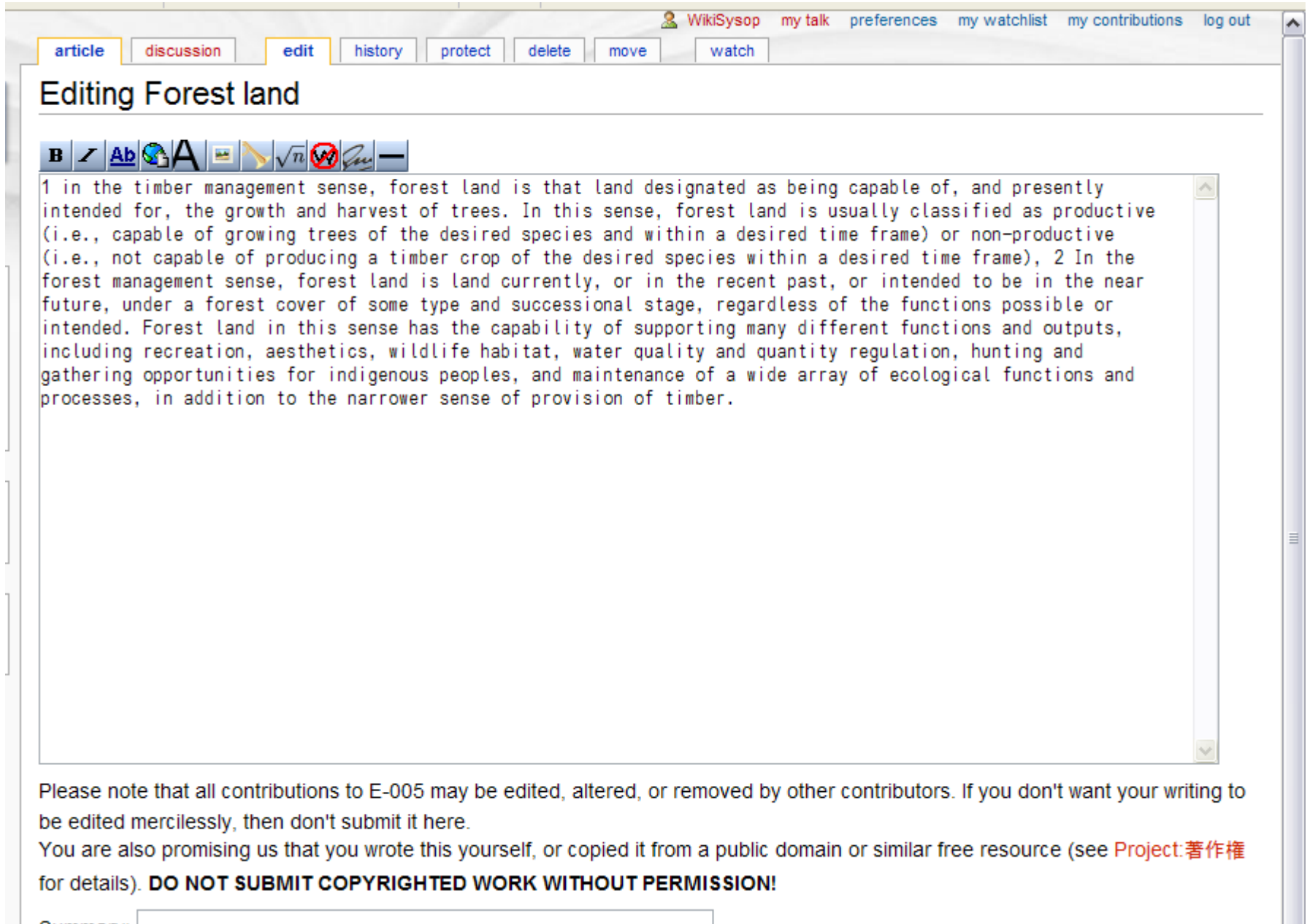
search

toolbox

- [What links here](#)
- [Related changes](#)
- [Upload file](#)
- [Special pages](#)
- [Printable version](#)
- [Permanent link](#)

インターネット

Modification by using MediaWiki












The screenshot shows a MediaWiki editing interface. At the top, there is a navigation bar with the user name 'WikiSysop' and links for 'my talk', 'preferences', 'my watchlist', 'my contributions', and 'log out'. Below this is a secondary navigation bar with buttons for 'article', 'discussion', 'edit', 'history', 'protect', 'delete', 'move', and 'watch'. The main heading is 'Editing Forest land'. Below the heading is a rich text editor toolbar with icons for bold, italic, link, unlink, image, table, math, source, undo, redo, and a minus sign. The main text area contains two paragraphs of text. The first paragraph defines forest land in the timber management sense, and the second paragraph defines it in the forest management sense. Below the text area is a warning message and a notice about copyright.

WikiSysop my talk preferences my watchlist my contributions log out

article discussion **edit** history protect delete move watch

Editing Forest land

B *I* [Ab](#)         

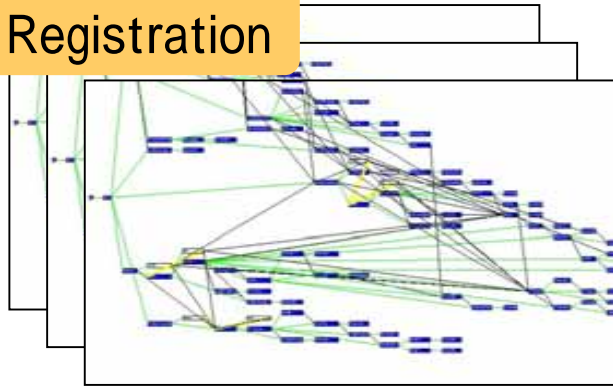
1 in the timber management sense, forest land is that land designated as being capable of, and presently intended for, the growth and harvest of trees. In this sense, forest land is usually classified as productive (i.e., capable of growing trees of the desired species and within a desired time frame) or non-productive (i.e., not capable of producing a timber crop of the desired species within a desired time frame), 2 In the forest management sense, forest land is land currently, or in the recent past, or intended to be in the near future, under a forest cover of some type and successional stage, regardless of the functions possible or intended. Forest land in this sense has the capability of supporting many different functions and outputs, including recreation, aesthetics, wildlife habitat, water quality and quantity regulation, hunting and gathering opportunities for indigenous peoples, and maintenance of a wide array of ecological functions and processes, in addition to the narrower sense of provision of timber.

Please note that all contributions to E-005 may be edited, altered, or removed by other contributors. If you don't want your writing to be edited mercilessly, then don't submit it here.

You are also promising us that you wrote this yourself, or copied it from a public domain or similar free resource (see [Project:著作権](#) for details). **DO NOT SUBMIT COPYRIGHTED WORK WITHOUT PERMISSION!**

Framework for ontological information

(1) Registration

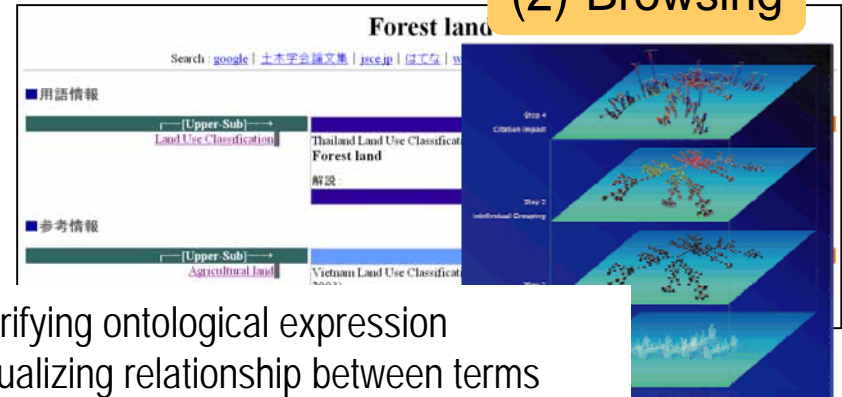


Correction and registration of Ontology

Created ontology is registered to the system again.

Ontology Registry System

(2) Browsing



Clarifying ontological expression
Visualizing relationship between terms
→ Providing reference information to users

Assist of Technical term

Information retrieval

Data Integration

Constriction of data model

(4) Utilization

Providing integrated ontology
Utilizing as knowledge



Modification of registered information on the system
→ newest information

(3) Modification

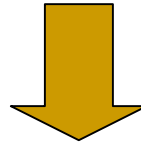
Ontology for Land classification

Utilization of OWL (Web Ontology Language)

Land Classification System

- Land Cover Map
- Land Use Map

Different Land classification schemas developed for different purposes



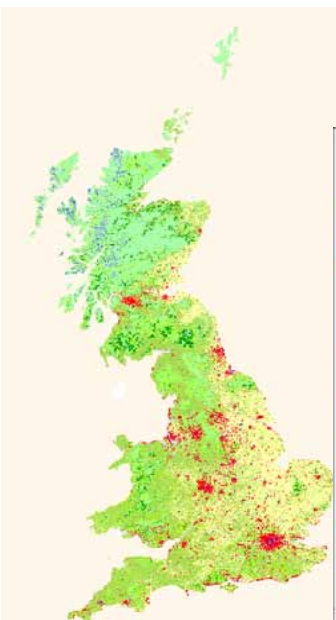
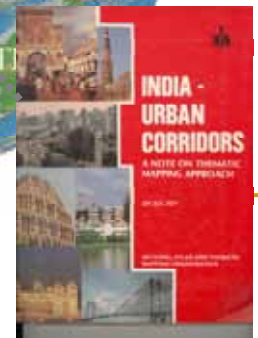
Integration and Fusion by Ontology

Preparation of land classification DB

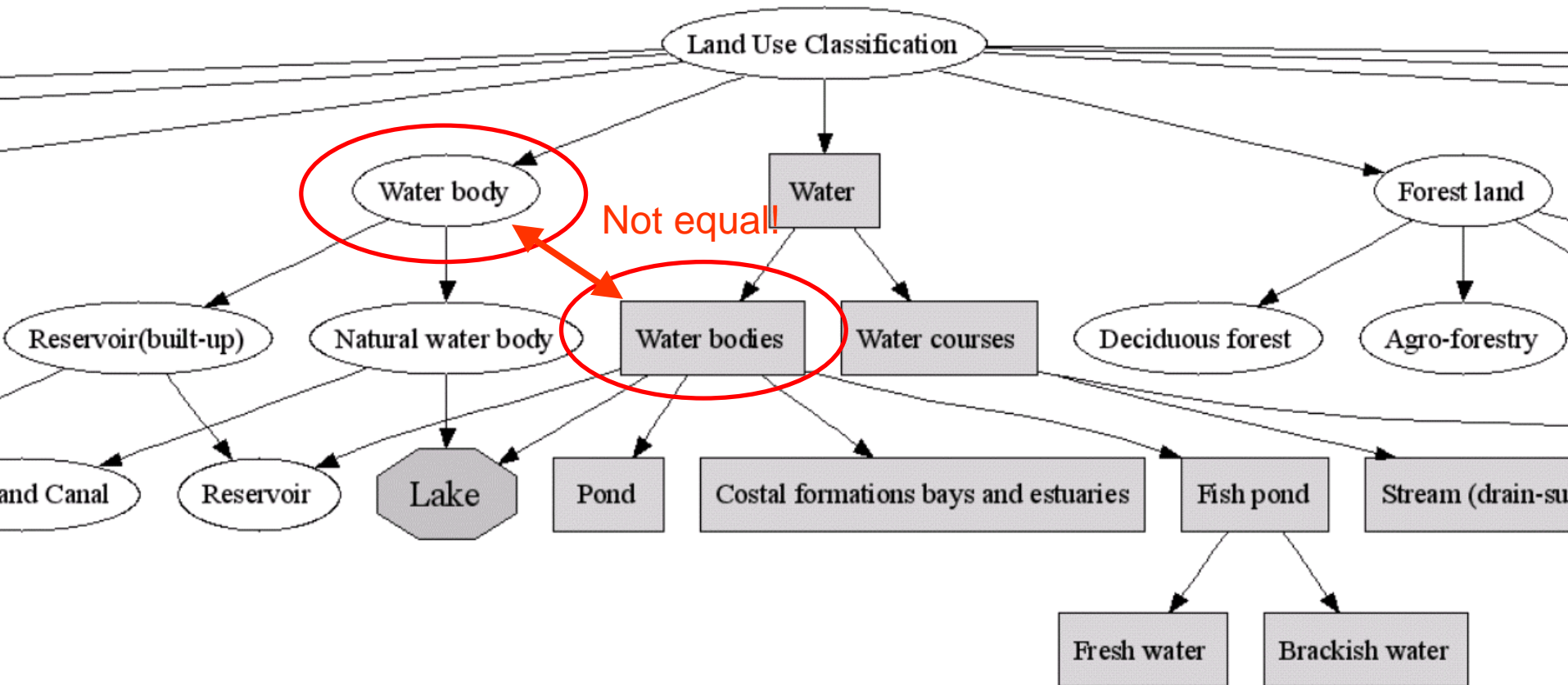
Collection of Land Cover / Land Use Map

Comparison or mutual referencing by accumulating in DB.

Land Cover / Land Use Map is accumulated in Access



Comparison of land classification



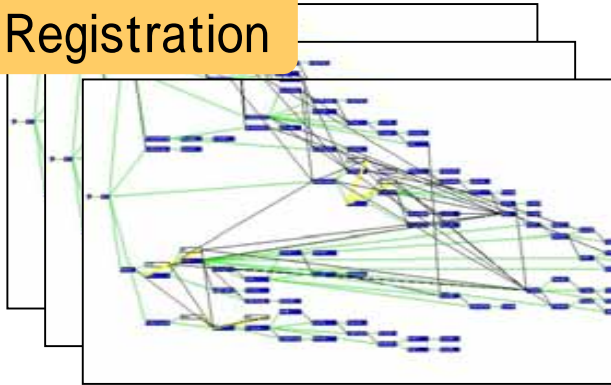
Landuse in Thailand



Landuse in Indonesia

Framework for ontological information

(1) Registration



Correction and registration of Ontology

Created ontology is registered to the system again.

Assist of Technical term

Information retrieval

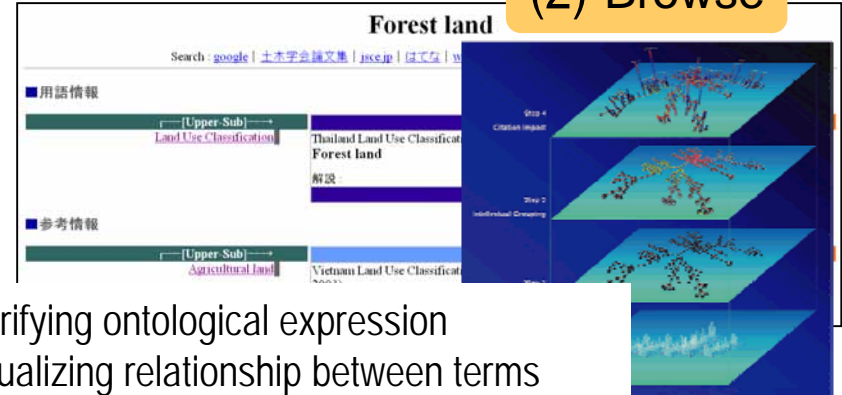
Data Integration

Constriction of data model

Providing integrated ontology
Utilizing as knowledge

(4) Utilization

(2) Browse



Clarifying ontological expression
Visualizing relationship between terms
→ Providing reference information to users

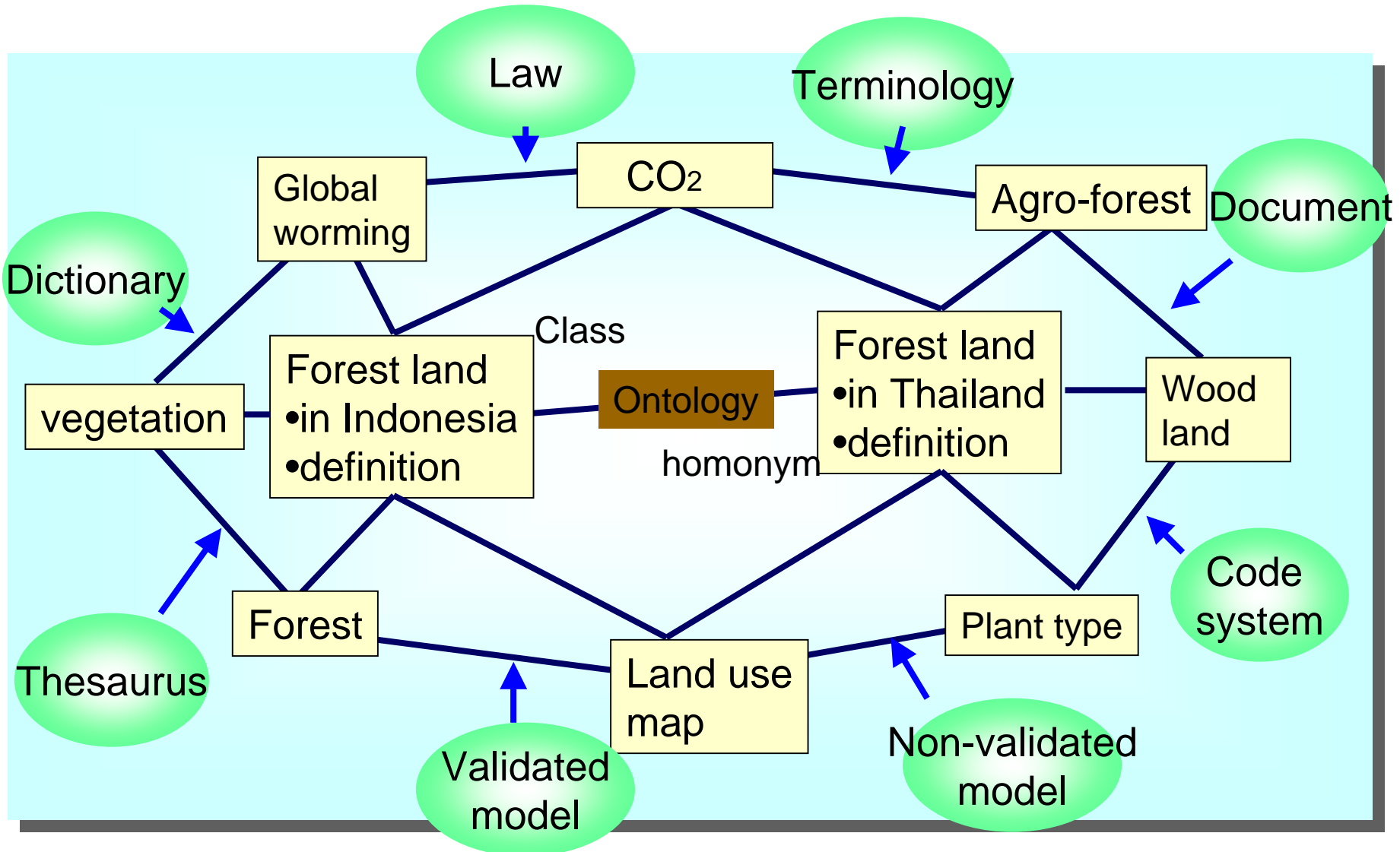
Ontology
Registry System



Modification of registered information on the system
→ newest information

(3) Modification

Network can grow!



Conclusions

- Semantic interoperability should also be taken care of.
 - Cooperation for enriching ontological contents
 - Dictionaries
 - Gazetteers
 - Need to provide more sophisticated user support system based on the ontological information
 - Supporting data search in the web
 - Supporting development of data models, metadata etc.
-