MAPOVÉ ZDROJE

Prof. Dr. Milan KONEČNÝ

Dr. Radim ŠTAMPACH

Cílem předmětu je podat přehled o stávajících analogových a digitálních zdrojích, jež jsou využívány v kartografii a geoinformatice, včetně zdrojů statistických.
Tento přehled je podán ve třech horizontech, a sice ČR, Evropa (země EU a ostatní země) a Svět.
Geoinfostrategie ČR.
Rozvoj a využití Big Data.

Pozornost je věnována i integraci dat v rámci prostorových datových a informačních infrastruktur a možnostem využití dat, informací a znalostí ze stávajících prostorově orientovaných regionálních a globálních projektů.

1. Přehled a struktura zdrojů pro kartografii a geoinformatiku. Český kontext (EGON, Registry, Geoinfostrategie ČR, U.N. GGIM, DBAR).
2. Analogové zdroje v kartografii: mapové sbírky, analogová mapová a atlasová díla
3. Státní mapová díla; významná produkce map a atlasů v soukromém sektoru (autoatlasy, turistické mapy, aj.)
4. Digitální zdroje dat; data, informace a znalosti na Internetu; elektronické atlasy. Otevřené zdroje.
5. ČR a budování digitálních datových zdrojů: civilní a vojenský sektor (ZABAGED, DMR, aj.)

6. Jednotné digitální mapové dílo ČR: teoretické předpoklady, koncepce, praktické požadavky; implementace. Digitální katastr.

7. Digitální fotogrammetrie a mapová díla v ČR.

8. Evropa: digitální mapové zdroje v rámci Evropské unie (Eurogeographics, INSPIRE, COPERNICUS)

9. Tvorba, koncepce a implementace Evropské geografické informační infrastruktury

10. Statistické zdroje v ČR, EU (Eurostat aj.) a ve světě (OSN, FAO, aj.)

11. Svět: Globální mapování a Globální prostorová datová infrastruktura. GEO, GEOSS, Future World.

12. Svět: Digitální planeta Země a Geografická datová báze OSN. U.N. GGIM, DBAR spatial data.

13. Prostorová data a mapy pro redukci rizik a katastrof.

14. Data a informace v „Spatially Enabled Society“.

15. BIG DATA – Velká Data: koncepce, analýza, vizualizace

References:

www.geoinfostrategie.cz

www.digitalearth.com

www.gsdi.org

www.cuzk.org

Manual of Digital Earth. Guo Huadong, Michael F. Goodchild, Alessandro Annoni, eds. International Society for Digital Earth. Springer Open. 2020.

Open access: *Manual of Digital Earth | SpringerLink*

U.N. GGIM. https://ggim.un.org/

U.N. GGIM: Europe. https://www.cuzk.cz/O-resortu/Mezinarodni-spoluprace/UNGGIM-Europe.aspx

GEO and GEOSS portal. https://www.geoportal.org/?f:dataSource=dab

DEFINITIONS- GI SCIENCES
TYPES AND THEMES OF GEOGRAPHIC DATA
FREE GIS DATA SOURCES

Definitions

- **Geographic information science** is the scientific discipline that studies the techniques to capture, analyze, process and represent / visualize geographic information.

- **GIScience** is conceptually related to geography, cartography, geodesy, information science, computer science, but it claims the status of an independent scientific discipline. Other overlapping disciplines are: geoinformatics, geomatics and geovisualization. (Wiki)

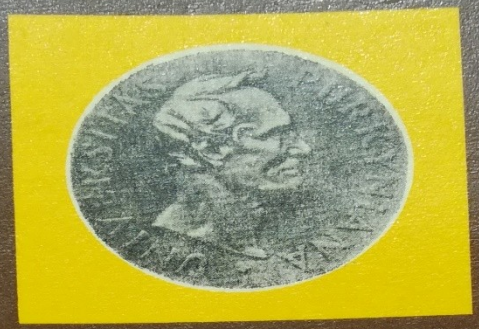
- **GIScience** is a multidisciplinary research enterprise that addresses the nature of geographic information and the application of geospatial technologies to basic scientific questions (Goodchild, 1992).

GIS first Textbook in Brno, 1985, Konecny Milan, Karel Rais, Folia Geographia, 21, 26,13, p.9: (first time mentioned people)

- „GIS is a system of people, technical and organizational means that collect, transfer, store and process data to create information suitable for further use in geographic research and its practical applications.”

- Citation of book is: KONEČNÝ, M. – RAIS, K. Geografické informační systémy. Folia Geografia, roč. XXVI, Geographia 21, č. 13. Brno,1985. 196 p.

PŘÍRODOVĚDECKÁ FAKULTA UJEP V BRNĚ



FOLIA

FACULTATIS SCIENTIARUM NATURALIUM
UNIVERSITATIS PURKYNIANAE BRUNENSIS

GEOGRAPHIA

M. KONEČNÝ — K. RAIS

GEOGRAFICKÉ INFORMAČNÍ SYSTÉMY

XXVI 1985 13

UNIVERSITA JANA EVANGELISTY PURKYNĚ V BRNĚ

"Geo-information science is the integration of different disciplines dealing with spatial information (figure 8). It was introduced as geographical information science by Goodchild (1992) meaning the science behind the systems or research about GIS and research with GIS."

Prof. W. Kainz

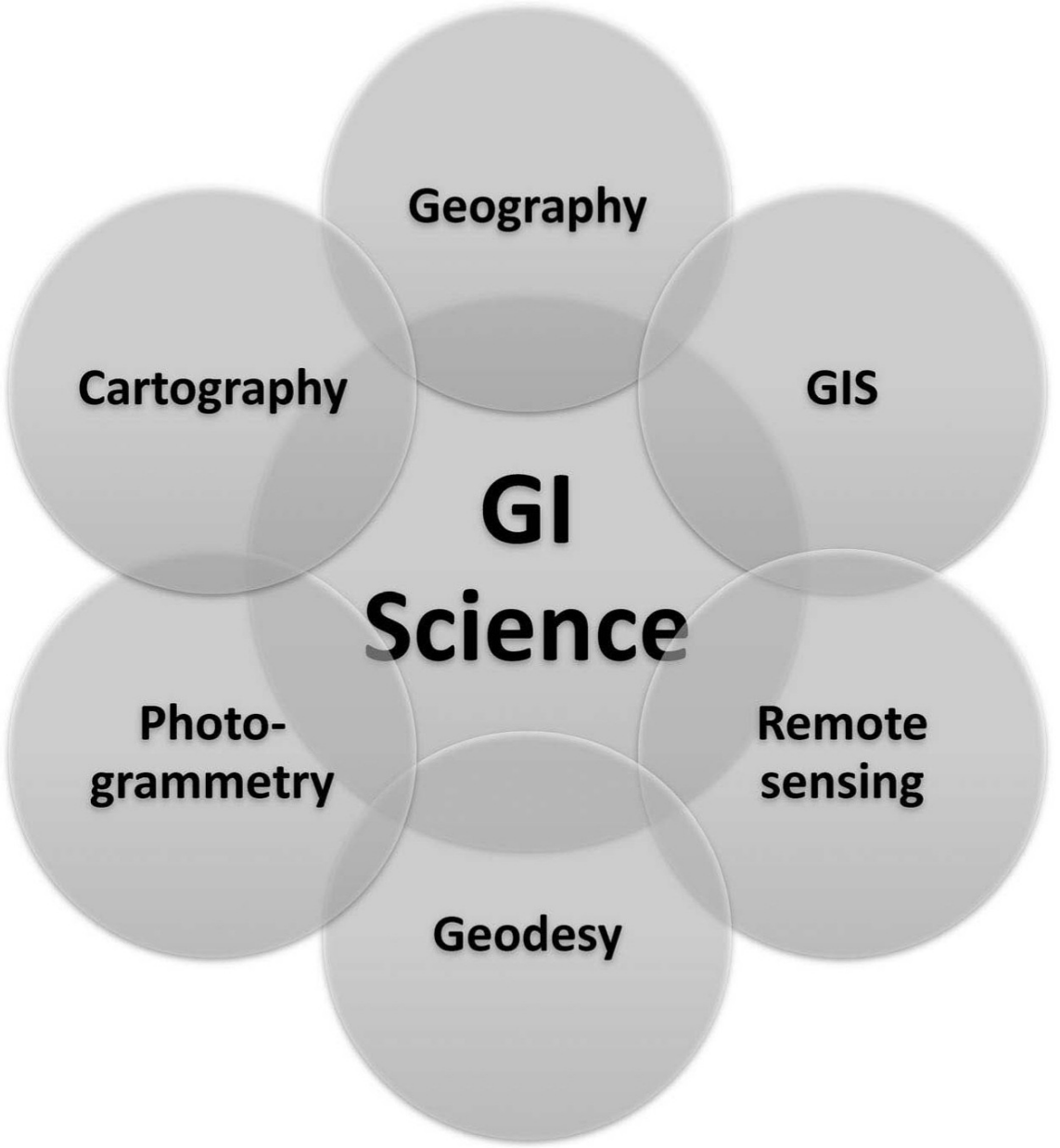


Figure 8. Spatial sciences and their overlaps.

More GI Sciences?

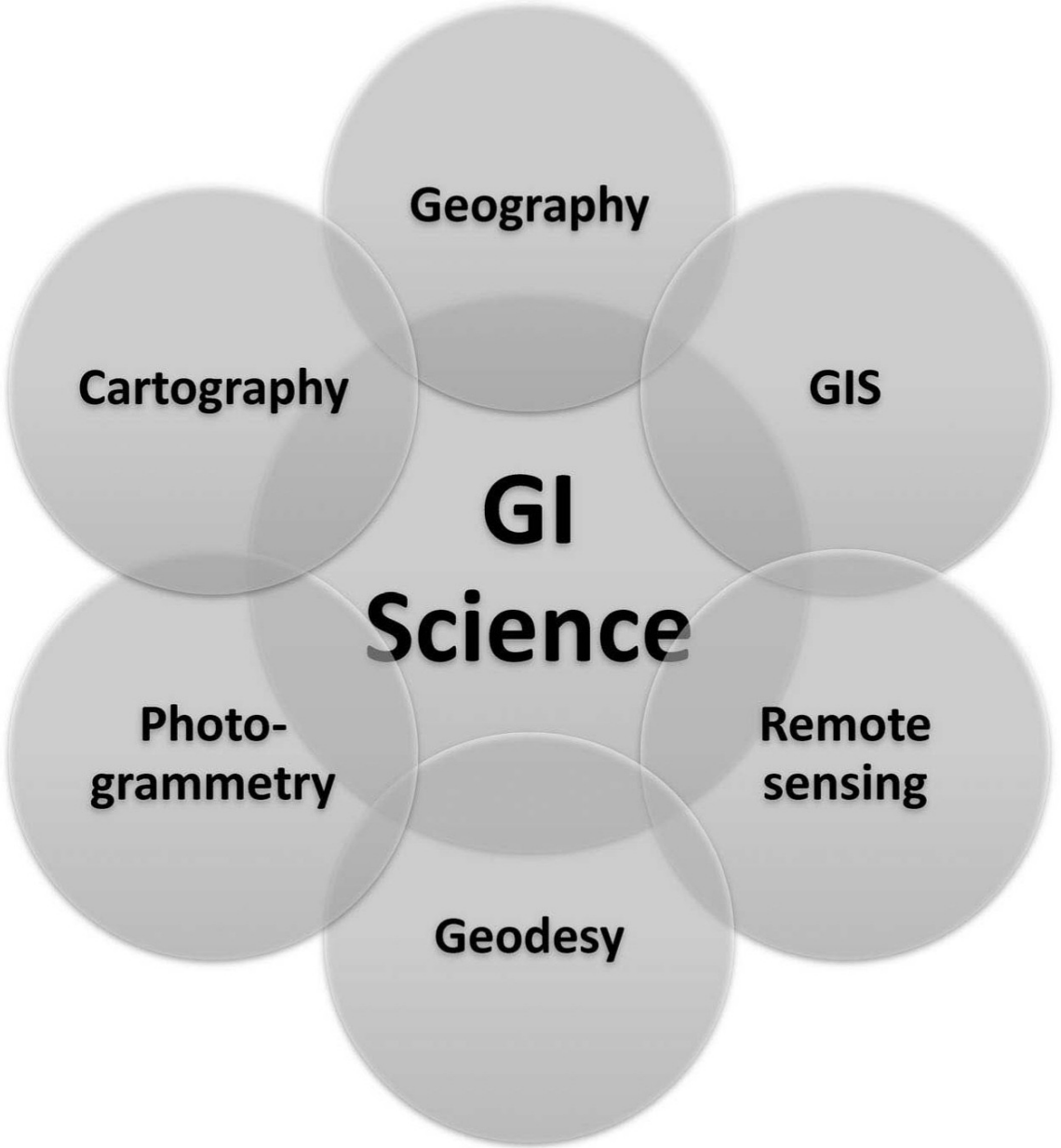


Figure 8. Spatial sciences and their overlaps.

1. GEOLOGY
2. GEOCHEMISTRY
3. GEOPHYSICS
4. ECONOMIC GEOLOGY
5. PETROLOGY
6. SEDIMENTOLOGY
7. MARINE GEOLOGY
8. OCEANOGRAPHY
9. PETROLEUM GEOLOGY
10. FIELD GEOLOGY
11. MINING GEOLOGY
12. ENGINEERING GEOLOGY
13. HYDROGEOLOGY
14. ENVIRONMENTAL GEOLOGY
15. OPTICAL MINERALOGY AND
16. EARTH SCIENCES

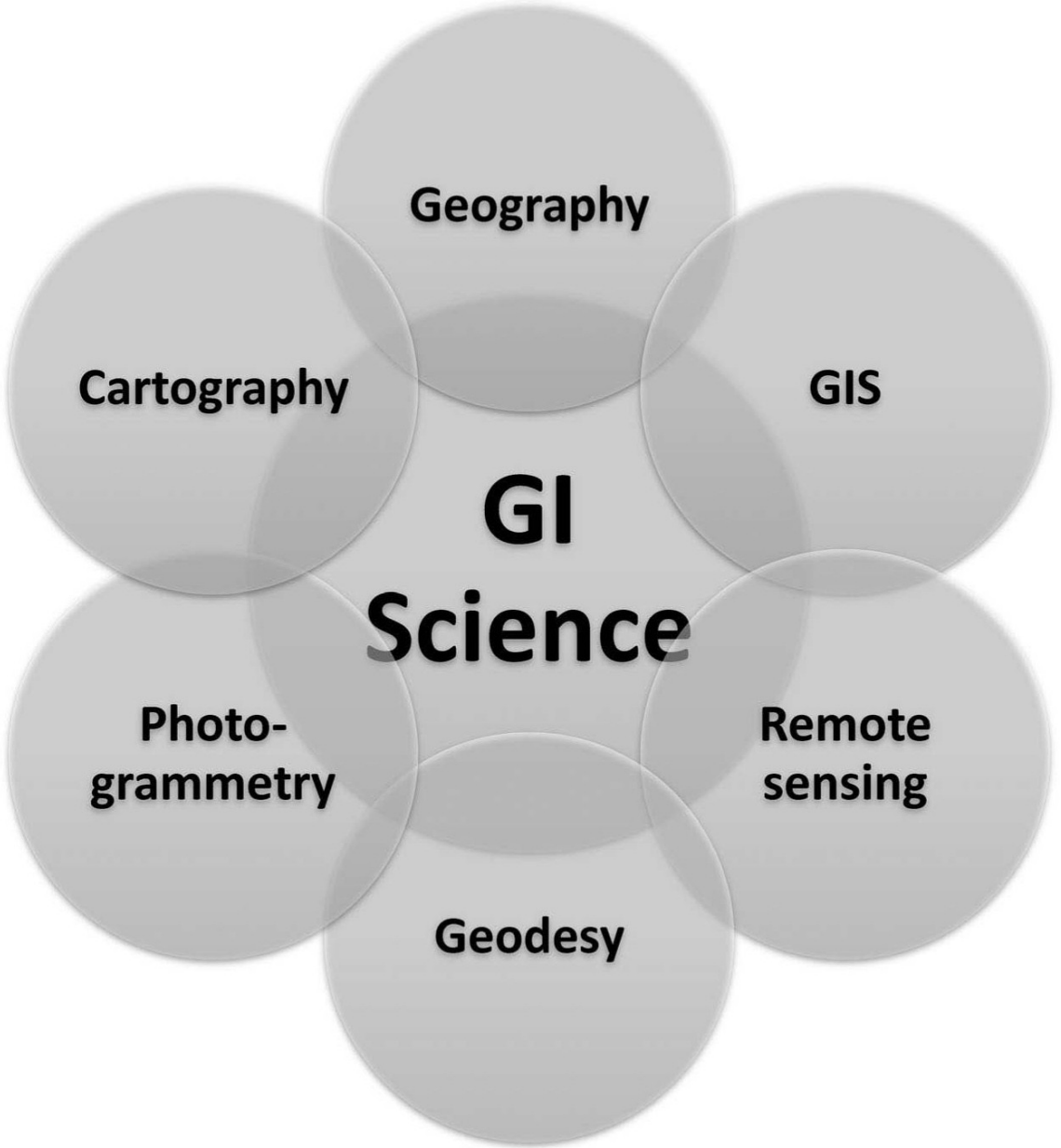


Figure 8. Spatial sciences and their overlaps.

Occupation 2000-2010 Growth (projected)

Cartographers and Photogrammetrists..	18.5%
Surveyors ……..	08.1%
Surveying and Mapping Technicians…..	25.3%
Architectural and Civil Drafters……	20.8%
Civil Engineering Technicians……..	11.9%
Mechanical Drafters……...	15.4%
Electrical Drafters……...	23.3%
Electrical and Electronic Engineers…….	10.8%
Mechanical Engineering Technicians…..	13.9%
Industrial Engineering Technicians……..	10.1%
Environmental Engineering Technicians.	29.1%
Geoscientists……...	18.1%

U.S. Department of Labor “Geospatial Jobs Outlook” (Department of Labor, n.d.)

Quick Facts: Geoscientists

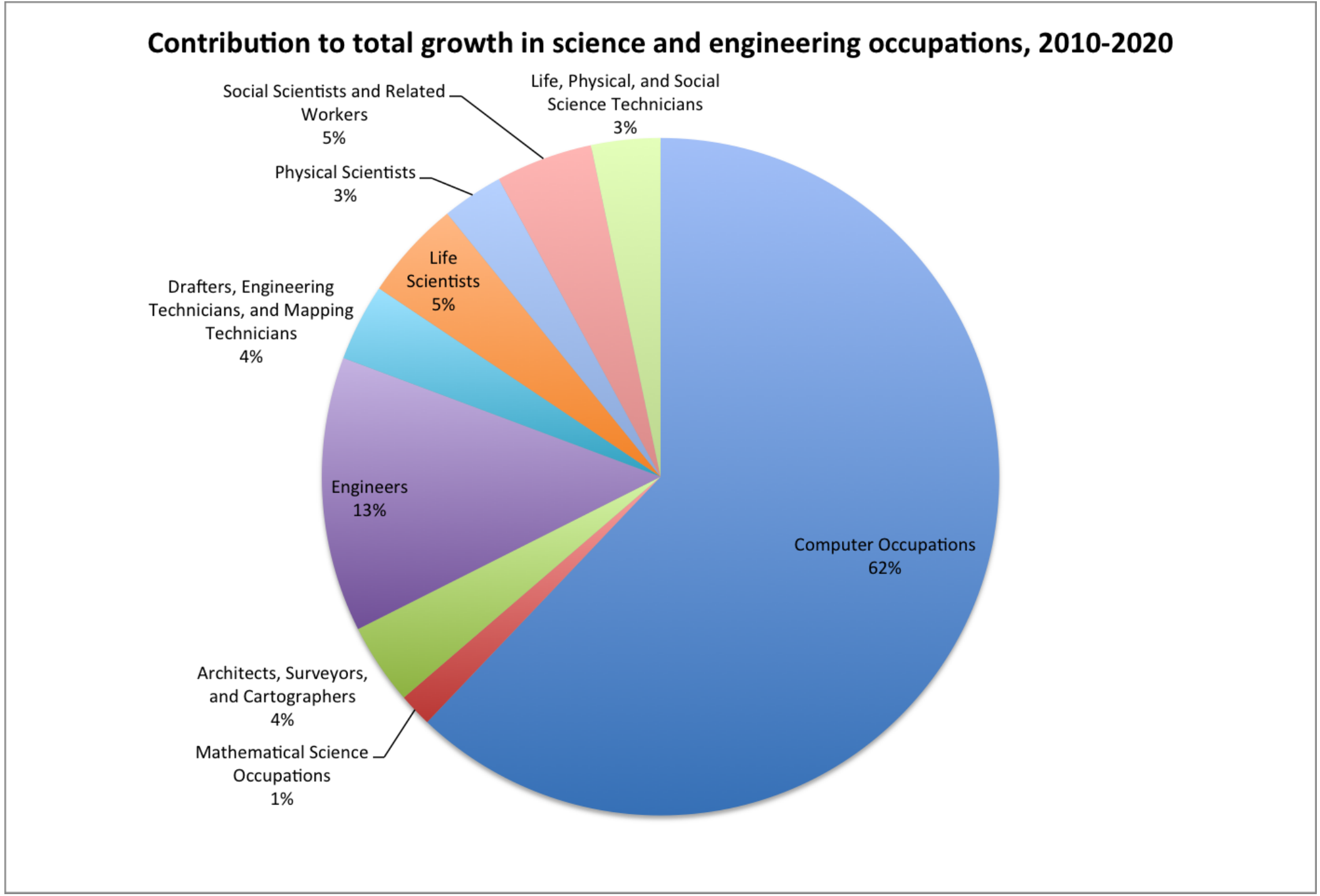
2019 Median Pay	$92,040 per year $44.25 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2019	31,800
Job Outlook, 2019-29	5% (Faster than average)
Employment Change, 2019-29	1,600

U.S. Bureau of Labor Statistics

US Cartography Employment Outlook 2010-2020

According to the ArcNews Summer 2012 issue, the occupation listed as “cartographers and photogrammetrists” has a 2010 estimated employment of 14,000 in the US with a projected growth between 2010 and 2020 of 6,100, for a predicted growth rate of 20%-28%.
This growth rate is the highest reported for the 10 GIS related occupations listed in the ArcNews article, tying with “geodetic surveyors” and “surveyors”. Numerically, however, it is still a relatively small portion of GIS work, considering the categories of “geospatial information scientists and technologists” and “geographic information systems technicians” each have a 2010 estimated employment of 210,000.

ArcNews sites the US Bureau of Labor Statistics as the source.

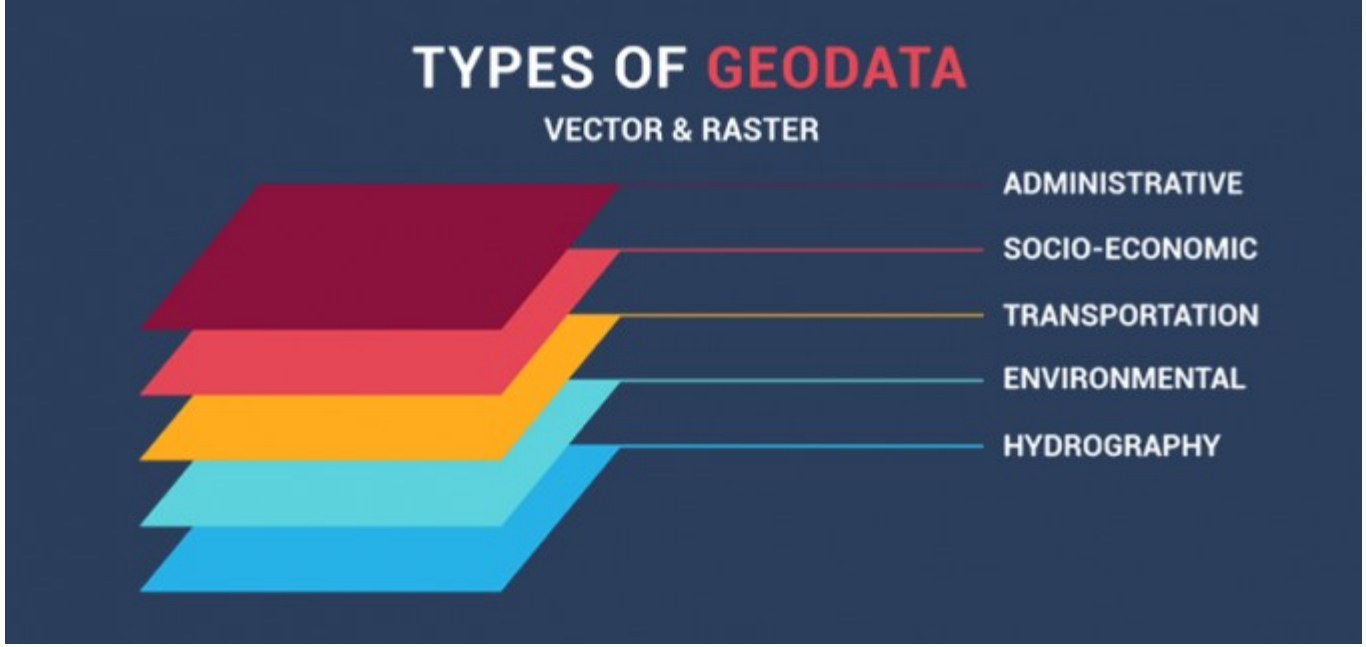

Contribution to total growth in science and engineering occupations, 2010-2020
Social Scientists and Related Workers 5%
Life, Physical, and Social Science Technicians 3%
Physical Scientists 3%
Life Scientists 5%
Drafters, Engineering Technicians, and Mapping Technicians 4%
Engineers 13%
Computer Occupations 62%
Architects, Surveyors, and Cartographers 4%
Mathematical Science Occupations 1%

Cartography

•Barber, Peter. *The Map Book*. Walker & Company, 2005.
•Brewer, Cynthia A. *Designing Better Maps: A Guide for GIS Users 2nd Edition*. ESRI Press, 2016.
•Brotton, Jerry. *Great Maps (Dk Smithsonian)*. DK, 2014.
•Dent, B., Torguson, J., Hodler, T. *Cartography: Thematic Map Design*. McGraw-Hill Science/Engineering/Math; 6 edition, 2008.
•Imhof, Eduard. *Cartographic Relief Presentation*. ESRI Press, 2007.
•Monmonier, Mark. *How to Lie with Maps* (3rd Edition). University of Chicago Press, 2018.
•Peterson, Gretchen N. *Cartographer's Toolkit: Colors, Typography, Patterns*. PetersonGIS Press, 2012.
•Peterson, Gretchen N. *GIS Cartography: A Guide to Effective Map Design Second Edition*. CRC Press, 2014.
•Peterson, Gretchen N. *QGIS Map Design Second Edition.* Locate Press, 2018. Order the PDF here. Order the print book here or at any other book store.
•Zineddin, Z., P. M. Garvey, R. A. Carlson, and M. T. Pietrucha. "Effects of Practice on Font Legibility," *Perception and Performance 4, Human Factors and Ergonomics Society Annual Meeting Proceedings* (2007): 1717–1720.

•Carto Blog , a blog for the company Carto, start with posts by Mamata Akella.
•Free and Open Source GIS Ramblings Anita Graser's blog on QGIS and other software technique.
•GeoLounge is a news site that features cartography articles among others.
•The Map Room is a blog about maps, mapping, and technology by Jonathan Crowe.
•The National Geologic Map Database is maintained by the U.S. Geological Survey and contains information on mapping techniques and guidelines.
•Petrichor Geoviz Studio is a blog of sweet (donuts, etc.) cartography techniques.
•The Soil Geographic Data Standard, developed by the Federal Geographic Data Committee (FGDC), describes the standards for mapping soils in the United States with specific regard to the soil data created by the National Cooperative Soil Survey.
•The Utilities Data Content Standard, created by the Federal Geographic Data Committee, is a good resource for looking up the standard attributes of many utility features.
•View from the sky, a blog post by Amy Lee on designing the Cali Terrain map style. See other posts in this blog for more cartography-minded discussions.

Geodata is location information stored in a geographic information system (GIS)



What is Geodata?

As it turns out, there's not one single type of geodata. Instead geodata exists in various forms. For example, we commonly use vector and raster to depict geodata.

Types of Geographic Data

Vector files

Vector data consists of vertices and paths. The three basic types of vector data are points, lines and polygons (areas). Each point, line and polygon has a spatial reference frame such as latitude and longitude.

First, vector points are simply XY coordinates. Secondly, vector lines connect each point or vertex with paths in a particular order. Finally, polygons join a set of vertices. But it encloses the first and last vertices creating a polygon area.

Types of Geographic Data

Raster files

Raster data is made up of pixels or grid cells. Commonly, they are square and regularly-spaced. But rasters can be rectangular as well. Rasters associate values to each pixel.

Continuous rasters have values that gradually change such as elevation or temperature. But discrete rasters set each pixel to a specific class. For example, land cover classes are represented to a set of values.

Types of Geographic Data

Geographic Database

The purpose of geographic databases is to house vectors and rasters. Databases store geographic data as a structured set of data/information.

Geographic databases are used because it's a way to put all data in a single container. Within this container, networks can be built, mosaics can be created and versioning can be done.

Types of Geographic Data

Web files

As the internet becomes the largest library in the world, geodata has adapted with its own types of storage and access. For example, GeoJSON, GeoRSS and web mapping services (WMS) were built specifically to serve and display geographic features over the internet.

Types of Geographic Data

Multi-temporal

Multi-temporal data attaches a time component to information. But multi-temporal geodata not only has a time component, but a geographic component as well.

For example, weather and climate data tracks how temperature and meteorological information changes in time in a geographical context. Other examples of multi-temporal geodata are demographic trends, land use patterns and lightning strikes.

Types of Geographic Data

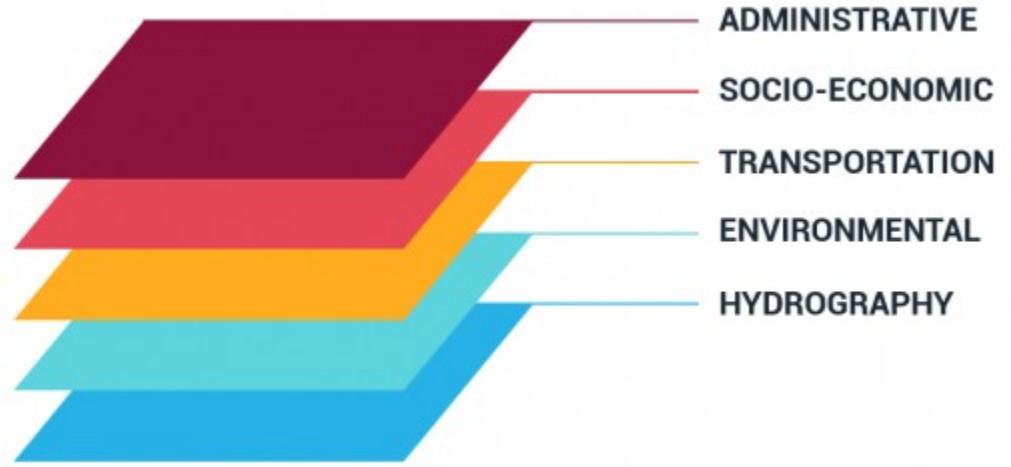
Geodata Themes

Geodata can be grouped into as many themes as you want. They can be as broad or as narrow to your liking.

Here are examples of geographic themes:

cultural
administrative (boundaries, cities and planning)
socioeconomic data (demographics, economy and crime)
transportation (roads, railways and airport)

physical
environmental data (agriculture, soils and climate)
hydrography data (oceans, lakes and rivers)
elevation data (terrain and relief)



GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BEST GLOBAL RASTER AND VECTOR DATASETS [2020]

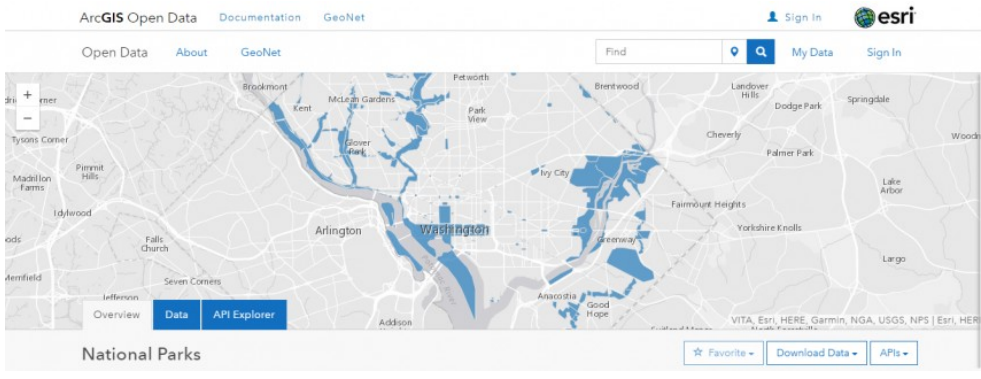
gisgeography.com/best-free-gis-data-sources-raster-vector/

1. Esri Open Data Hub

https://hub.arcgis.com/search

In 2020, the Esri Open Data Hub is a hidden gold mine of free GIS data. For example, it now houses over **250,000+ open data sets** from **5,000+ organizations** worldwide.

The search is convenient with a map preview of the extent and table. Alternatively, the search by topic or location and download data in multiple GIS formats are available. Ultimately, there is nothing more thorough for GIS data than the Esri Open Data Hub.

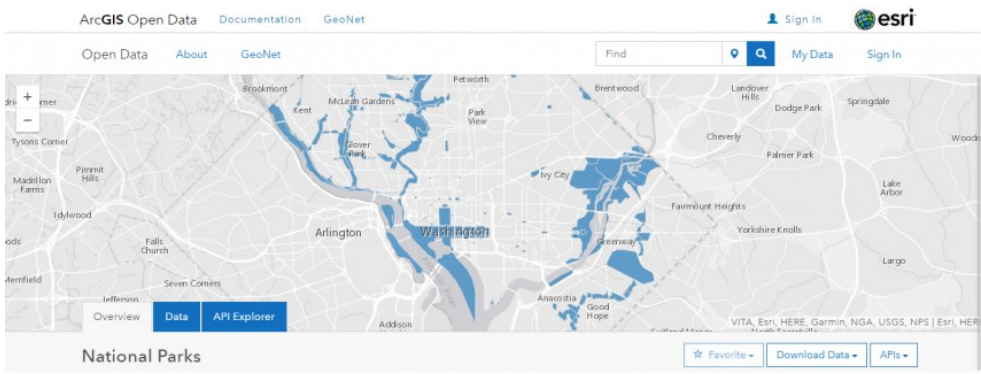


GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BEST GLOBAL RASTER AND VECTOR DATASETS [2020]

1. Esri Open Data Hub

https://hub.arcgis.com/search



Advantages

•As of 2020, it has 250,000+ open data sets from over 5,000+ organizations worldwide
•Managed by the largest commercial GIS organization in the world.

Data Types

•Download formats are in spreadsheet, KML, shapefile.
•API's are OGC WMS, GeoJSON and GeoService.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

http://www.naturalearthdata.com/downloads/

2. Natural Earth Data

Natural Earth Data is number 2 on the list because it best suits the needs of cartographers. By and large, all the key cultural and physical vector GIS datasets are at a global scale conveniently to use. The raster datasets also provide beautiful hillshade relief for any map.

The best part is Natural Earth Data is in **public domain**. So this means that you have the right to use, modify and disseminate the data in any manner.
Here's more details for Natural Earth data: https://gisgeography.com/natural-earth-data-free-gis-public/

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

http://www.naturalearthdata.com/downloads/

1. Natural Earth Data

Advantages

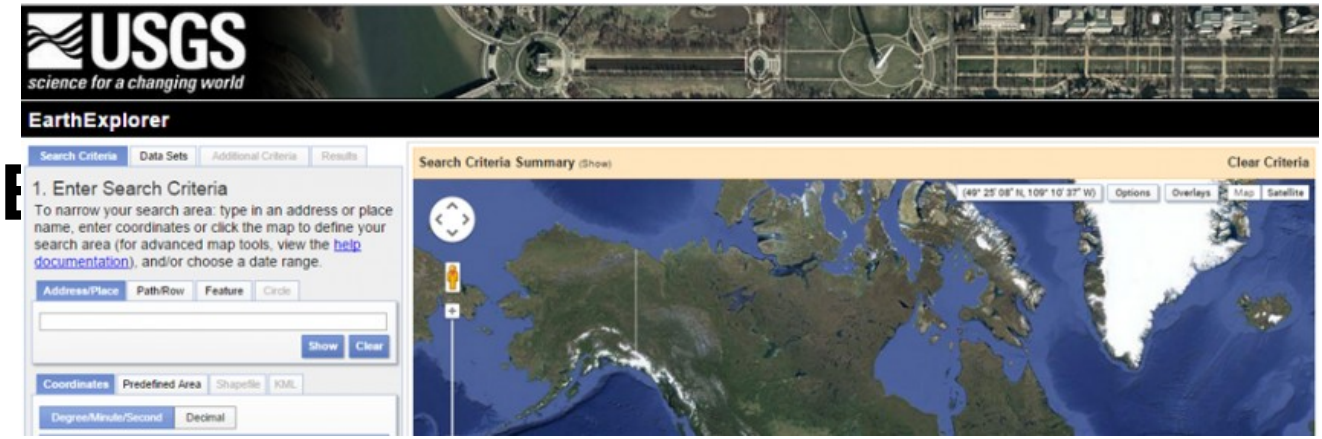
•Download global free GIS data in public domain
•Supported by the North American Cartographic Information Society (NACIS).

Data Types

•Cultural, physical and raster (basemap) data.
•Quick start kit (MXD and QGS files) with all the essential stylized layers.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://earthexplorer.usgs.gov/

3. USGS Earth Explorer

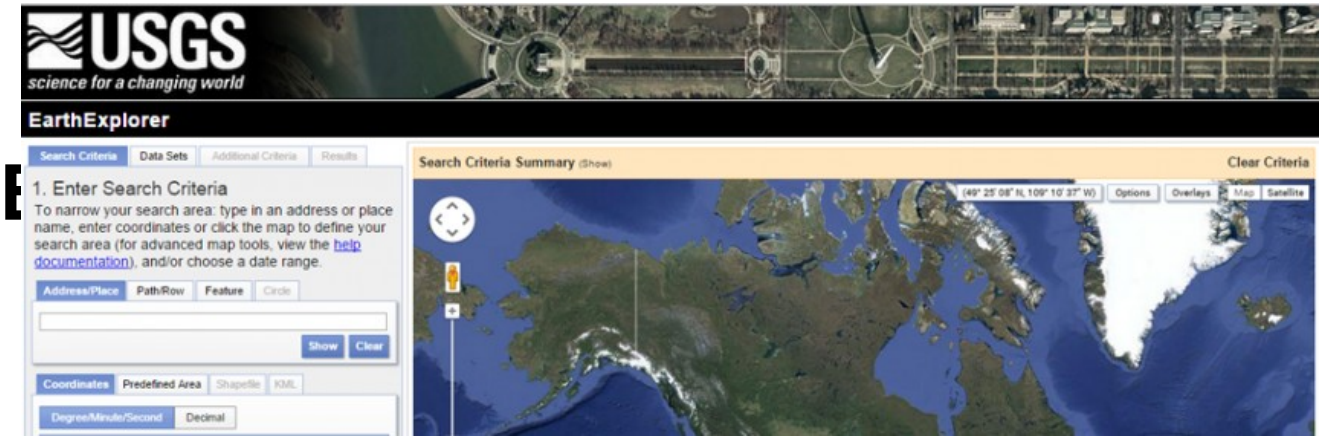
For satellite and aerial imagery, the USGS Earth Explorer is one of the largest free sources of data. The best part? It is possible to download data **outside of the United States** too.

A friendly user-interface makes accessing remote sensing data simple. In fact, it even has a bulk download application if it is needed to be downloaded more than one data sets.
Registration is free. For other satellite data providers, here is a list of 15 free satellite imagery sources: https://gisgeography.com/free-satellite-imagery-data-list/

(Sentinel-2 has 10-meter resolution in red, green, blue and near-infrared.)

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://earthexplorer.usgs.gov/

3. USGS Earth Explorer

Advantages

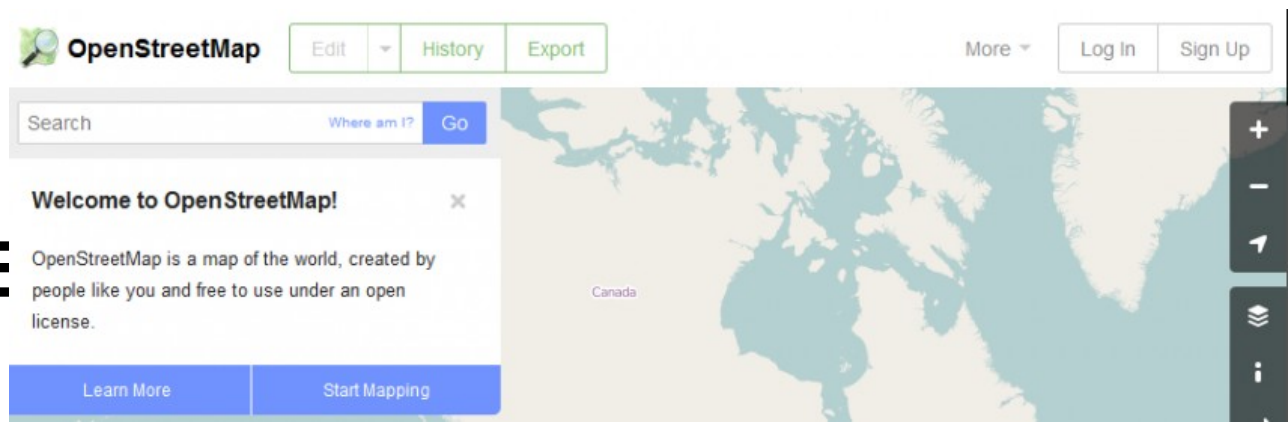
- Satellite imagery is worldwide and not just within the United States
- User interface is state-of-the-art with easy-to-use filters

Data Types

- Landsat, Sentinel-2 and land cover
- Digital Elevation Models such as NASA's ASTER and SRTM

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://gisgeography.com/openstreetmap-download-osm-data/

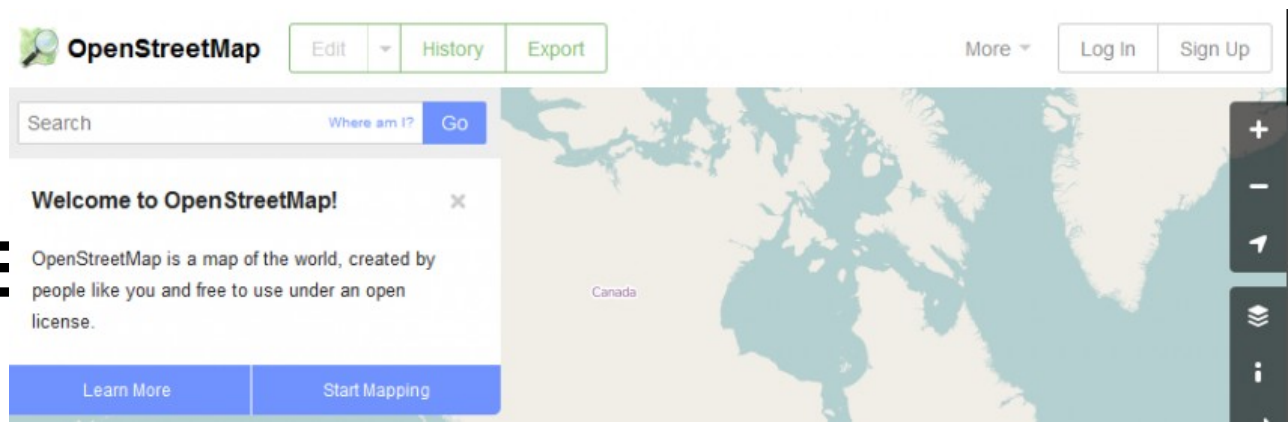
4. OpenStreetMap (OSM)

GIS users are harnessing the power of OSM as a means to crowdsourced data. The result of crowd-sourcing is highly detailed data. But it is detailed with cautious optimism.
While OSM is open to the public, it's also created by the public. So this means that accuracy varies based on the creator.

For GIS analysts seeking free GIS data at a street level, OSM is exactly what they are looking for. For example, it may be the **biggest inventory of buildings** in the world.
How much data is being created every second into OpenStreetMap? There's a map for that – OSM Show Me The Way: http://osmlab.github.io/show-me-the-way/

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://gisgeography.com/openstreetmap-download-osm-data/

4. OpenStreetMap (OSM)

Advantages

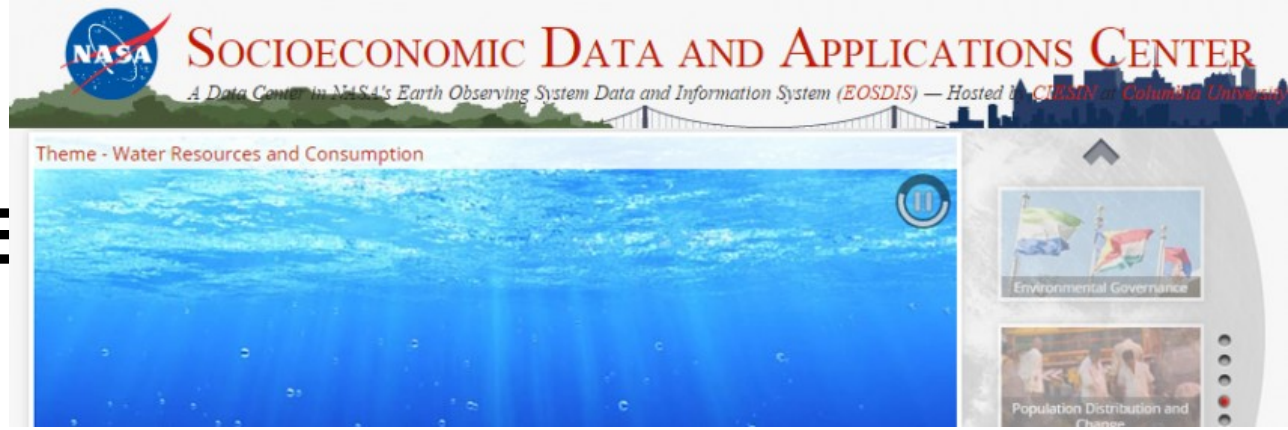
•Highly detailed free GIS data with different levels of accuracy and completeness

Data Types

•High spatial resolution cultural vector data such as buildings, roads, waterways.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://sedac.ciesin.columbia.edu/

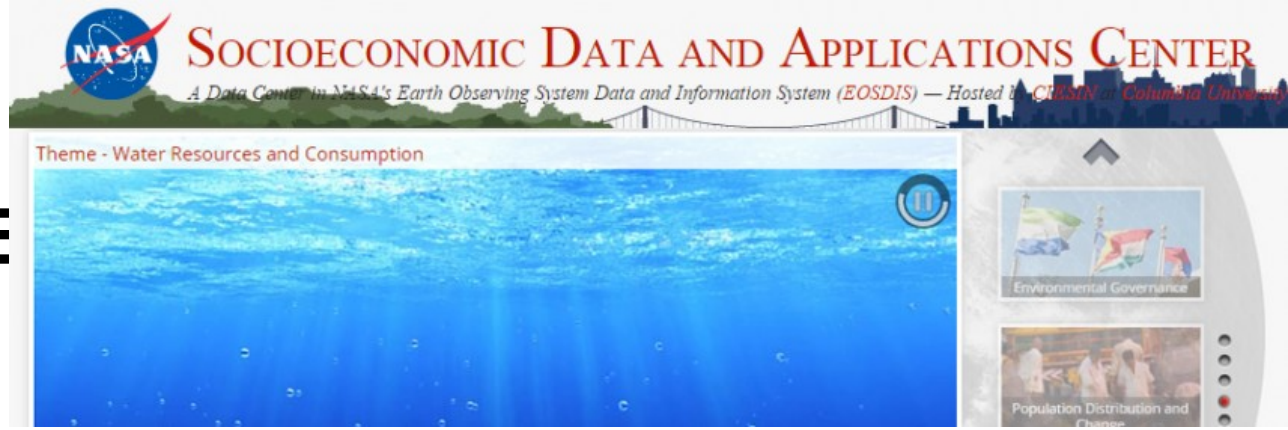
5. NASA's Socioeconomic Data and Applications Center (SEDAC)

NASA's Socioeconomic Data and Applications Center (SEDAC) shows human interactions with the environment. SEDAC has a wide variety of coarse global free GIS data.
For example, their flagship data product is a **gridded population** of the world. With 800+ citations, it includes population characteristics such as age, education and density. And the global urban and local populations extents comes from night time lights

The SEDAC map viewer is good because it can be selected GIS thematic maps of the socioeconomic data. If the assemble data is needed, there's that option too.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://sedac.ciesin.columbia.edu/

5. NASA's Socioeconomic Data and Applications Center (SEDAC)

Advantages

•Flagship data is its gridded population of the world.
•Global socioeconomic data comes from 15 different themes.

Data Types

•Socioeconomic data includes a range of topics such as agriculture, climate and health.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

https://portal.opentopography.org/datasets

6. Open Topography

It provides a portal to high spatial resolution topographic data and tools. In particular, it houses LiDAR Data, which is a rare, precious resource nowadays.
https://gisgeography.com/lidar-light-detection-and-ranging/

Currently, Open Topography has collected **300 high resolution datasets**. Most are point clouds. Some are just available in raster format. Their data map shows most available data is in the United States. But data is also available in Europe, Asia and Australia too.
If you can't find LiDAR data for your area of interest, the next best thing is a global DEM.
https://gisgeography.com/free-global-dem-data-sources/

LIDAR (Light Detection And Ranging, také LADAR) je **metoda dálkového měření vzdálenosti na základě výpočtu doby šíření pulsu laserového paprsku odraženého od snímaného objektu.** Obvykle se využívá spektra 1064–1540 nm, pro batymetrická měření cca 530 nm.

Radar i lidar slouží k měření vzdálenosti objektů.
Zatímco radar pro tyto účely používá elektromagnetické záření, konkrétně rádiové vlny, lidar využívá laserový paprsek. Jedná o stejný princip, který používá sonar, ovšem s tím rozdílem, že sonar (SOund Navigation And Ranging) využívá pro stejný účel ultrazvukové vlny.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

https://portal.opentopography.org/datasets

6. Open Topography

Advantages

•Select regions in the world and search available LiDAR data.

Data Types

•LiDAR (90% in United States, Canada, Australia, Brazil, Haiti, Mexico and Puerto Rico)
•If LiDAR is unavailable, coarse global DEMs are available for download.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

http://geodata.grid.unep.ch/

7. UNEP Environmental Data Explorer

It is the authoritative source for UN data. For example, it holds more than **500 variables** such as freshwater, climate and health.

It is a bit difficult to explore the GIS data because the interfaces takes awhile to get used to. But clicking advanced, it can be filtered “Geospatial Data Sets”. From here, you can download free GIS data like climate, disasters and ecosystems.

UNEP is U.N. Environmental program.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BES GLOBAL RASTER AND VECTOR DATASETS [2020]

http://geodata.grid.unep.ch/

7. UNEP Environmental Data Explorer

Advantages

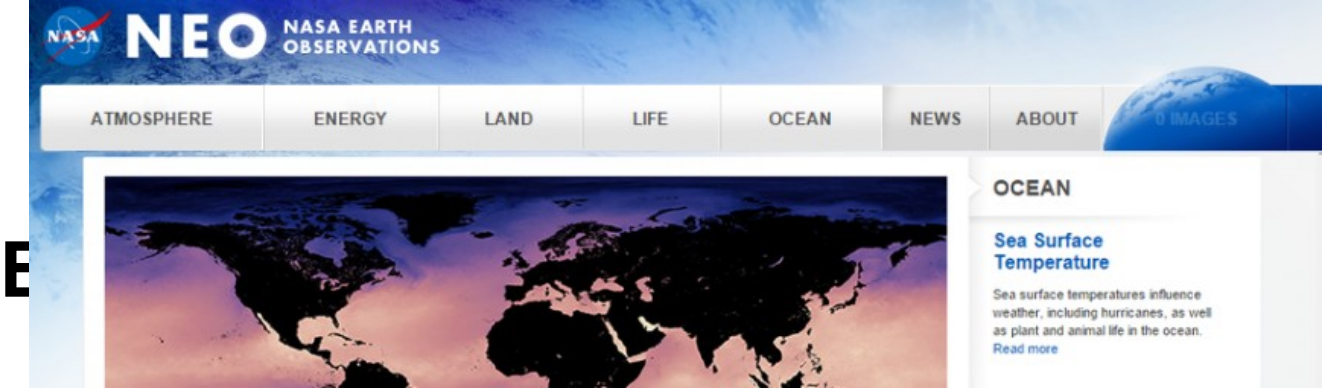
•Spatial and non-spatial data on a variety of themes.
•Display maps, graphs and tables on-the-fly.

Data Types

•Themes include population, forests, emissions, disasters and GDP (gross domestic product) for spatial and non-spatial data.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://neo.sci.gsfc.nasa.gov/

8. NASA Earth Observations (NEO)

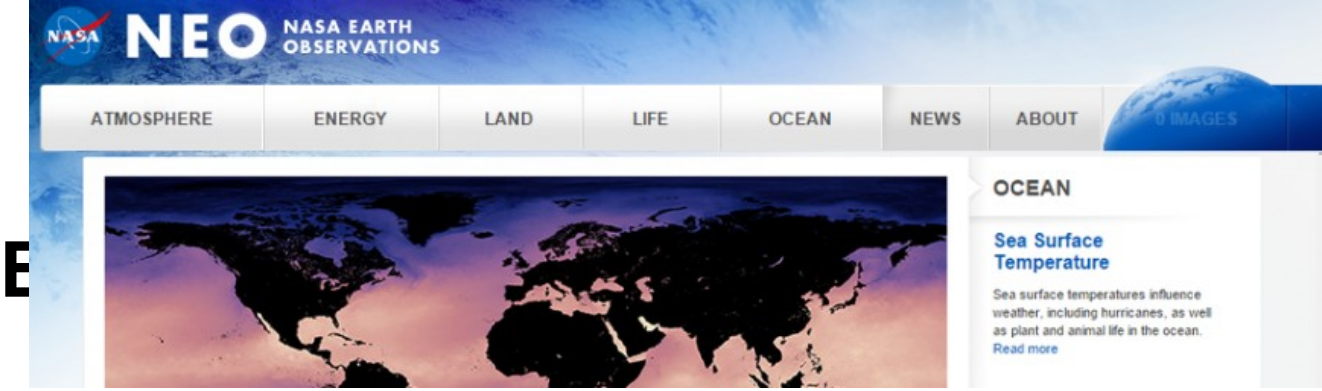
Imagine seeing daily snapshots of climate and environmental conditions of Earth. It is like a real-time climate snapshot of the world.

NEO focuses on 5 themes with **50+ global datasets**, mostly climate-related. For example, data ranges from aerosols, chlorophyll to sea surface temperature. All are free GIS data sets that can be downloaded in JPEG, GeoTIFF and Google Earth formats.

If there is not enough data, it can be found a whole list of 7 free world climate data sources: https://gisgeography.com/free-world-climate-data-sources/

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://neo.sci.gsfc.nasa.gov/

8. NASA Earth Observations (NEO)

Advantages

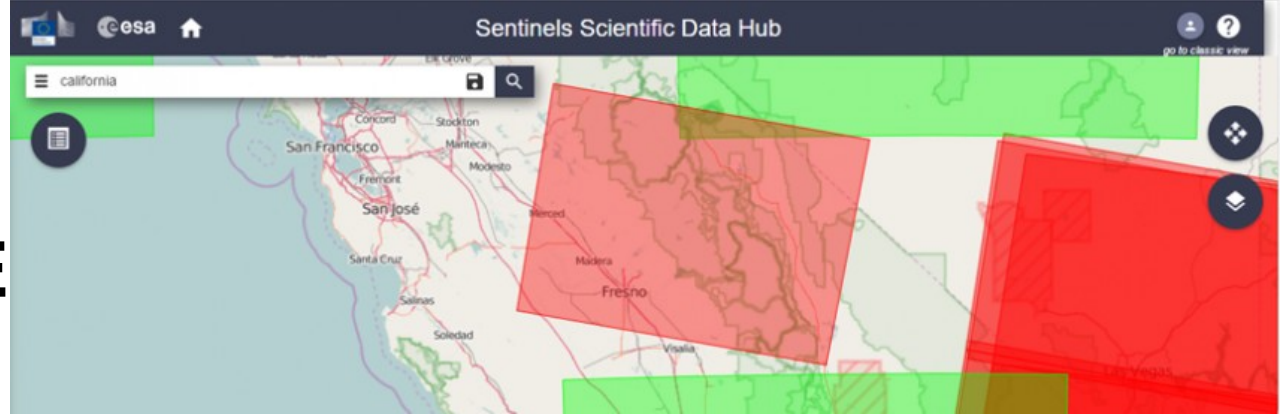
•Constant updates ensuring timely climate information of our globe.
•Accessible in a variety of GIS formats.

Data Types

•All raster grids are atmosphere, energy, land, life and ocean GIS data.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://scihub.copernicus.eu/dhus/#/home

9. Sentinel Satellite Data

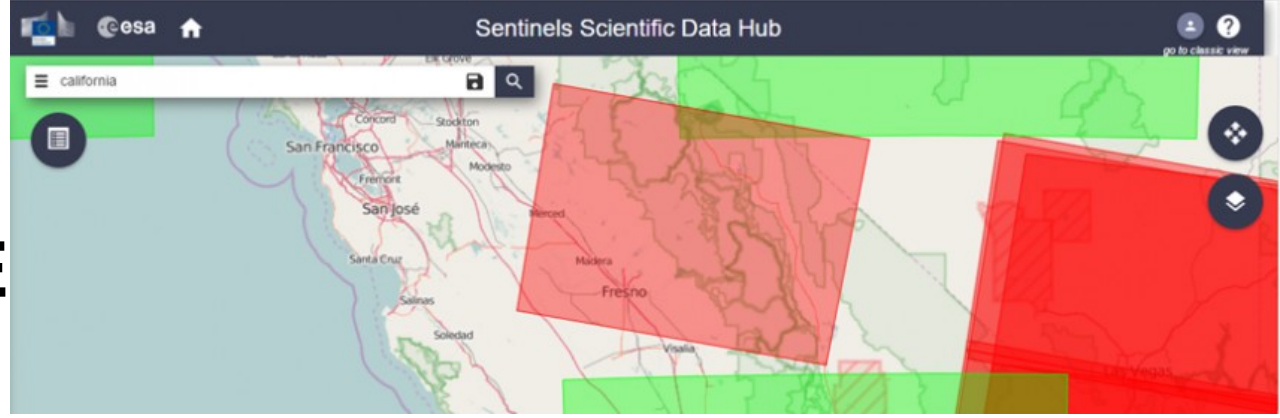
Sentinel-2 is the highest resolution satellite imagery available to the public for free. Its interface is the Copernicus Open Access Hub.

First, an account is needed after registration. Next, the area of interest can be selected by right-clicking on the map. Finally, the S2A or S2B product can be selected and downloaded.

The Copernicus Open Access Hub also stores Sentinel-1 which is synthetic aperture radar.
READ MORE: How to Download Sentinel Satellite Data for Free - https://gisgeography.com/how-to-download-sentinel-satellite-data/

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



https://scihub.copernicus.eu/dhus/#/home

9. Sentinel Satellite Data

Advantages

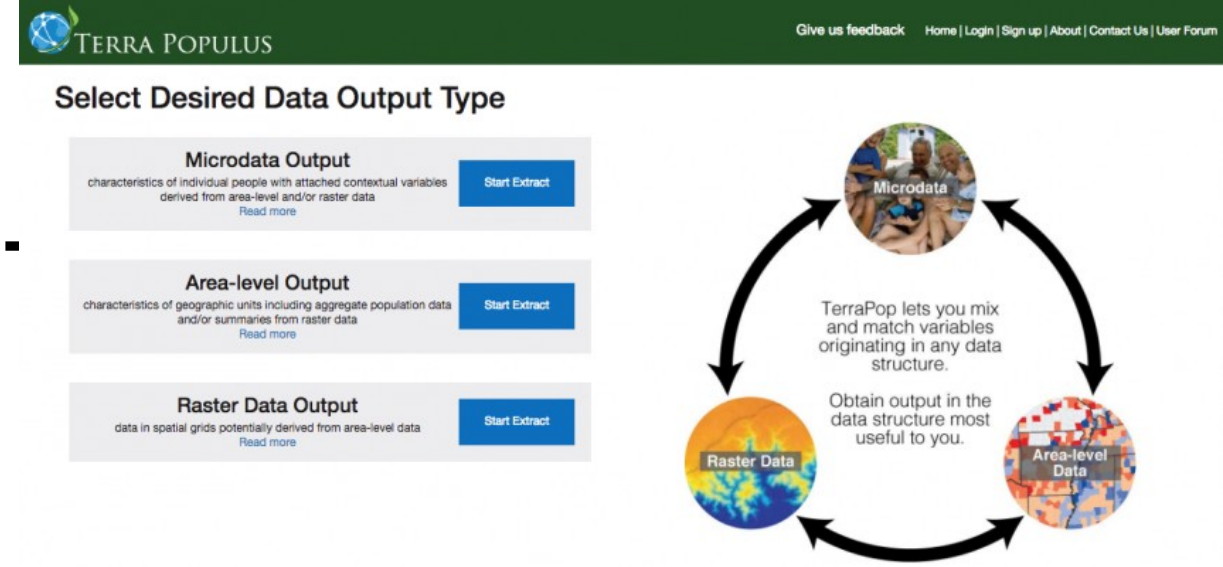
•10-meter resolution satellite data readily available.
•Sentinel 2 data has 13 spectral bands including red, green, blue, near-infrared

Data Types

•Raster data – 13 channels from Sentinel-2.
•Synthetic aperture radar from Sentinel-1.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BEST GLOBAL RASTER AND VECTOR DATASETS [2020]



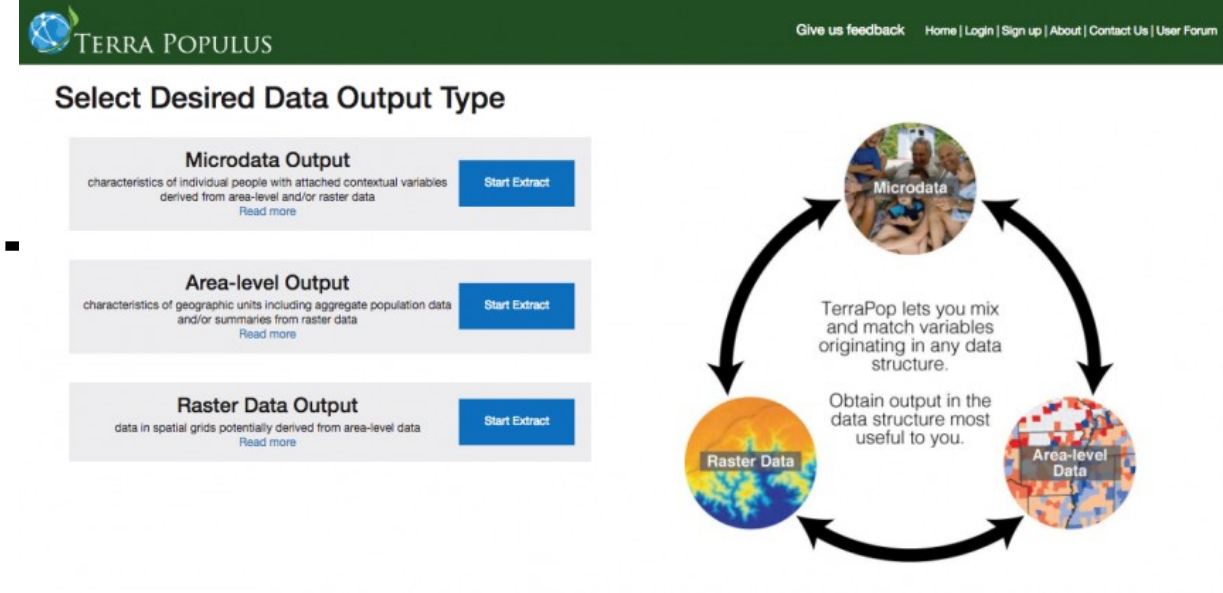
10. Terra Populus

https://www.terrapop.org

Terra Populus (TerraPop for short) integrates census data from over 160 countries around the world. In fact, it spans up to six decades for household-level and aggregate data for more than 80 countries.
The unique thing about it is how you can explore **temporal and spatial changes**. It's not only for researches. But everyone can access changes in the human-environment system for geographic space.
TerraPop also includes your basic land cover, land use, and climate data. It's supported by the National Science Foundation and the University of Minnesota. Even now, updates keep rolling out.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BEST GLOBAL RASTER AND VECTOR DATASETS [2020]



10. Terra Populus

https://www.terrapop.org

Advantages

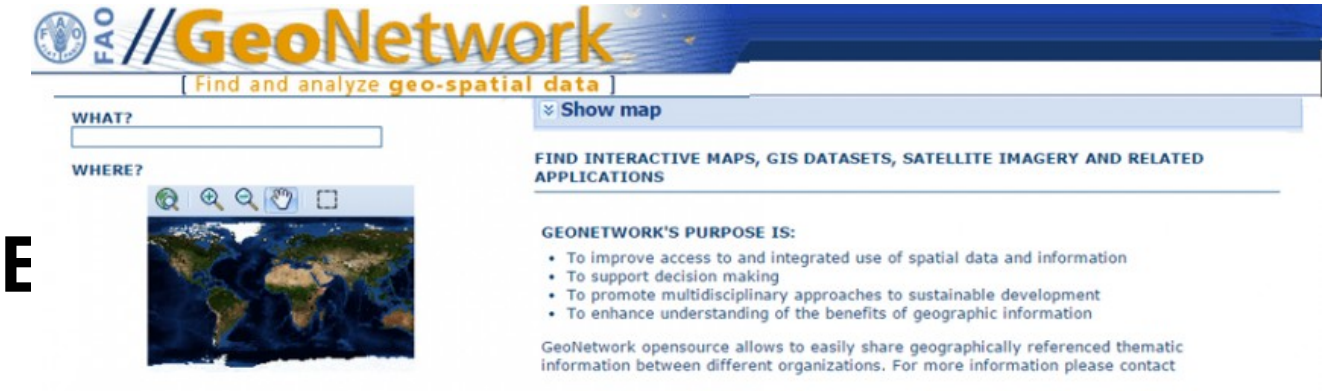
•User-friendly interface with customized temporal data delivery.

Data Types

•Micro and environmental data describing land cover, land use, and climate.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



http://www.fao.org/geonetwork/srv/en/main.home

11. FAO GeoNetwork

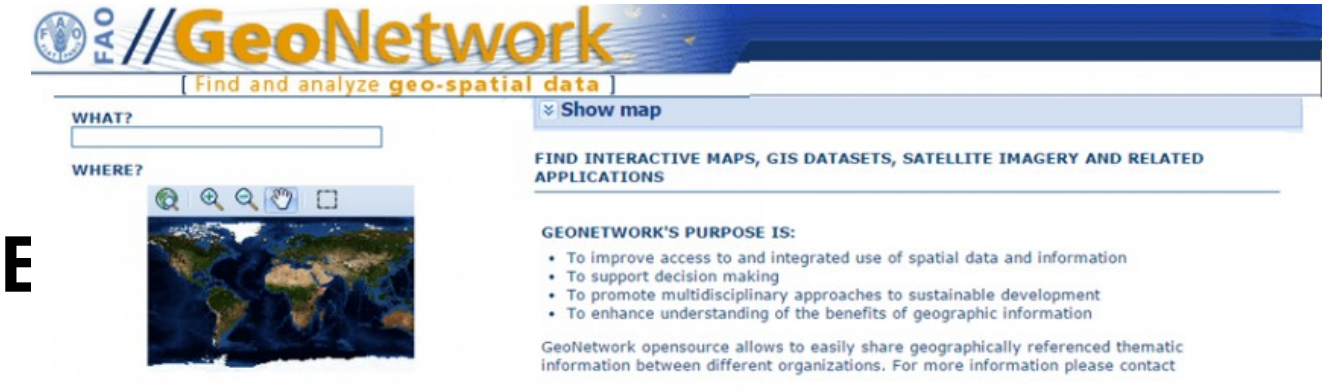
This one is the FAO GeoNetwork which is another portal of free GIS data from the United Nations.
The focus of GeoNetwork is to improve **global sustainable development**. For example, global agriculture, food security and fisheries are some of its key free GIS data.

FAO produces a large number of GIS datasets for monitoring, assessment and analysis of environmental and socio-economic factors causing poverty and food insecurity.

FAO – Food and Agriculture Organization of the United Nations

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: BE GLOBAL RASTER AND VECTOR DATASETS [2020]



http://www.fao.org/geonetwork/srv/en/main.home

11. FAO GeoNetwork

Advantages

•Search wide range of categories and filter by country.

Data Types

•Agriculture, fisheries, land resource GIS data.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: B GLOBAL RASTER AND VECTOR DATASETS [2020]

https://globalmaps.github.io/

12. ISCGM Global Map

Unfortunately, the International Steering Committee for Global Mapping (ISCGM) portal no longer exists. But that doesn't mean the data is gone forever. That's because ISCGM archived their data to the Global Map Github.

Global Map still packs some serious punch with their free GIS data. For example, global land cover and percent tree cover are the two key datasets here. But that's not all. It has cultural and natural vector datasets in here too. Since the move, registration is no longer required. Despite the lack of updates, ISCGM free GIS data is still a source that many of us can use in our maps.

GISGEOGRAPHY.COM

12 FREE GIS DATA SOURCES: B GLOBAL RASTER AND VECTOR DATASETS [2020]

https://globalmaps.github.io/

12. ISCGM Global Map

Advantages

•Download global land cover and tree prevent by selecting map tiles.

Data Types

•Boundaries, drainage, transportation, population centers, elevation, land cover, land use and vegetation.

GISGEOGRAPHY.COM

In a perfect world, you'd be able to find all the **free GIS data** you need in a single website. Of course, it would have to be free, downloadable from an authoritative source.

But well, you know the drill. The world's not perfect, life's not fair.

More Free GIS Data

Here are more free GIS data sources to superpower your maps:

•15 Free Satellite Imagery Data Sources
•https://gisgeography.com/free-satellite-imagery-data-list/

•Free Global DEM Data Sources – Digital Elevation Models
•https://gisgeography.com/free-global-dem-data-sources/

•Top 6 Free LiDAR Data Sources
•https://gisgeography.com/top-6-free-lidar-data-sources/

BUT

U.N. GGIM is missing

(next lectures)

EU Efforts

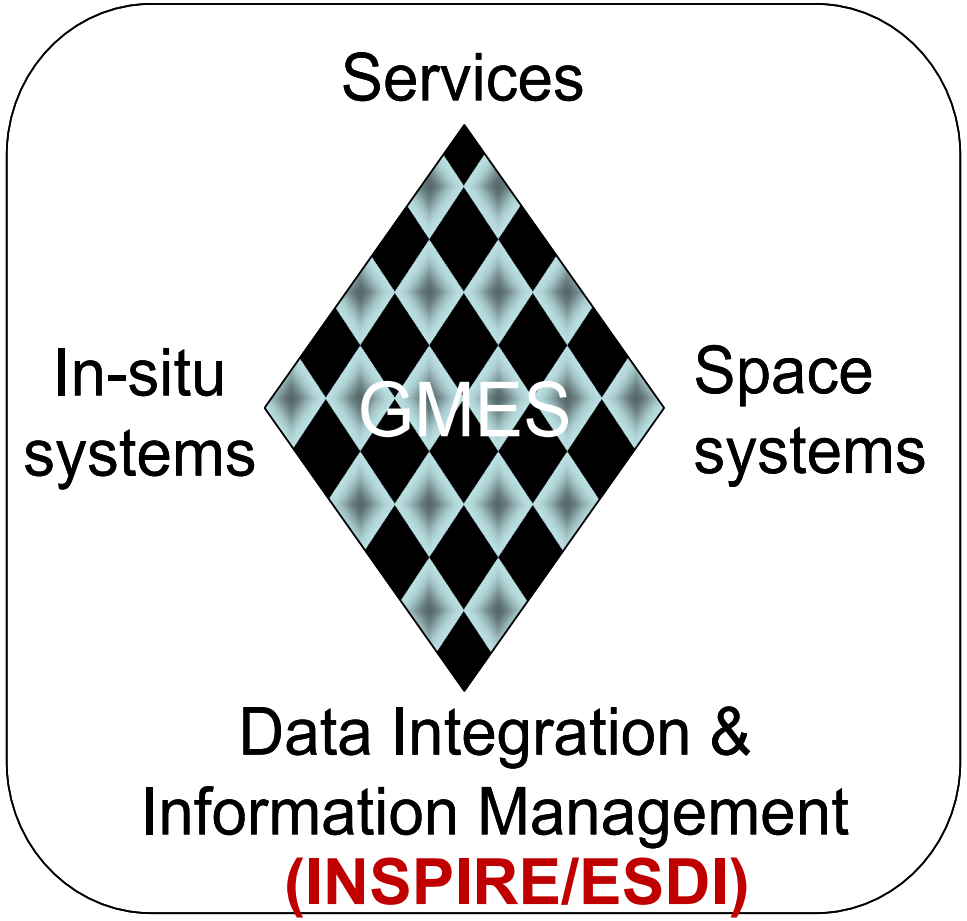
COPERNICUS and INSPIRE

COPERNICUS (GMES) and INSPIRE: from begining to valuable services

Milan KONECNY
Masaryk University Brno, CZ
President (past) ICA, Vice-President, ISDE
konecny@geogr.muni.cz

Brno, October 8, 2020

Global Monitoring for Environment and Security



INSPIRE

Infrastructure for Spatial Information in Europe

COPERNICUS-GMES (Global Monitoring for Environment and Security) **is a European initiative for the implementation of information services dealing with environment and security.**

GMES is based on observation data received from Earth Observation satellites and ground based information. These data will be coordinated, analysed and prepared for end-users.

Through GMES the state of our environment and its short, medium and long-term evolution will be monitored to support policy decisions or investments.

GMES is a set of services for European citizens helping to improve their quality of life regarding environment and security.

GMES is built up gradually: it starts with a pilot phase which targets the availability of a first set of operational GMES services by 2008 followed by the development of an extended range of services which meet user requirements.

2. How did it start?

Years of research in the fields of science and technology associated with observation and understanding of the processes and phenomena of the terrestrial environment led in 1998 to the idea to launch GMES.

By a combination of measurements at terrestrial level and from space, it rapidly became clear that new operational services could be offered in fields such as **oceanography, precise mapping of land use, rapid mapping at times of emergency for the civil protection field or air quality monitoring**.

The progressive implementation of GMES is made possible by the activities and investments of European Union and ESA Member States. These and other public and private contributions are jointly supported by the European Commission (EC) and the European Space Agency (ESA).

3. To whom is it addressed?

GMES is the European solution to respond to the needs of citizens in Europe to access reliable information on the status of their environment.

GMES will mainly support decision-making by both institutional and private actors. Decisions could concern either new regulations to preserve our environment or urgent measures in case of a natural or man–made catastrophes (i.e. floods, forest fires, water pollution).
But to take decisions, it is necessary to **anticipate, intervene and control**.

WHAT SERVICES WILL BE PROVIDED?

The services provided by GMES can be classified in ***three major categories:***

Mapping, including topography or road maps but also land-use and harvest, forestry monitoring, mineral and water resources that do contribute to short and long-term management of territories and natural resources. This service generally requires exhaustive coverage of the Earth surface, archiving and periodic updating of data.

Support for emergency management in case of natural hazards and particularly civil protection institutions responsible for the security of people and property. This service concentrates on the provision of the latest possible data before intervening.

Forecasting is applied for marine zones, air quality or crop yields. This service systematically provides data on extended areas permitting the prediction of short, medium or long-term events, including their modelling and evolution.

The widespread and regular availability of technical data within GMES will allow a more efficient use of the infrastructures and human resources. It will help the creation of new models for security and risk management, as well as better management of land and resources.

COPERNICUS

is the European participation in the **worldwide** monitoring and management of our planet Earth and the European contribution to the Group on Earth Observation (GEO). The global community acts together for a synergy of all techniques of observation, detection and analysis.

GEO and GEOSS

At the World Summit on Earth Observation in Washington in July 2003, the Group on Earth Observations (GEO) was established, with the goal of addressing the information requirement for the environment on a global scale.

This work was completed in Brussels in February 2005 by the adoption of a 10 year implementation plan of an integrated Global Earth Observation System of Systems (GEOSS).

The GEOSS

is an ambitious programme of information for ecological security and durable development intended for mankind.

It principally foresees the monitoring and *understanding of nature, the extent of disasters due to human activities*, the impact of global warming, desertification, erosion and deforestation.

GMES will be the main European contribution to GEOSS.

Overall GMES objectives

to provide information services to policy-makers and other users

Information

Needs
(policy driven)

Space Agencies
In-situ Observing systems
Scientific Community
EO Value Adding Industry

National Governments and Agencies
European Union Institutions
Inter-Governmental Organisations (IGOs)
Non Governmental Organisations (NGOs)

Virginia PUZZOLO, EC DG Enterprise-
GMES Burreau, Prague Symposium, 2009

Former GMES – Global Monitoring of Environment and Security)

The Copernicus programme **supports** the **protection of the environment and the efforts of Civil Protection and civil security, and contributes to European participation in global initiatives.**

Copernicus offers **six different service lines**:

Emergency Management, Atmosphere Monitoring, Marine Environment Monitoring, Land Monitoring, Climate Change, and services for Security applications.

The Copernicus Emergency Management Service (EMS) provides actors

with ***timely and accurate geo-spatial information*** derived from satellite-based remote sensing complemented by available *in situ* (non-space) or open source data.

As an EU service, the EMS's ***first priority*** is responding to national or cross-border disasters in Europe and large-scale disasters outside of the EU.

The Copernicus Emergency Management Service (EMS) has two main components:

- ***Early Warning,*** EW component strengthens the preparedness of national and local authorities for floods and forest fires, and

- ***Mapping***, as well as a dedicated component for the validation of the mapping products.

The EMS Mapping Service

is provided in ***two modules***:

-**Rapid Mapping,** for rapid service delivery during the response phase of crises, and

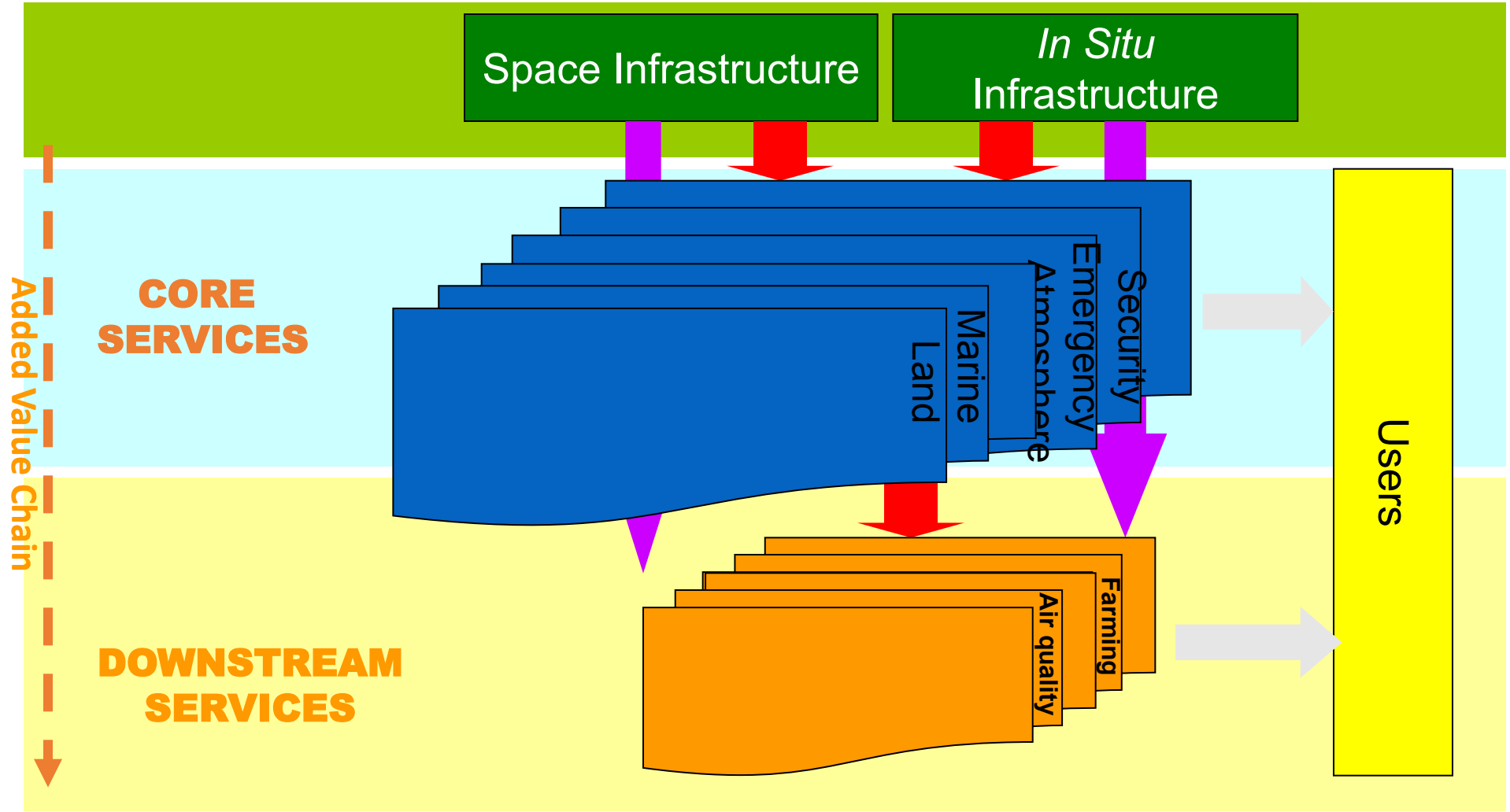
-**Risk & Recovery Mapping**, which is designed for pre- or post-crisis situations in support of recovery, disaster risk reduction, prevention, and preparedness activities.

On demand
Standardised
Hours-days
REFERENCE MAPS
DELINEATION MAPS
GRADING MAPS
VALIDATION

EARLY WARNING
Floods: EFAS
Forest Fires: EFFIS
CONTINOUS ALERTS

RISK AND RECOVERY MAPPING
On demand
Tailored to user needs
Weeks-months
REFERENCE MAPS
PRE-DISASTER SITUATION MAPS
REFERENCE MAPS
POST-DISASTER SITUATION MAPS
VALIDATION

Overall architecture



The Forum GMES 2008 held in Lille on 16-17 September 2008 marked the launch of the first GMES services in pre-operational mode:

Marine Environmental Services
Atmospheric Environmental Services
Land Environmental Services
Support to Emergencies and Humanitarian Aid
Support to security -related activities

The development of these services is supported by **implementation groups** put in place in the context of the Action Plan 2004 - 2008.

Marine Environmental Services

MyOcean is a project granted by the European Commission within the 7th Framework Programme, with the objective to define and to set up a concerted and integrated pan-European capacity for Ocean Monitoring and Forecasting.

The areas of benefit are:
Maritime Security
Oil Spill combat
Marine Resources management
Climate Change
Seasonal Forecast
Coastal Activities
Ice Survey
Water Quality and Pollution.

MyOcean is the last step toward the GMES Marine Core Service after many Europe founded programmes such as POLARVIEW, ECOOP, MARCOAST, MERSEA, ...

Atmospheric Environmental Services

The prototype atmospheric services of GMES are currently provided by two cooperating consortia that operate the **PROMOTE** GMES Service Element project funded by the European Space Agency, and the GEMS project funded by the European Commission as part of the 6th Framework Programme for Research, Technical Development and Demonstration.

The focus of PROMOTE is the delivery of services to support informed decisions on issues related to stratospheric ozone depletion, surface UV exposure, air quality and climate change. Services are based both on products derived directly from satellite data and on products from established data assimilation and modelling systems. Services can be accessed from PROMOTE website.

The focus of GEMS is to develop new integrated systems for monitoring the global distributions of atmospheric constituents important for climate, and for monitoring and forecasting constituents affecting air quality and surface solar radiation, with a focus on Europe. Trial versions of these systems are currently being operated, and the products can be accessed from GEMS website.

From mid-2009, the core services of the atmospheric component of GMES will be delivered by a new consortium comprising most of the partners of the GEMS project and core production partners from PROMOTE,

following the conclusion of a grant from the European Commission under the 7th Framework Programme. These services will continue and rationalize the provision of the main sets of data products provided currently by PROMOTE and GEMS. It is also expected that the Framework Programme

will support development of a set of **downstream services that provide user-oriented information based on the core-service data products.**

Land Environmental Services

Land Environmental Services operationally provide sound, reliable and affordable land related geo-information products on the regional, European and global scale. Their aim is to effectively support public authorities of the European Commission and the EU Member States in the implementation of the new European Environmental Directives as well as international treaties towards adaptation to Climate Change.

By the combined analysis of data received from Earth Observation satellites and ground based measuring networks theses services provide wide-area and cross-boarder harmonized geo-information products for a multitude of thematic areas,

like land use / land cover change, soil sealing, water quality and availability, spatial planning, forest management, carbon storage and global food security. Selected examples of products from various European regions can be viewed and tested on the Land Information Services portal.

Fast Track Service / CORINE Land Cover 2006

Based on previous consolidation results, the European Environment Agency (EEA) has added the first Pan-European High-Resolution Land Cover Data to its data service: a Sealing Layer and a Forest Layer covering entire Europe. In addition, the CORINE Land Cover database, existing since the 1990s, was updated for the third time for the year 2006.

The ambition is to add further high-resolution layers during the coming years during the implementation of the Land Information Core Services

Urban Atlas

Quality of Life in Europe's cities is being recorded by the Urban Audit initiative of DG Regional Cohesion and DG Environment. The Urban Atlas Core Service Element is to add a spatial dimension, e.g. to show the accessibility to green urban areas or to enable the localization of abstract statistical parameters (e.g. population density).

Forest Monitoring

Forest Monitoring Services provide innovative, timely, cost-effective and quality-assured forest information to support reporting on national and international policies such as the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the UN Convention on Biological Diversity (UNCBD), the Ministerial Conference on the Protection of Forests in Europe (MCPFE) and processes related to Streamlining European Biodiversity Indicators by 2010 (SEBI 2010). Making use of Earth Observation methodologies allows retrieving spatially explicit information on the state and development of forests from continental to regional scale in a cost-efficient way and at proven high quality.

Water Quality

Water Quality Services address the Water Framework Directive (WFD) obligating the EU Member States to manage, monitor and report the status of the water resources on river basin scale. The services focus on identification and management of nutrient and pesticide inputs into the water cycle resulting from diffuse and point sources.

Spatial Development

The Spatial Development Service provides spatially referenced and consistent geo-information for monitoring of urban structure, urban growth and soil sealing in support of reporting obligations. Products describe the pressure, state and impact of urban land take for integrated spatial planning.

Environmental Resource Management in Africa

The Service for Environmental Resource Management in Africa ensures permanent access to high quality pre-processed data for all African countries by using advanced satellite telecommunication infrastructures. Products of the service comprise advanced environmental parameters (in particular related to vegetation conditions), processed according to standard procedures, as well as maps such as land cover maps, forest maps, etc.

Support to Emergencies and Humanitarian Aid Services

Support to Emergencies and Humanitarian Aid services target three main application domains:
Civil Protection: National Civil Protection Services of Europe, DG ENV (European CP Unit), and more globally all risk management actors in Europe at different territorial scales

Humanitarian Aid: DG RELEX, DG ECHO, NGOs
Security crises: European Council, Member States
It addresses all types of disasters: natural disasters (floods, fires, landslides, storms, earthquakes, etc.), technological accidents, humanitarian crises (for instance after a severe drought period), civilian-military crises.

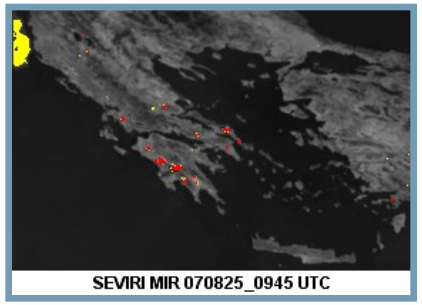
Data Portal

The Connecte@sy portal offers access to products delivered by the PREVIEW and RISK-EOS projects. The goal of this common portal is to provide a unified access to the products in order to facilitate the information exchange and sharing between the service providers and the risk user community.

In complementary with the existing delivery means held by the service provider for specific users, the Connecte@sy portal proposes the following functionalities at a global level:
The consultation of the available products,
The on-line visualisation and combination of data,
The possibility to retrieve and visualise data in Google Earth.

Four main types of products:

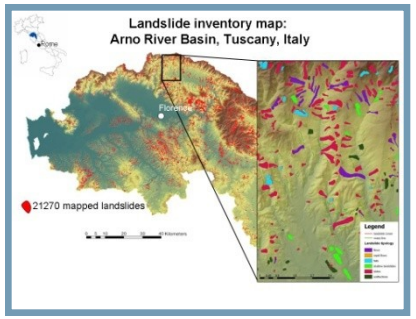
Early warning



Reference maps

Assessment maps

Thematic maps



For headquarters, decision-makers and in-field operatives In Europe and worldwide

ERCS 1st priority

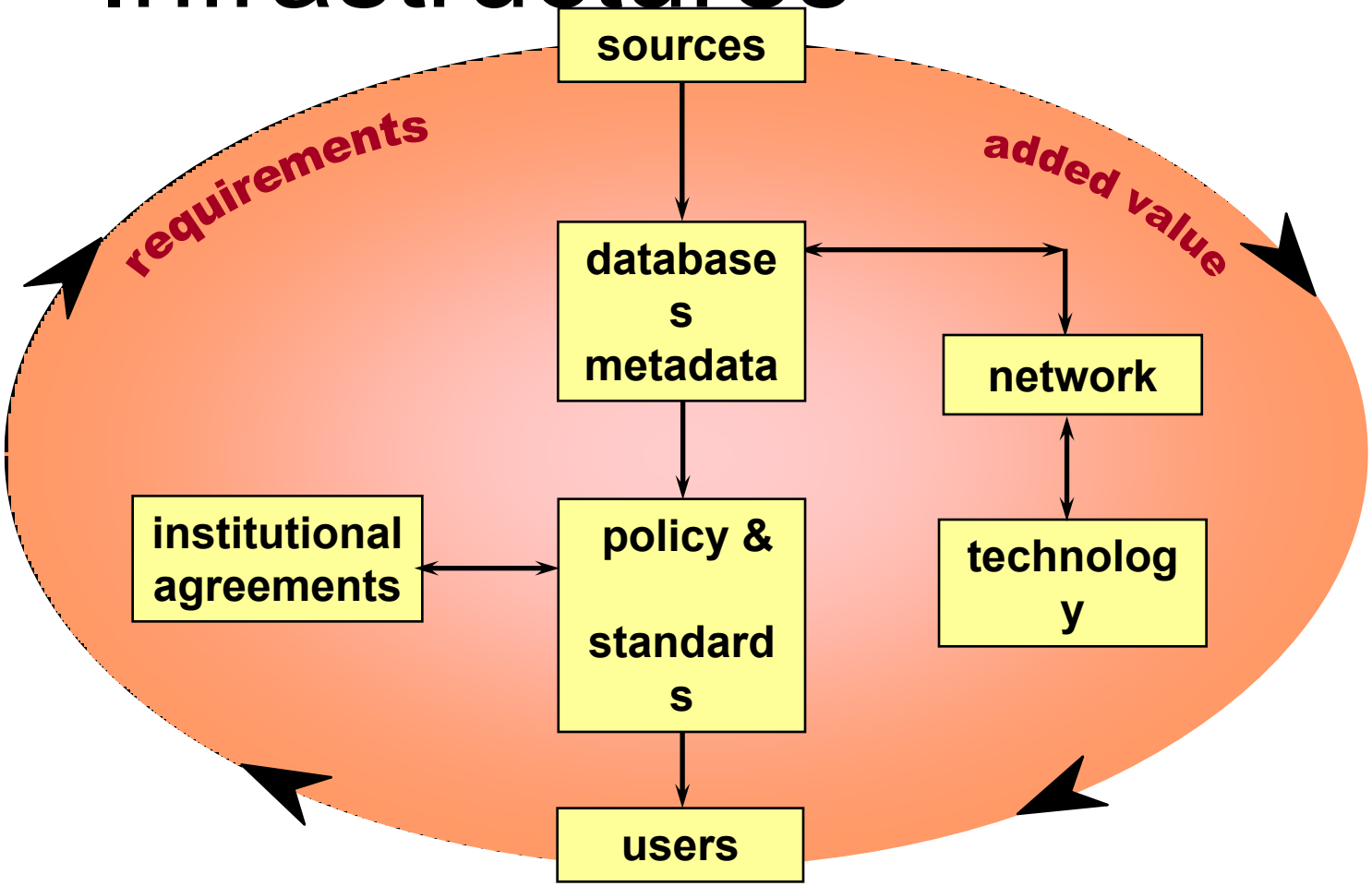
Rapid mapping on demand in case of humanitarian crises, natural disasters, and man-made emergency situations within & outside Europe

- **Reference maps** available within 6 hours over crisis area
- **Damage assessment maps** available within 24 hours & daily updated
- **Situation maps and forecasts** of evolution of situations within the few days-weeks after crisis

INSPIRE

Infrastructure for Spatial Information in Europe

Spatial Data Infrastructures



The term *Spatial Data Infrastructure (SDI)* is used to *encapsulate the technologies, policies, institutional arrangements, financial and human resources that facilitate the availability, access and effective usage of geographic data.*

The SDI provides the means for *discovery, access and application* of spatial data for policy-makers, planners and managers, citizens and their organizations.

SDI technologies consist of *a set of data services* that provide geographic data and their attributes.

Services and data are documented with *meta-data* which that subsequently offer the means

to discover, visualise and evaluate the data through the Web. Additionally, methods are provided to access the data. Applications are built to solve specific needs on the data service layer.

The INSPIRE de facto begun in September 2001, than the first INSPIRE, or at that time the E-ESDI Expert group, was convened in Brussels.

The most important step: on 11 April 2002 Memorandum of Understanding between Commissioners Wallstróm, Solbes, Busquin titled *Infrastructure for Spatial Information in Europe (INSPIRE)* has been signed

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal on the 25th April 2007.

…into force on the 15th May 2007, implemented in various stages, fully by 2019.
Appendixes 1-3 with obligatory Data Themes for all EU Member States (MS).

INSPIRE is based on common principles:

- Data should be collected only once and kept where it can be maintained most effectively.

- It should be possible to combine seamless spatial information from different sources across Europe and share it with many users and applications.

- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.

- Geographic information needed for good governance at all levels should be readily and transparently available.

- Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

The INSPIRE concept:

Availability

Accessibility

Legislation rules.

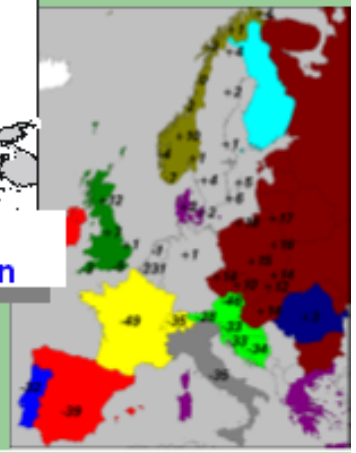
Infrastructure for Spatial Information in Europe

Different Policies and standards

Technical Support to GI policy development

Standards implementation

Europe is moving 3cm/ year



Different sea level in Europe

GI Institutional framework

GI technical standards

Spatial Data Infrastructure

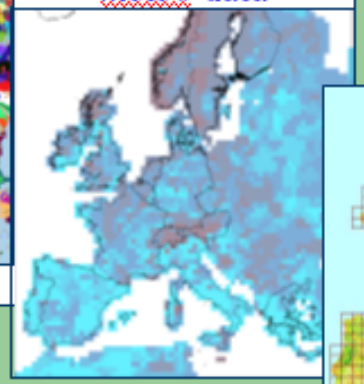
Fundamental GI data sets

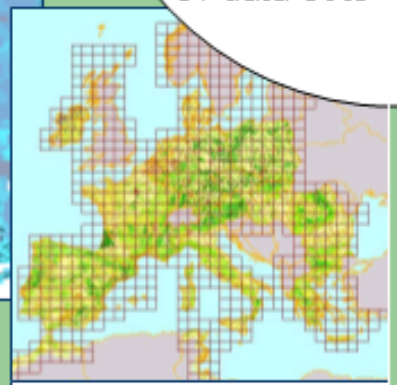
Spatial Information Services

Catchments

Technical Support To data set creation

Meteo data

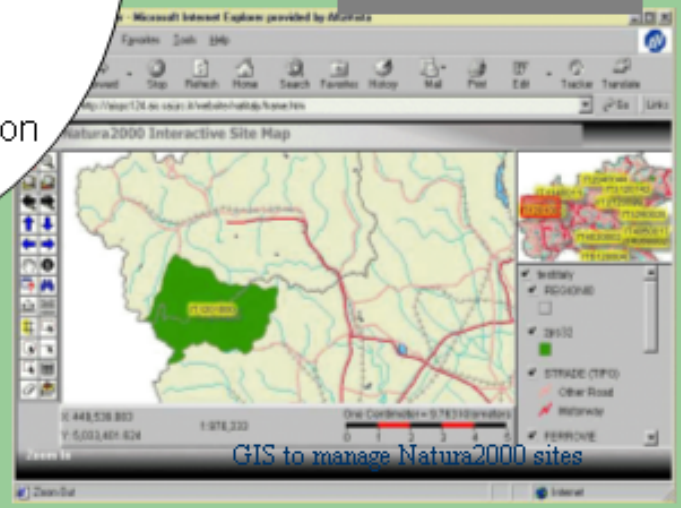




Land Cover

Needs to create european spatial data sets

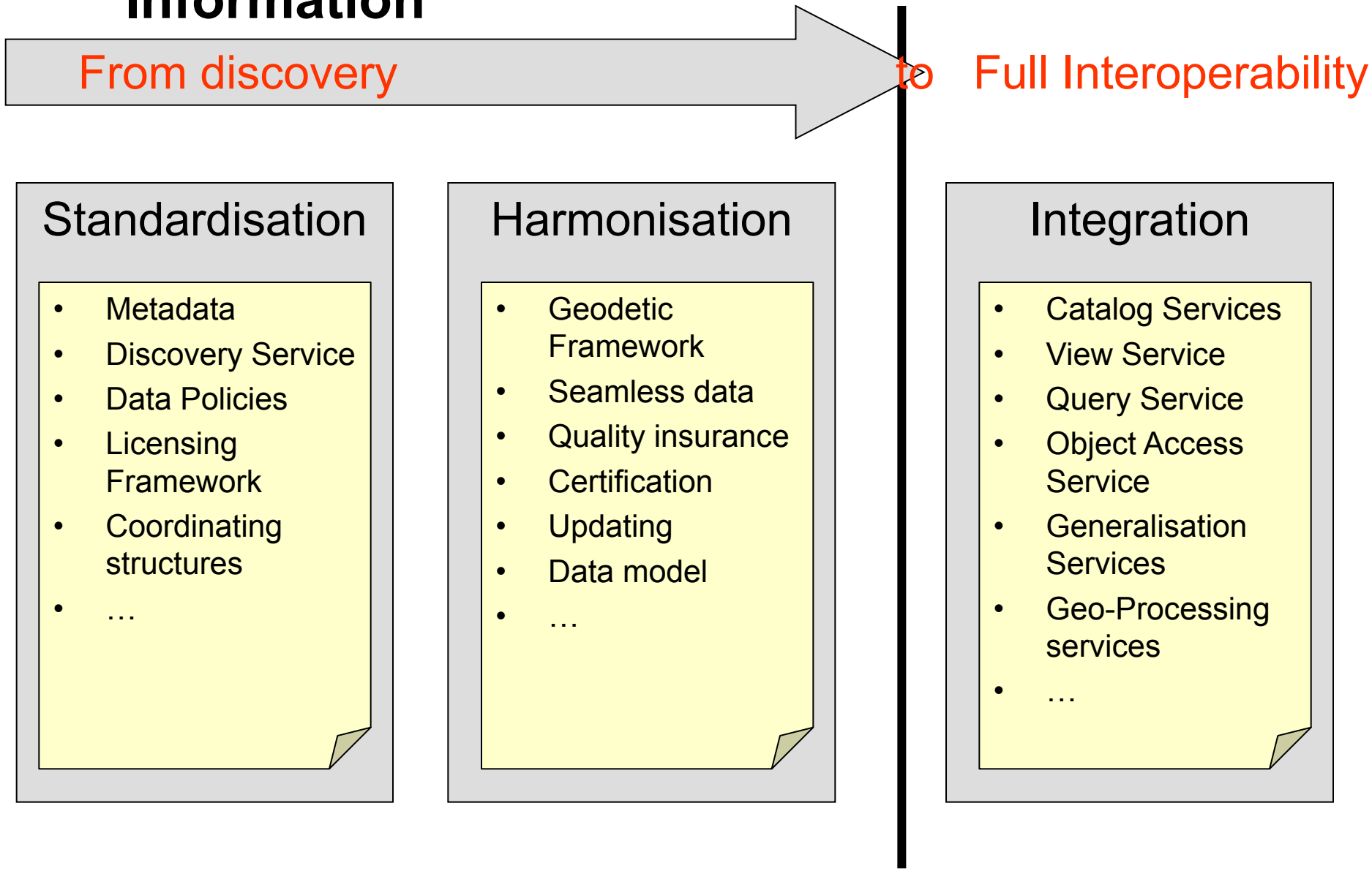
GIS for Natura 2000



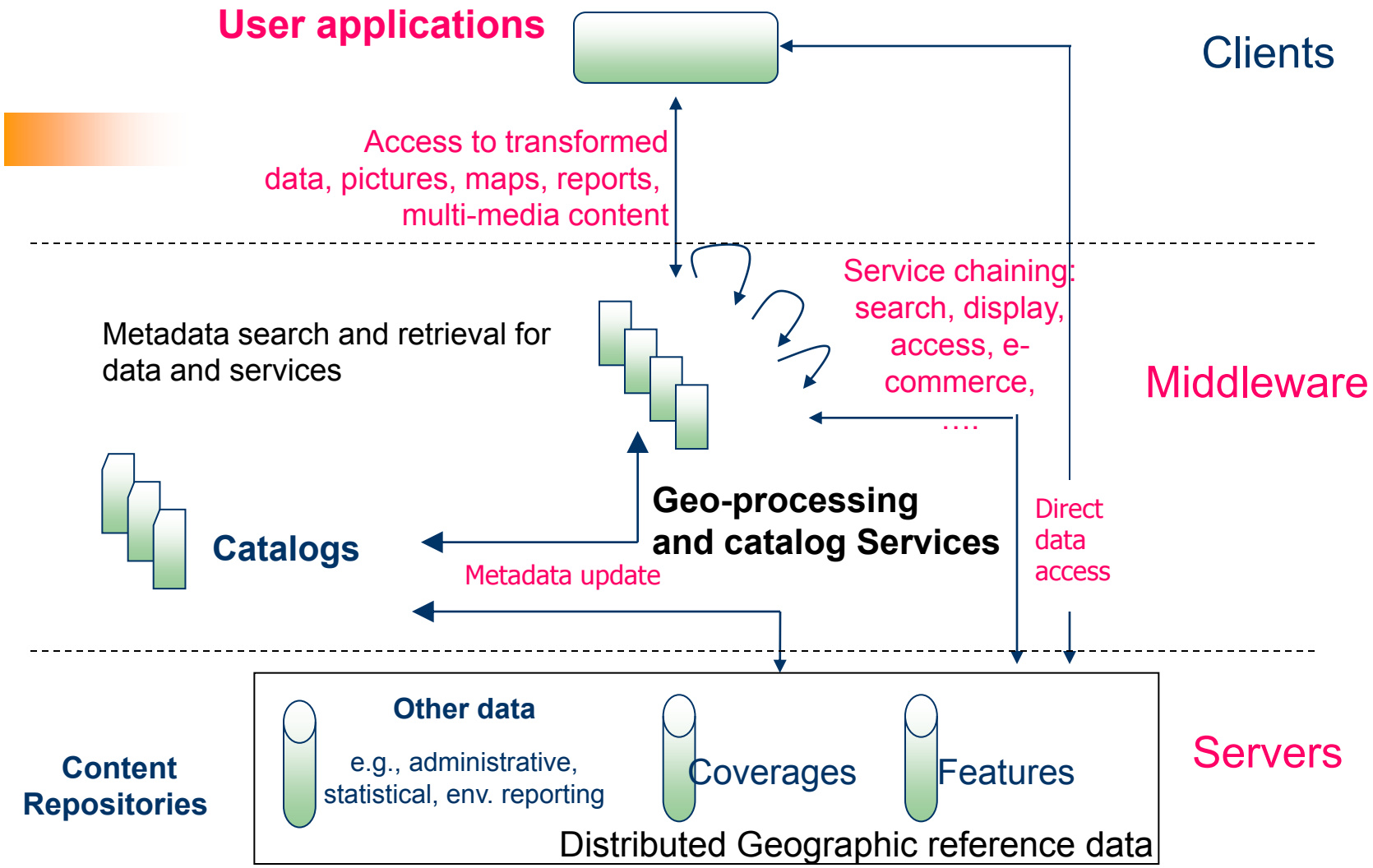
GIS to manage Natura2000 sites

eEurope : eGovernement on line

Towards an Infrastructure for Spatial Information



Current status
Architecture model



After the Digital Earth Reference Model

A new strategic approach

- Comprehensive set of policies covering surface and ground water quality, flood assessment, marine and coastal areas, soil, etc.
- Right geographical scale i.e. river basin for water quality and floods
- Sound knowledge based on timely, accurate, easily accessed, harmonised / interoperable geospatial and environmental information, shared across European, national, and local jurisdictions.
- Increasing shift from sector-based (silos) policy making towards more integrated, cross-sectoral approaches.

Two Examples:

- **Directive on the Assessment and Management of Floods**

- **Water Framework**
  Directive for the protection of all waters

In summary the situation in Europe

- A lot of data but difficult to find because they are poorly documented
- Even if you find data, it is often not possible to access because of policy restrictions
- Lack of co-ordination across borders and between levels of government
- Lack of standards and incompatible information and information systems
- Even if these barriers are overcome, the data is often not re-usable or difficult to integrate with other data

LEGAL FRAMEWORK NEEDED

Directive establishing an infrastructure for spatial information in the Community - INSPIRE

INSPIRE Directive 2007/02/EC

The INSPIRE Directive lays down general rules to establish an Infrastructure for Spatial Information in Europe for the purposes of Community environmental policies and policies or activities which may have an impact on the environment

This infrastructure shall build upon infrastructures for spatial information established and operated by the Member States.

Which data/services?

Existing spatial data held by or on behalf of a public authority operating down to the lowest level of government when laws or regulations require their collection or dissemination.

Annex I

1. Coordinate reference systems
2. Geographical grid systems
3. Geographical names
4. Administrative units
5. Transport networks
6. Hydrography
7. Protected sites

Annex II

1. Elevation
2. Addresses
3. Cadastral parcels
4. Land cover
5. Orthoimagery
6. Geology

Harmonised spatial data specifications more stringent for Annex I and II than for Annex III

Annex III

1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utility and governmental services
7. Environmental monitoring facilities
8. Production and industrial facilities
9. Agricultural and aquaculture facilities
10. Population distribution – demography
11. Area management/restriction /regulation zones & reporting units
12. Natural risk zones
13. Atmospheric conditions
14. Meteorological geographical features
15. Oceanographic geographical features
16. Sea regions
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution
20. Energy resources
21. Mineral resources

From Commission proposal to Community Directive implementation

- **Preparatory phase** (2004-2006)
  - Co-decision procedure
  - Start of preparation of Implementing Rules
- **Transposition phase** (2007-2009)
  - **Directive entered into force 15 May 2007**
  - INSPIRE Committee starts its activities **26 June 2007**
  - Continuation of preparation of Implementing Rules
  - **Transposition into national legislation 15 May 2009**
  - Adoption of Implementing Rules by Comitology
- **Implementation phase** (2009-2013)
  - Implementation and monitoring of measures
  - Continuation of preparation of Implementing Rules
  - Adoption of Implementing Rules by Comitology

INSPIRE Components

- Metadata
- Interoperability of spatial data sets and services
- Network services (discovery, view, download, invoke)
  - Made available trough the European geo-portal
- Data and Service sharing (policy)
- Coordination and measures for Monitoring & Reporting

Detailed technical provisions will be laid down in Commission Regulations (Implementing Rules) that become European legislative acts binding in 27 Member States and in some EFTA countries

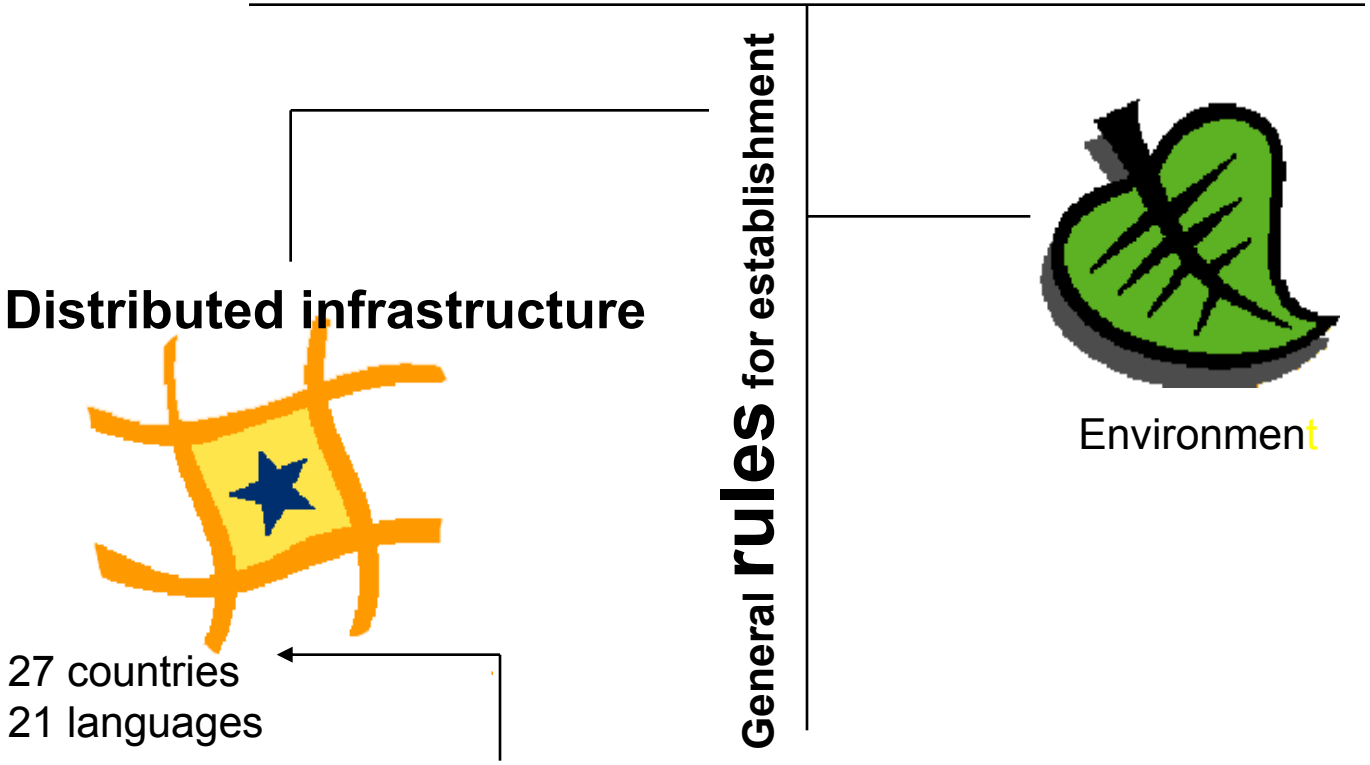
Interoperability and harmonisation of spatial data sets and services

The development of INSPIRE Implementing rules for the interoperability and, where practicable, harmonisation of spatial data sets and services follow a two-step approach:

1) Development of conceptual framework and specification methodology:
   - DS-D 2.5 *Generic Conceptual Model* (GCM),
   - DS-D 2.6 *Methodology for Specification Development*…
2) Development of data specifications for each data theme
   - Based on the conceptual framework and specification methodology, and based on the INSPIRE roadmap.

What is INSPIRE?

“Infrastructure for Spatial Information in the European Community”



European legislation

The Copernicus Emergency Management Service (EMS) provides actors

with ***timely and accurate geo-spatial information*** derived from satellite-based remote sensing complemented by available *in situ* (non-space) or open source data.

As an EU service, the EMS's ***first priority*** is responding to national or cross-border disasters in Europe and large-scale disasters outside of the EU.

Scope INSPIRE Directive

- General rules to establish an infrastructure for spatial information in Europe
  - Community environmental policies
  - Policies or activities which impact on the environment
- To be based on SDIs established and operated by the Member States
- Does not require collection of new spatial data

Types of documents produced by INSPIRE

- INSPIRE Directive
- Implementing Rules Legislative Acts
- Draft Implementing Rules and Guidelines
- Technical reports and supporting material

Metadata

- INSPIRE Metadata Regulation published 4th December 2008
- Two years for Member States to create metadata for Annex I and II, 5 years for Annex III.
- Maintenance of Technical Guidelines based on user feedback
- Metadata editor publicly available as part of prototype INSPIRE geo-portal
  - to test technical coherence and compliance with ISO standards
  - to support MS in creating metadata compliant with regulation
  - plan to assess the need for a Multilingual Open Source version so that it can be downloaded by users and extended by thematic communities

Network Services

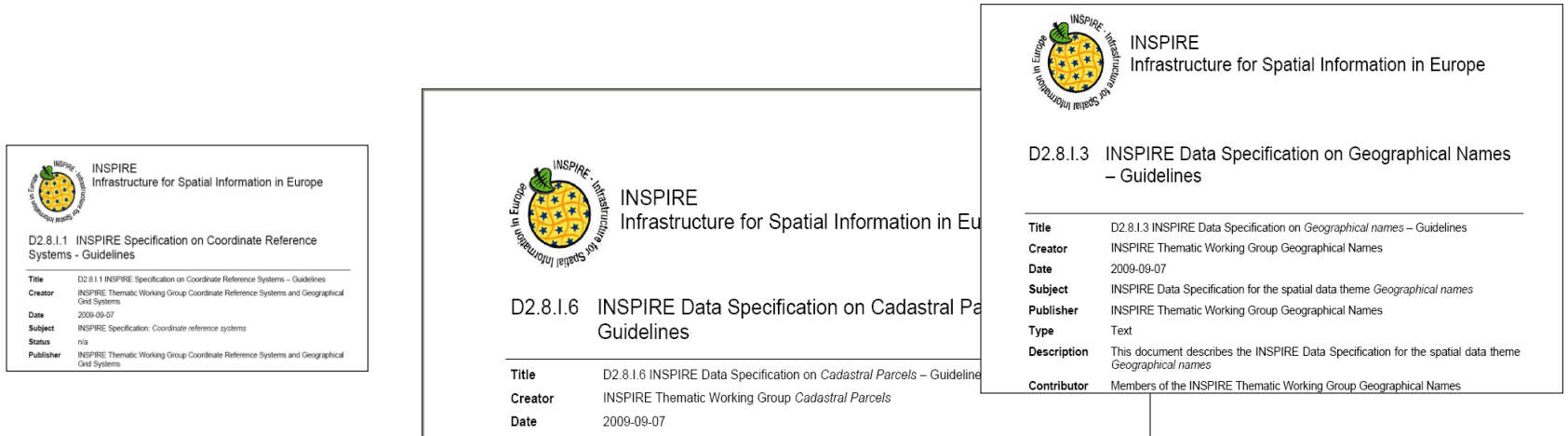
- **Discovery and View Services**
  - Draft Commission Legislation: Draft Regulation on INSPIRE Discovery and View Services
  - Finalization and publication expected by the end of the year
  - Initial Operating Capability foreseen as part of the regulation
- **Transformation Service**
  - Network Services Drafting Team has finalised the next version of their proposal for Transformation service Implementing Rules and the accompanying Technical Guidelines for the coordinate transformation.
  - Taking into account the comments received from the SDICs and LMOs
  - The Draft Legislation is currently being prepared by the European Commission for submission to the INSPIRE Committee.
  - The Draft Implementing Rules, the Technical Guidelines and the comments resolution document are publicly available as of 25 September 2009.

Network Services

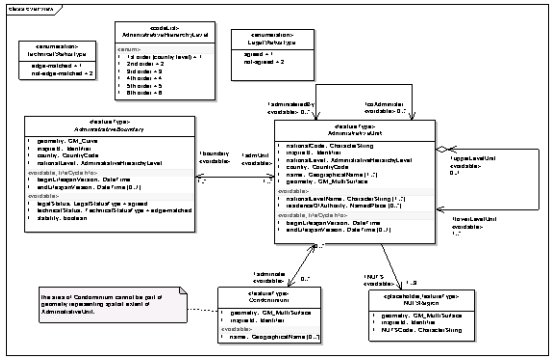
- **Invoke Services**
  - Technical Report on the state of play for service invocation.
  - Network Service Drafting Team will start activity on this service
  - As more and more geo-processing services become available, the issues of how to chain them is increasingly important to move from a data-centric to an information-centric SDI, able to respond to much wider user base.
  - Several important research issues to address including better documentation of services, quality and trust, dependencies, rights management, etc.

Annex I data specifications

- Developed by 8 Thematic Working Groups since 2008-12
- Intermediate documents subject to consultation and testing by stakeholders
- V3 of data specifications for Themes of Annex I published on 2009-09-07
- The Draft Legislation is currently being prepared by the European Commission for formal submission to the INSPIRE Committee (meeting 2009-12-14)



Data specifications – Content



- Application schema in UML
  - spatial object types
  - attributes & attribute values
  - relationships between spatial objects
  - constraints
- Rule for geographical referencing
- Rules for unique identifiers for spatial objects, derived from national identifiers
- Theme specific metadata (including data quality)
- Simple portrayal rules for the INSPIRE View Network Service

Data and Service Sharing between Member States and Community Institutions and Bodies

- Member States to adopt measures for the sharing of data and services between public authorities for public tasks relating to the environment without restrictions occurring at the point of use. Such measures are open to international bodies and Community institutions and bodies
- Public authorities may charge, license each other and Community institutions provided this does not create an obstacle to sharing.
- When spatial data or services are provided to Community institutions for reporting obligations under Community law relating to the environment then this will not be subject to charging.
- Member States shall provide the institutions and bodies of the Community with access to spatial data sets and services in accordance with harmonised conditions.
- The regulation on these harmonised conditions has now been approved by the INSPIRE Committee. Best practice and guidelines allow to identify measures that are successful in ensuring and maintaining quality of data as well as increasing access and us

Monitoring and Reporting

- Monitoring and Reporting IR approved by INSPIRE Committee in December 2008, published in OJ 11th June 2009.
- Quantitative indicators on the progress of the SDI in the member states and qualitative reports about implementation experiences and benefits will enrich our collective knowledge in SDI assessment.
- Workshop with Member States Contact Points for INSPIRE focusing on Monitoring and Reporting scheduled on 2009-11-16

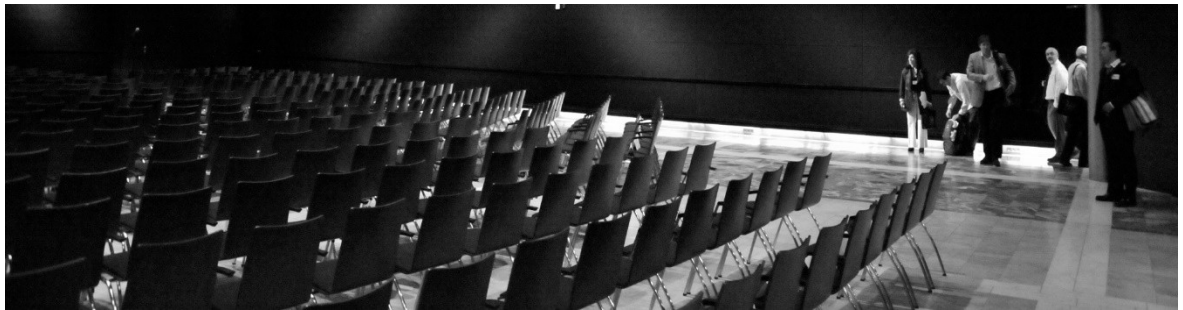
Interoperability of spatial data sets and services
Annex II, III

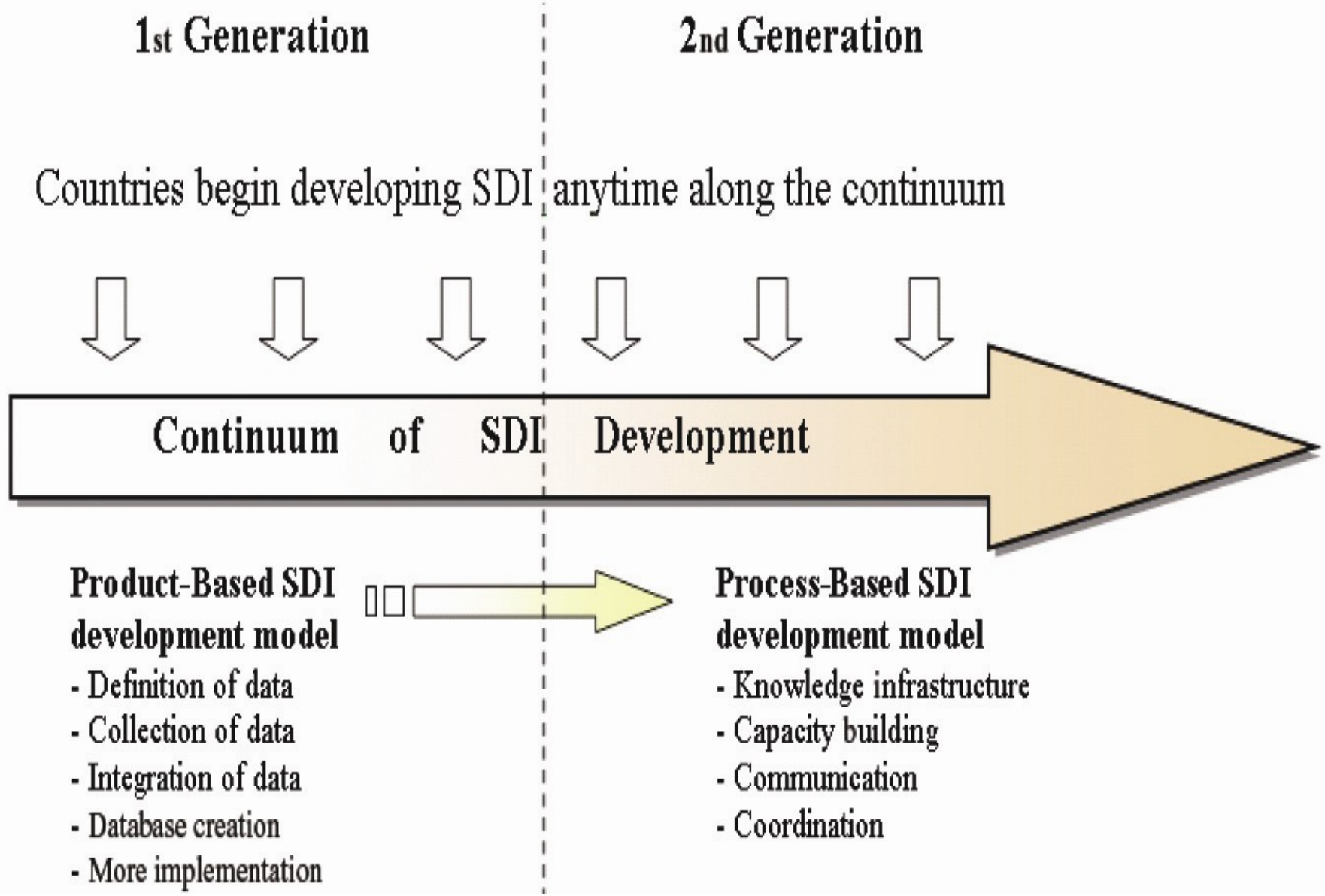
- Principles of process:
  - Open, participatory and transparent process
  - Involvement of stakeholders and relevant thematic experts and communities at all steps
  - Call for manifestation of interest was launched on 05/11 on http://inspire.jrc.ec.europa.eu/index.cfm/newsid/4140
    - Closing date for nominating experts 14/12/2009
    - For submitting reference materials 31/01/2010
  - Prior registration as SDIC required

Call for participation in Annex II&III data specification development

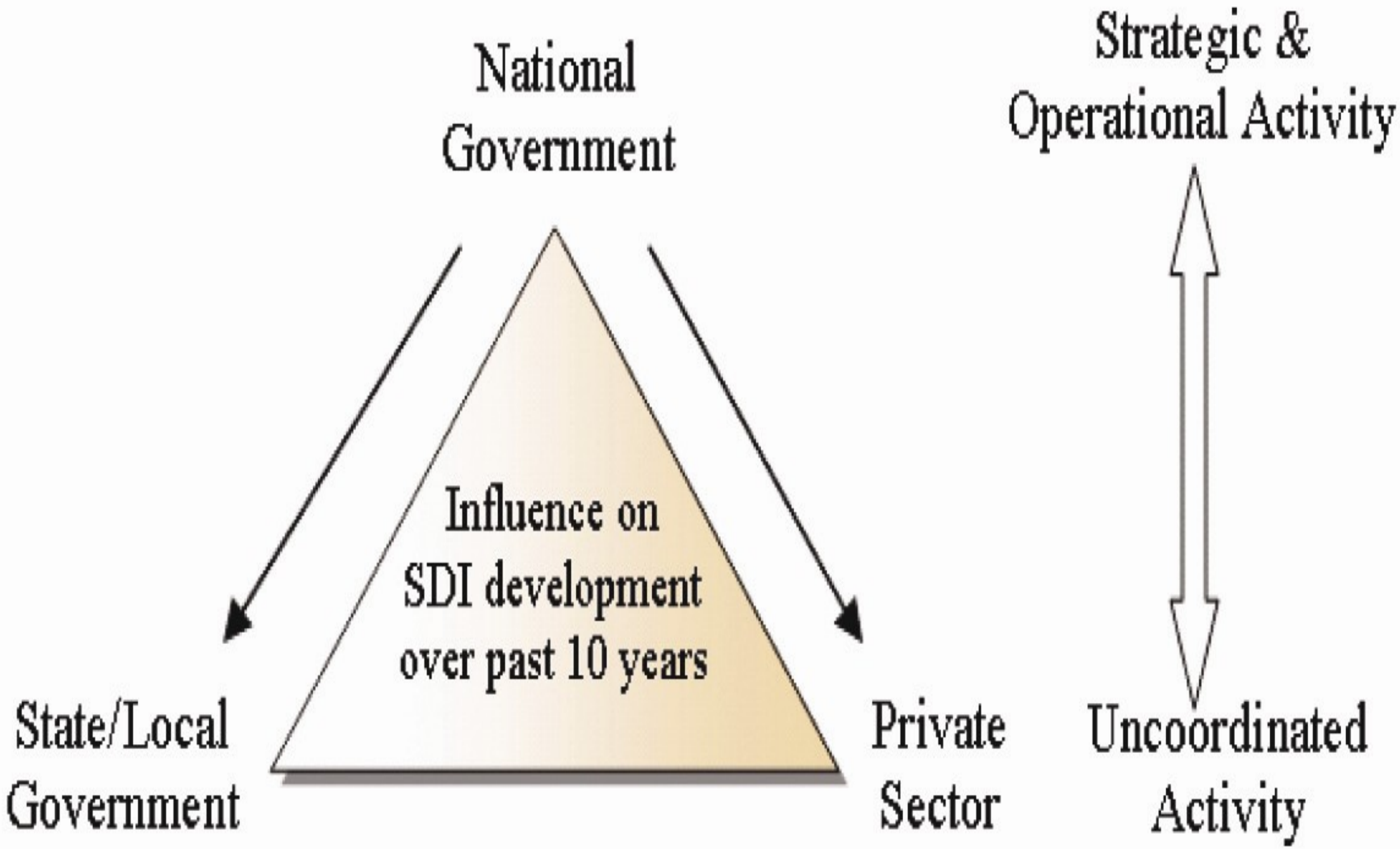
- Renewed EC INSPIRE website
- Web 2.0 INSPIRE Forum website

  http://inspire-forum.jrc.ec.europa.eu/
- Bring national and thematic workshops addressing INSPIRE aspects under Forum umbrella
  - Organizing an event relevant for INSPIRE development or implementation? Apply for it to be recognized as an INSPIRE Forum event!

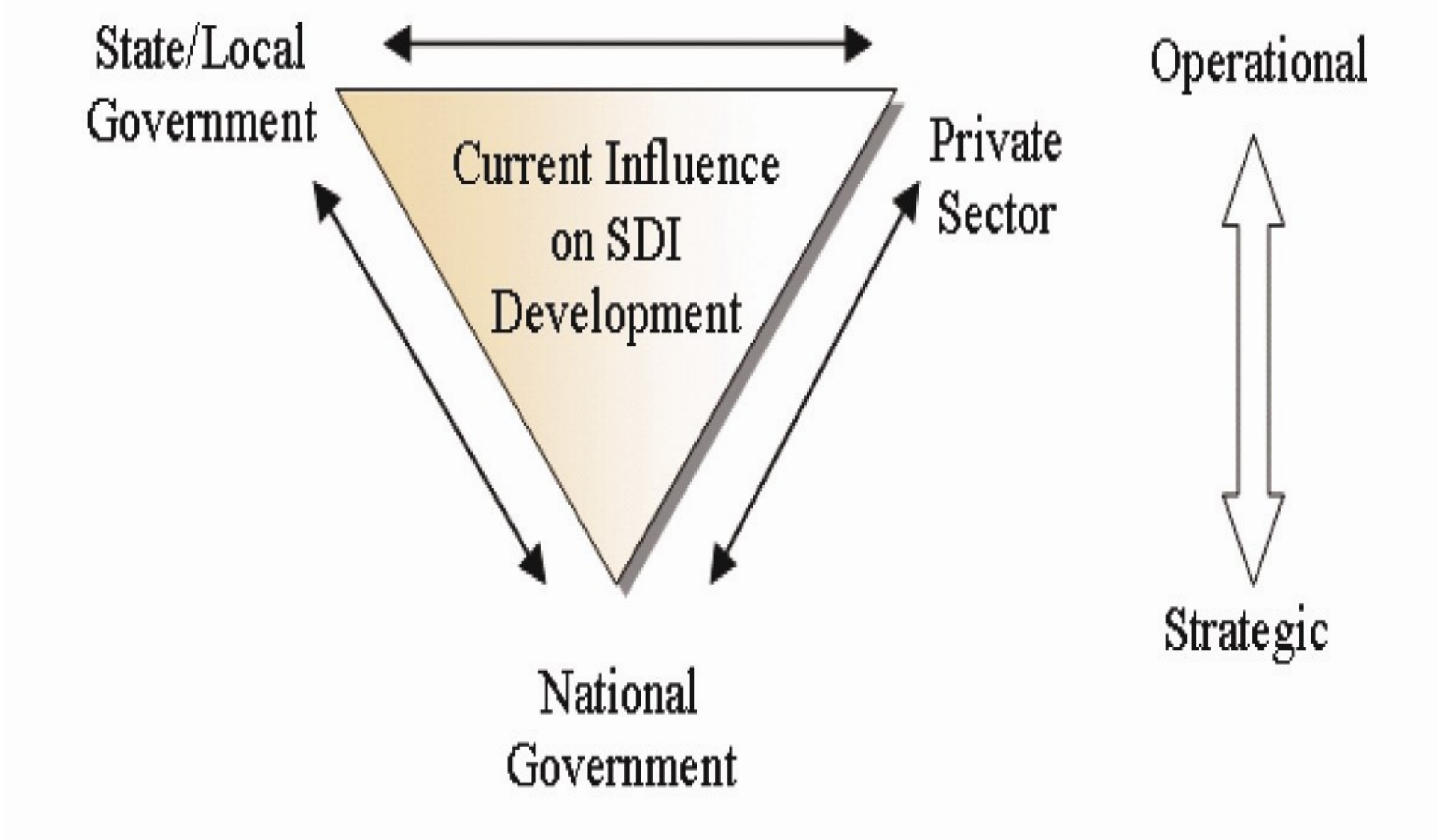




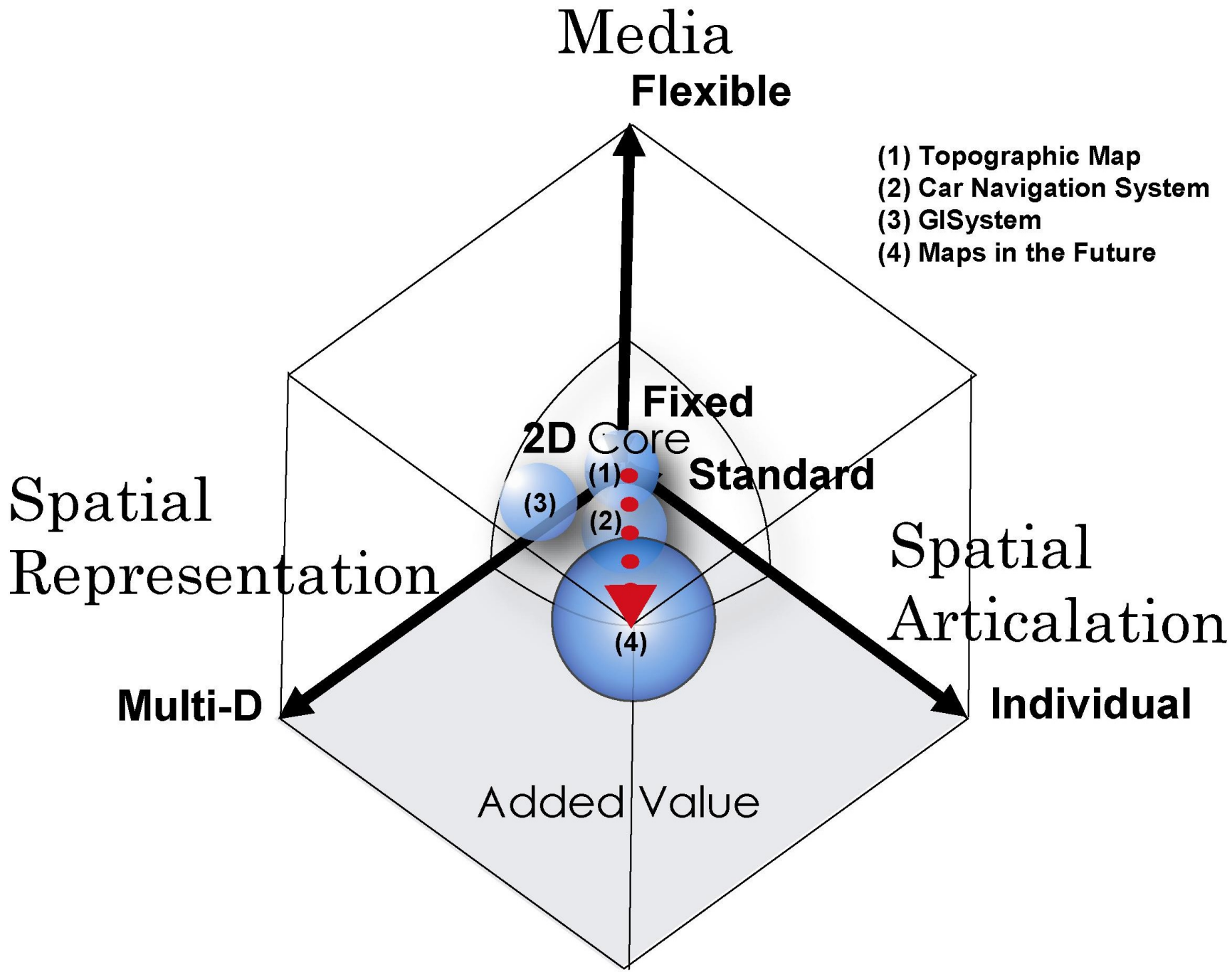
Relationship between the first and second generations of SDIs.
(by Williamson Rajabifard, Binns, 2007, reprinted from Rajabifard at al.2006 with permission of the International Journal of GIS)



Roles of national governments, subnational governments and the private sector in SDI development over the part decade.(by Williamson Rajabifard, Binns, 2007 reprinted from Rajabifard at al.2006 with permission of the International Journal of GIS)



Current roles of national governments, subnational governments, and the private sector in SDI development (by Williamson Rajabifard, Binns, 2007, reprinted from Rajabifard at al.2006 with permission of the International Journal of GIS).


Media
Flexible
(1) Topographic Map
(2) Car Navigation System
(3) GISystem
(4) Maps in the Future
Fixed
2D Core
Standard
(1)
(2)
(3)
(4)
Spatial Representation
Multi-D
Spatial Articalation
Individual
Added Value

DĚKUJI (in Czech)