www.grid.unep.ch

Regional training workshop on geographical information system for energy planning

UNIVERSITÉ DE GENÈVE

UNEP | GRID Geneva

Introduction to SDIs (Spatial Data Infrastructure)

Dakar, 12 August 2014

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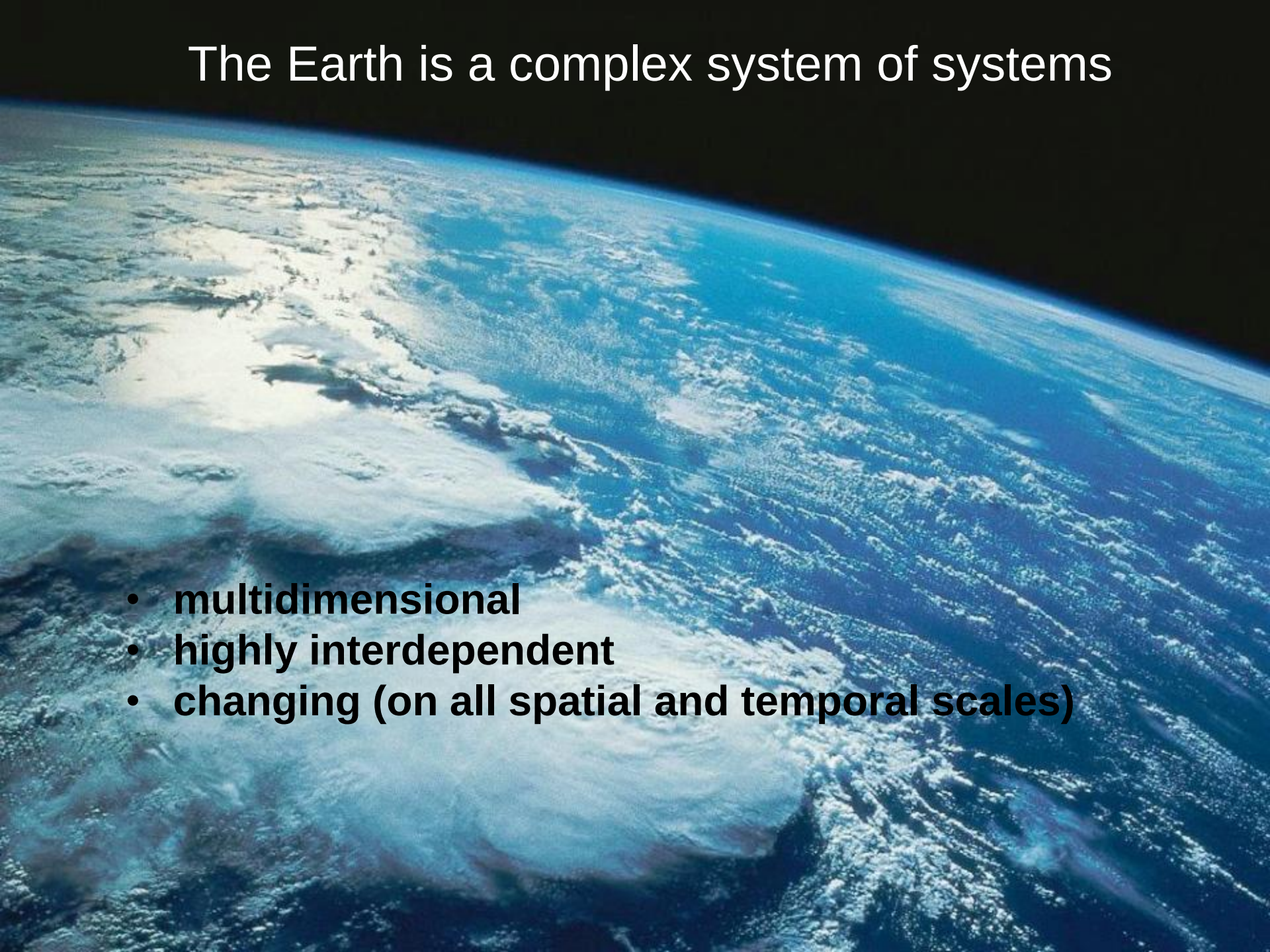
Andrea de Bono,
Bruno Chatenoux

Université de Genève
UNEP/GRID-Geneva

Introduction to SDIs (Spatial Data Infrastructure

The Earth is a complex system of systems



- **multidimensional**
- **highly interdependent**
- **changing (on all spatial and temporal scales)**

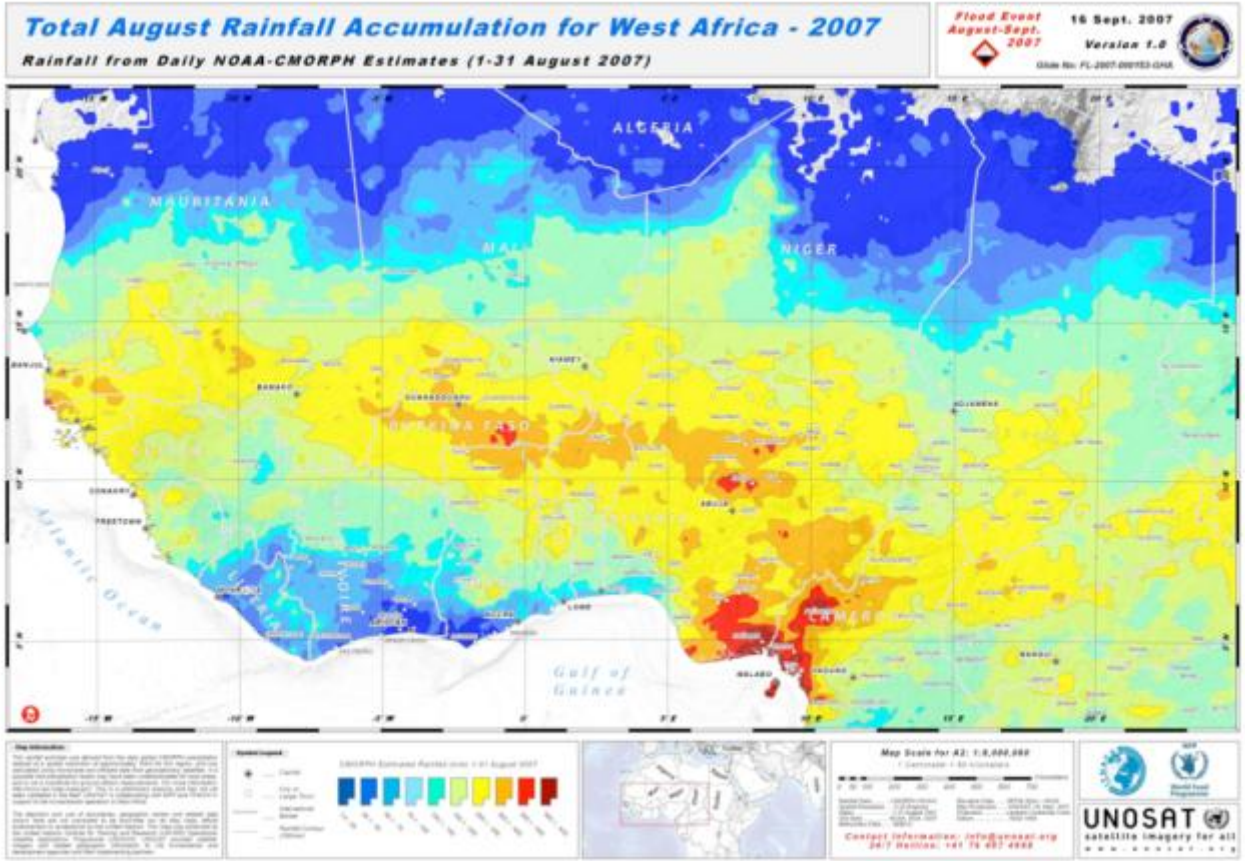
OBSERVE

SHARE

INFORM

One dataset for many users

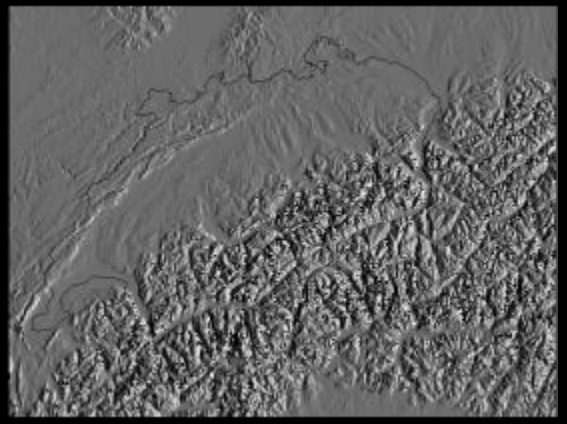
Many datasets for one user



Climatologists,
Hydrologists,
Geologists,
Biologists,
Ecologists, ...

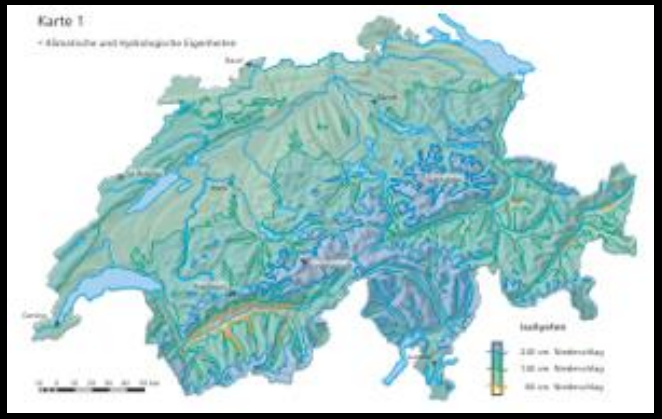
UNHCR
The UN Refugee Agency

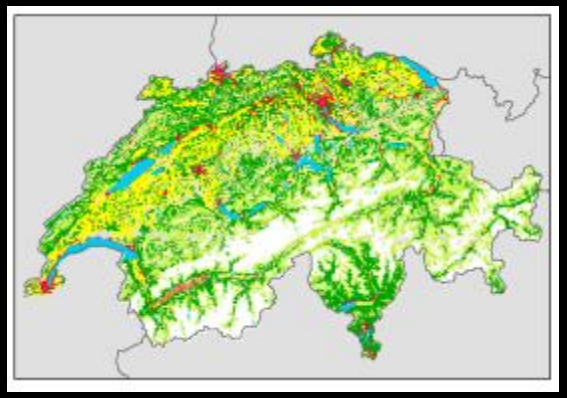
Digital Elevation Model



Temperatures

Precipitations





Land Cover

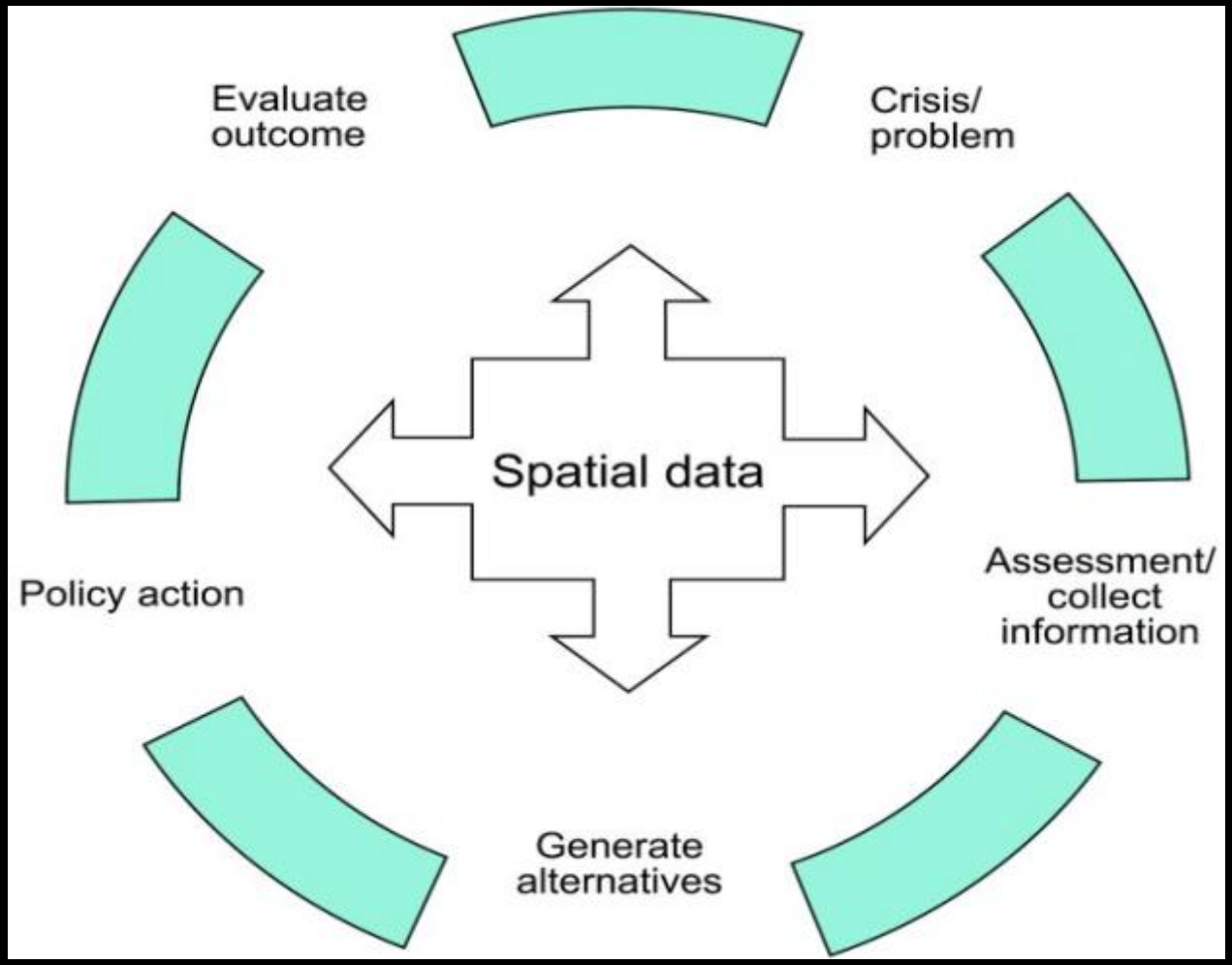
Soils

GIS Abstracts Geography into a Modern Information Technology Framework

…Abstracting Geographic Knowledge

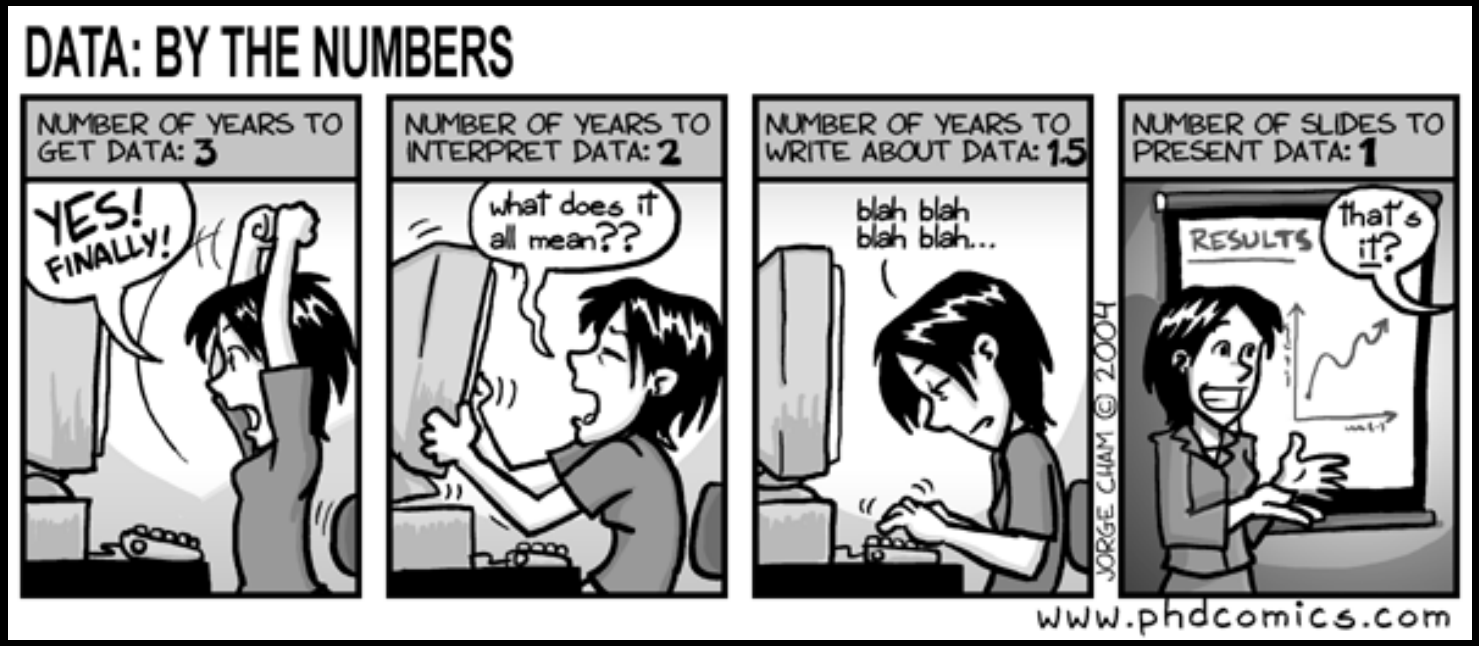
… an Information System for Geography

Data are the fuel for scientific analysis and decision-making

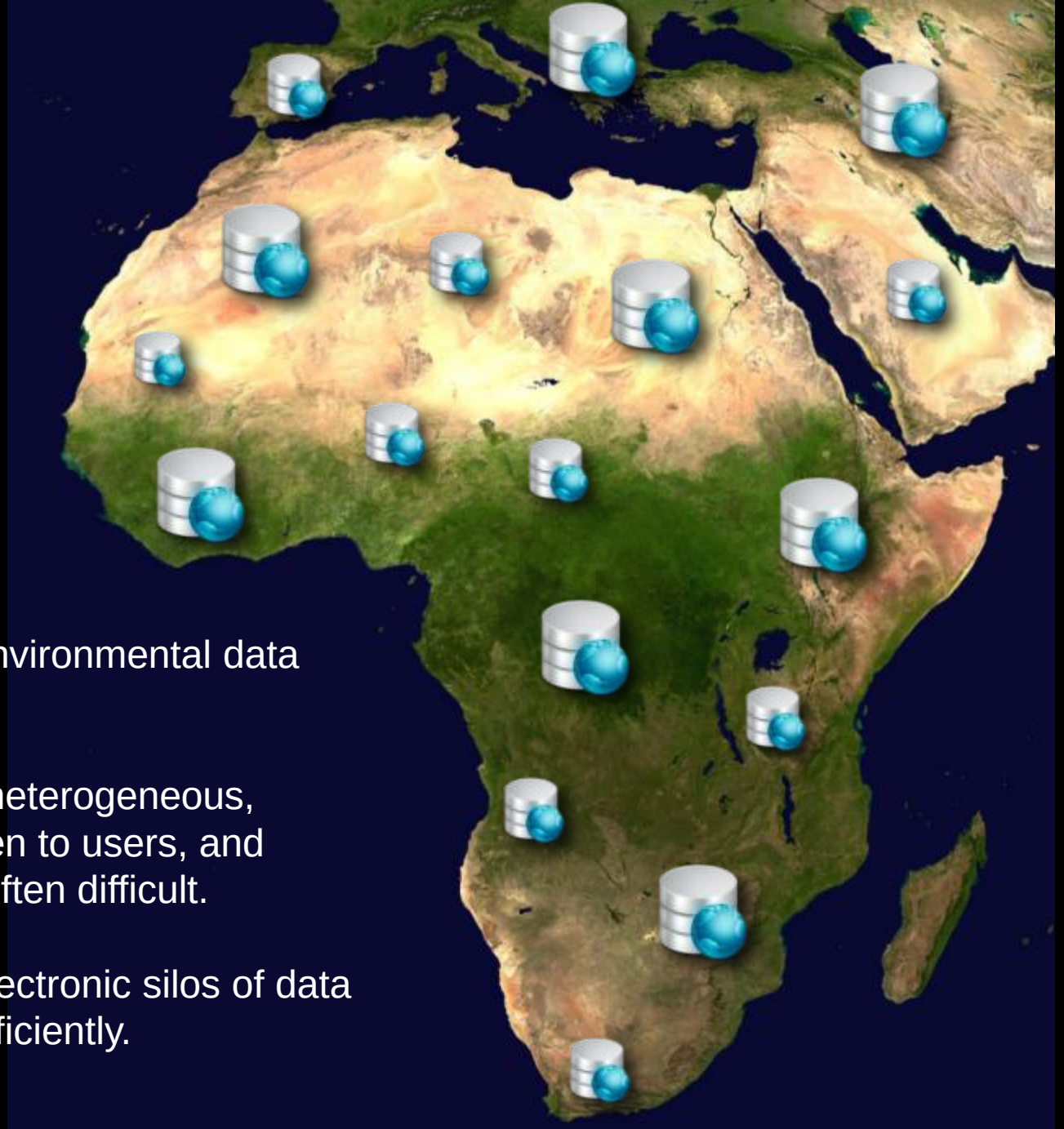


Spatial information affects 60 - 80% of all decisions

What is the real situation?



Finding environmental data is difficult.



There are a lot of environmental data repositories.

However, they are heterogeneous, disconnected, hidden to users, and accessing them is often difficult.

The are stored in electronic silos of data and are not used efficiently.

Operated in isolation...

Talking about Landsat...

“In spite of the great need for that information, the vast majority of those images have never fired a single neuron in a single human brain. Instead, they are stored in electronic silos of data”

Al Gore (1998)

Turning raw data into understandable information

Al Gore (1998)

Data are expensive to produce

More than 50% of time lost in searching data and information while preparing environmental reports.

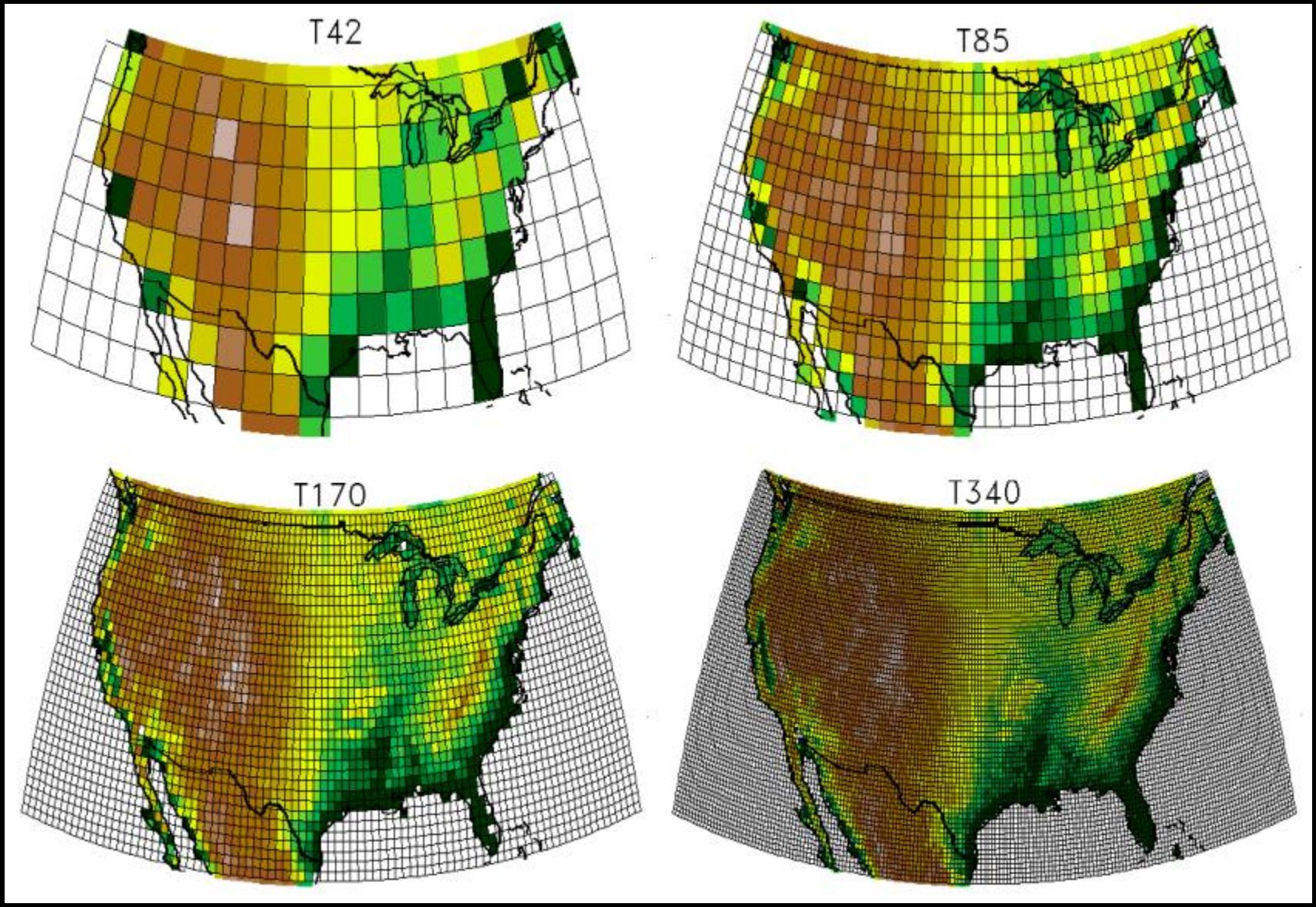
Craglia et al. (2010)

Many “islands” of data of different formats and quality.

GLC2000

CORINE

GLOBCOVER


T42
T85
T170
T340

Geospatial data are difficult to integrate

incompatibilities
(formats, models, ...)

missing documentation
(metadata)

data fragmentation
data replication

data policies

How to connect distributed & heterogenous data sources?

Spatial Data Infrastructure

An SDI can be seen as enabling environment that supports an easy access to and utilization of geospatial data.

SDIs are more than just data repositories.

They allow to discover, visualize, evaluate, and access geospatial data and information.

This is an environment where users can interact continuously with data. The objective is to bring data as close as possible of the users and answer to their needs.

SDIs are aiming to maximize the reuse of data.

They can be compared as a road, allowing the movement of data.

It is important to keep in mind that SDIs are all about:

- reuse: data, capabilities, skills, investments, ...
- sharing: data, knowledge, ...
- learning from others: collaboration and co-operation

The objective is to facilitate the work of every user

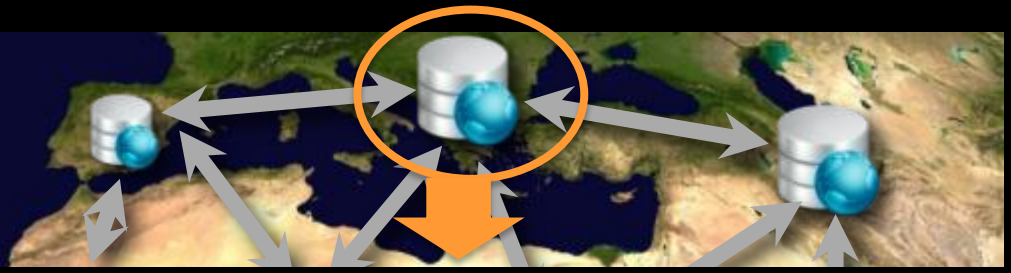
Working smarter and not harder

Unlock the power of data, information, and services

Data can be a shared resource

Through an SDI, data can be seen as a shared resource that can be exchanged with other domains and communities.

They are like pieces of a puzzle who will fit together and can be useful to different categories of users.



Exemple of SDI composants

(built around Free and Open Source Software):

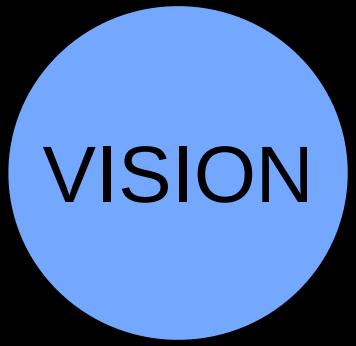
Managing data
OpenGeo Suite

Storing data
PostGIS

Documenting data
GeoNetwork

Publishing data
GeoServer

Visualizing data
OpenLayers & GeoExt


VISION

VISION

Support end-users

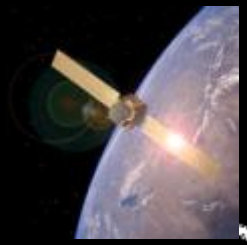
Facilitate discovery and access of existing data

Create and make available new data sets

Contribute to data sharing initiatives like GEOSS

Observing Systems

Space-based System



Air-based System

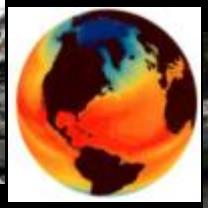
Cryosphere-based System

Land-based System

Ocean-based System

GEOSS

Disasters



Climate

Water

Health

Energy

Weather

Ecosystems

Agriculture

Biodiversity

Societal Benefit Areas

Renewable Energy initiative

https://www.earthobservations.org/geoss_en_ph.shtml

GROUP ON EARTH OBSERVATIONS

Home > GEOSS > Strategic Targets > Energy > Progress and Highlights

Home | About GEO & GEOSS | Communications | GEO Work Plan | GEO Community | Meetings & Events | Documents | Archive | Contact

GEO Portal

Browse Earth observation data and services

Products & Information

INFRASTRUCTURE
- Architecture
- Data Management

INSTITUTIONS AND DEVELOPMENT
- Capacity Building
- Science & Technology
- User Engagement

INFORMATION FOR SOCIETAL BENEFITS
- Disasters
- Health
- Energy
- Climate
- Water
- Weather
- Ecosystems
- Agriculture
- Biodiversity

Energy: Progress & Highlights

Introduction | Energy Resources | Energy Access | Energy Efficiency | Data Access | Users

Renewable Energy

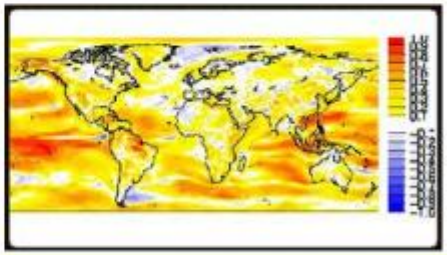
Renewable Energy activities of the GEO Energy Team include a wide range of renewable energy technologies from wind and solar to hydropower and bioenergy and both offshore and onshore. The products and tools developed facilitate evidence-based decision both of private and public sector.

IRENA Global Solar and Wind Atlas

Global to National / Wind and Solar

The GEO Energy Team contributes to the development of the Global Renewable Energy Atlases for the International Renewable Energy Agency (IRENA) and more specifically the development, compilation and provision of data through web-portal and mapping tools (the catalogue service for the Web (CSW).

http://geocatalog.webservice-energy.org/geonetwork/srv/eng/main.home

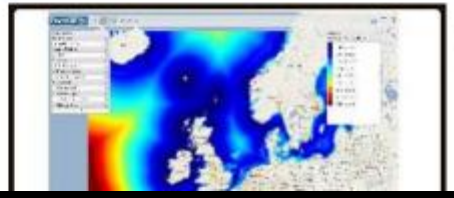


Forecast of Wind Speed

Global to National - Private Sector / Wind

Global and country level forecast skill maps (Fig.3) to show the regions where there is potential to predict wind and solar resources over future timescales (e.g. monthly, seasonal, annual, multi-annual or decadal). The regions with high forecast skills also show where the risk of resource variability can be managed most effectively. [IC3]

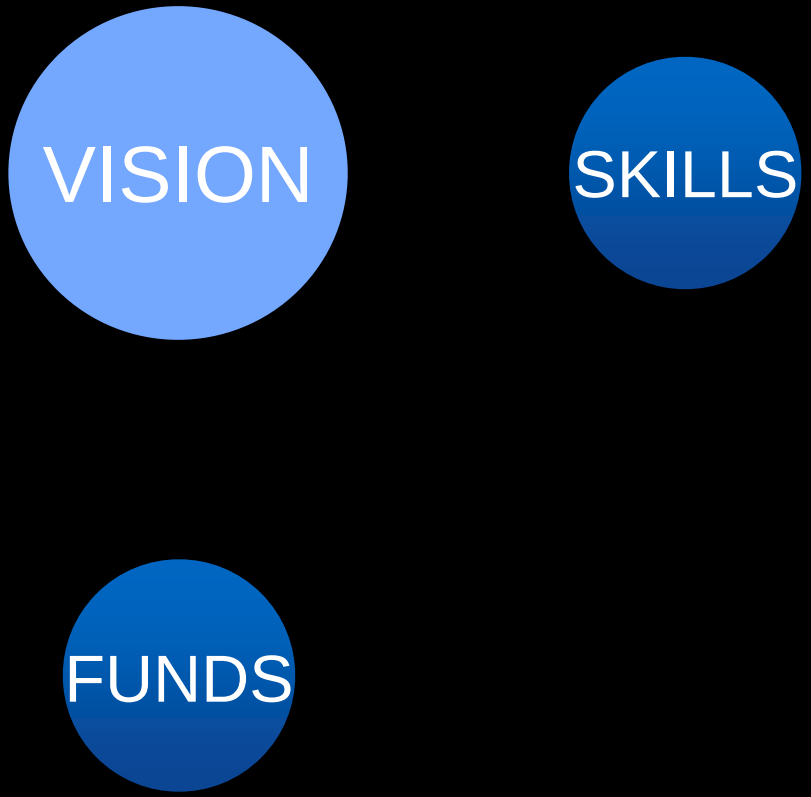
http://www.ic3.cat/



Impact Assessment of Offshore energy

North Europe to National - Private Sector / Marine Energy

A portfolio of environmental performance maps enabling "geo-localized life cycle assessment" of offshore wind farms for different configurations provided via a Web Map Service (WMS). Currently, the application is online for the installation and operation of offshore wind farm in Northern Europe. Innovation: The user can choose the impact type (i.e. human health, climate change, ecosystem, resources), system lifetime


VISION
SKILLS
FUNDS

SKILLS

GIS training

AFROMAISON

AFROMAISON GIS WORKSHOP

Project/subject	AFROMAISON : Africa at a meso-scale: adaptive and integr strategies for natural resource management grant agreement n° 266379. Collaborative project
Document	Gis_workshop.docx
Date	20 February 2012
Author	Gregory Giuliani, Yaniss Guigoz, Bruno Chatenoux
Update history	15 December 2011: creation
Material	Bruno Chatenoux, Gregory Giuliani, Harvard University, SpatialThou

AFROMAISON GIS WORKSHOP

1 **QGIS and GRASS installation**

2 **Customizing QGIS**

3 **Adding data (vector and raster)**

4 **Projections**

5 **Finding and adding WMS & WFS data**

6 **Mapping**

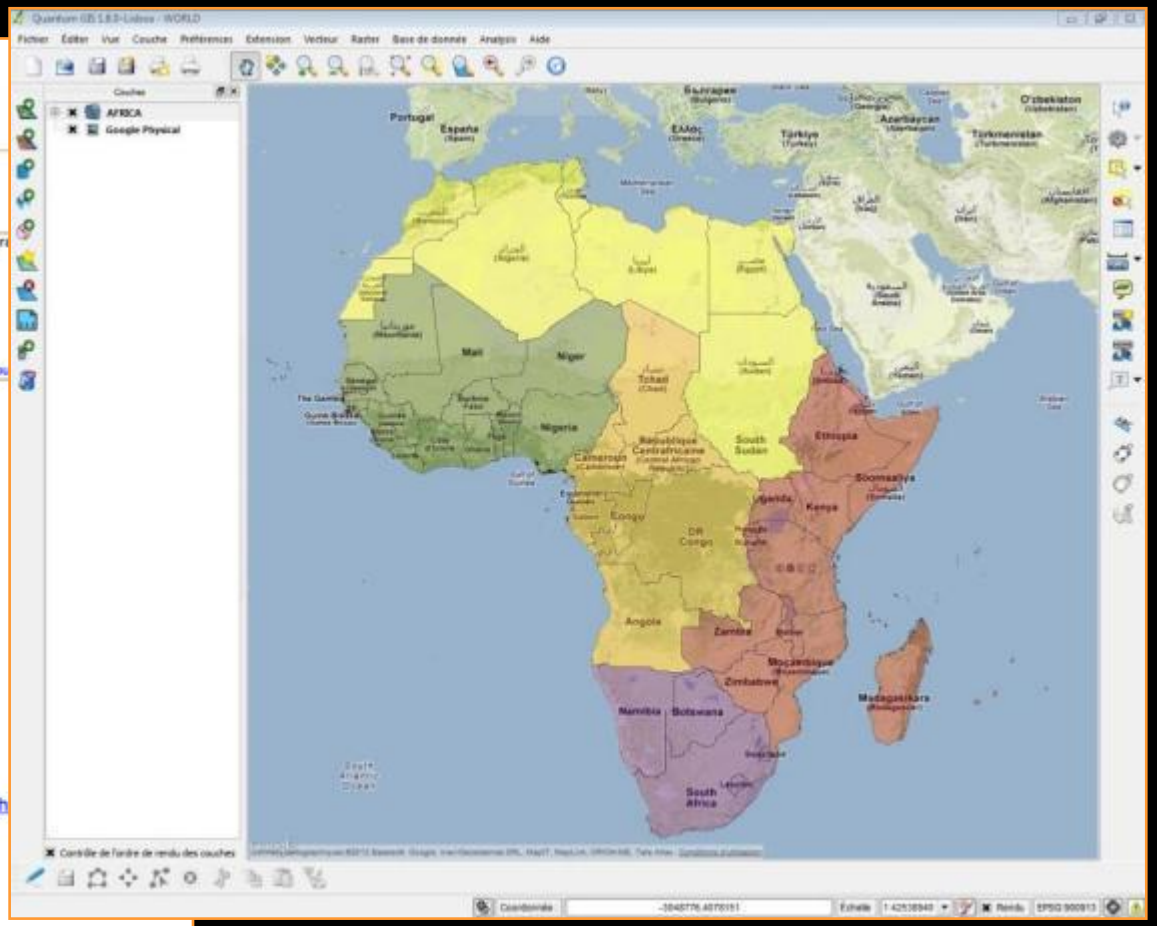
7 **Data analysis & handling**

8 **Performing Spatial Queries**

More tutorials are available at:

- Quantum GIS (QGIS) Tutorials: http://qgis.spatialthough
- AWF-Wiki: http://wiki.awf.forst.uni-goettingen.de/wiki/index.php/QGIS_tutorial
- Harvard QGIS workshop: http://maps.cga.harvard.edu/qgis/wkshop/
- Baruch Geoportal: http://www.baruch.cuny.edu/geoportal/practicum/

The procedure described in the tutorial is for a windows platform but for each main step the procedure for Mac users is also indicated.



We have taught to more than three hundred participants (in different countries) how to share their data and metadata using SDI and OGC standards.

SKILLS

Bringing GEOSS services into practice

http://geossintopractice.org

UNIVERSITÉ DE GENÈVE

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COORDINATION DE L'INFORMATION GÉOGRAPHIQUE

Université de Genève > Coordination de l'information géographique > Enseignements > GEOSS in practice

- Partenaires
- Enseignements
  - Certificat de géomatique
  - Cours SIG
  - Formation continue
  - GEOSS in practice
    - Description (français)
    - Start with the workshop
    - FAQ
    - Supporting projects and authors
    - Agenda
- Activités
- Outils SIG
- TIGERS
- Données
- Logiciels
- Infrastructure
- Contact

Description of the workshop

The **"Bringing GEOSS services into practice"** workshop aims at teaching how to configure, use and deploy a set of open source software to set up a spatial data infrastructure (SDI). Trainees will learn how to publish and share data and metadata using OGC and ISO standards and how to register services into the Global Earth Observation System of Systems (GEOSS).

The **material** related to the workshop (a **tutorial in PDF**, a **virtual machine in OVA format** and some general documentation on SDIs) can be **downloaded** here. The tutorial is available in iTunesStore and Google Play Books. More precise information on how to start with the workshop is available from here.

The **programme** of the workshop is the following:

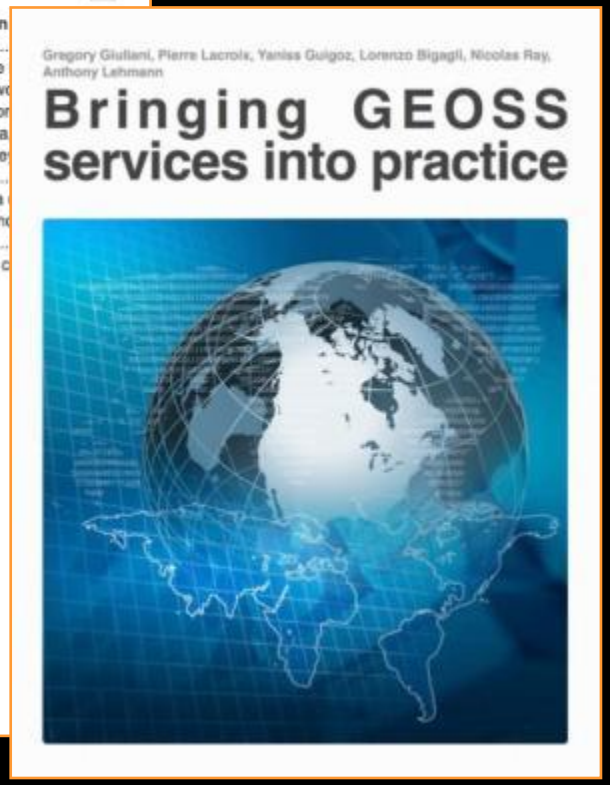
- **Concepts** on spatial data infrastructures
- How to **store** geospatial data? (PostGIS and flat rasters)
- How to **publish** geospatial data? (GeoServer, WMS, WFS, WCS, KML, SLD)
- How to **document and search** geospatial data? (GeoNetwork, CSW, ISO metadata)
- How to **process** geospatial data? (Python, WPS, PyWPS)
- How to **view** geospatial data? (WMS, OpenLayers, QGIS, KML)
- How to **download** geospatial data? (WFS, WCS, QGIS)
- How to **analyze** geospatial data? (WPS local/remote)

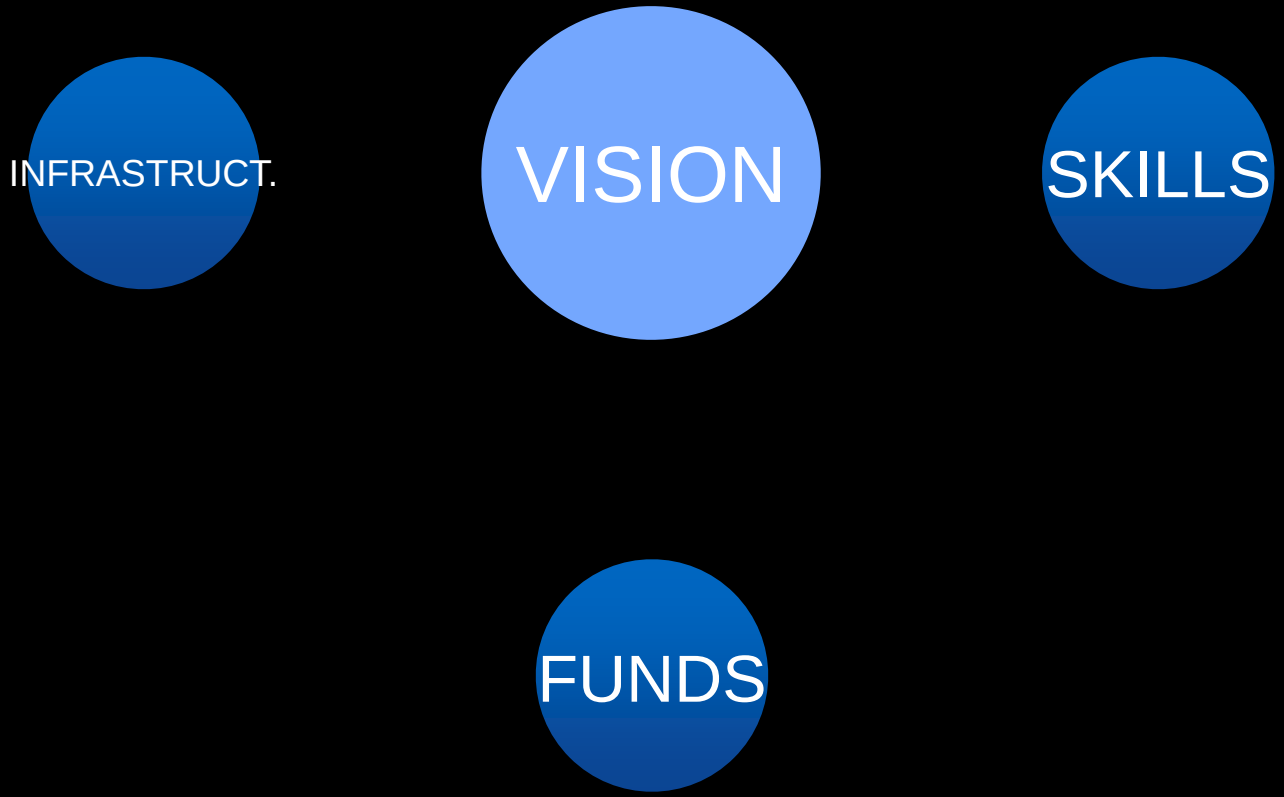
Practical information

More than 400 people been trained on this w Bulgaria, Georgia, Mor Netherlands, Romania Switzerland and Turke

The complete agenda workshop can be found

For more information c
Grégory Giuliani
Pierre Lacroix




INFRASTRUCT.
VISION
SKILLS
FUNDS

INFRASTRUCT.

Interoperability

We need to make resources coming from different platforms interoperable like to pieces of puzzle who can fit together.

“Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged. Interoperability facilitate the integration of data”.

INFRASTRUCT.

Interoperability

Standards, Standards, Standards, Standards, ...

To facilitate interoperability, several factors come into play.
But the most important is the STANDARD.

Standards are reference documents defining specifications and providing technical features to ensure interoperability between different components.

ISO International Organization for Standardization

CERTIFIED OGC® COMPLIANT

INFRASTRUCT.

OGC Making location count.

http://www.opengeospatial.org/

The Open Geospatial Consortium (OGC) is the leading organization for geospatial standards. The provide more than thirty (30) standards for data discovery, visualization, access and processing.

INFRASTRUCT.

OGC Making location count.

http://www.opengeospatial.org/

Web Mapping Service (WMS)
HTTP protocol for publishing a collection of layers as a map (PNG, JPEG)

Data

Web Feature Service (WFS)
HTTP protocol for publishing feature collections that may be queried and updated by clients (features published as GML,…)

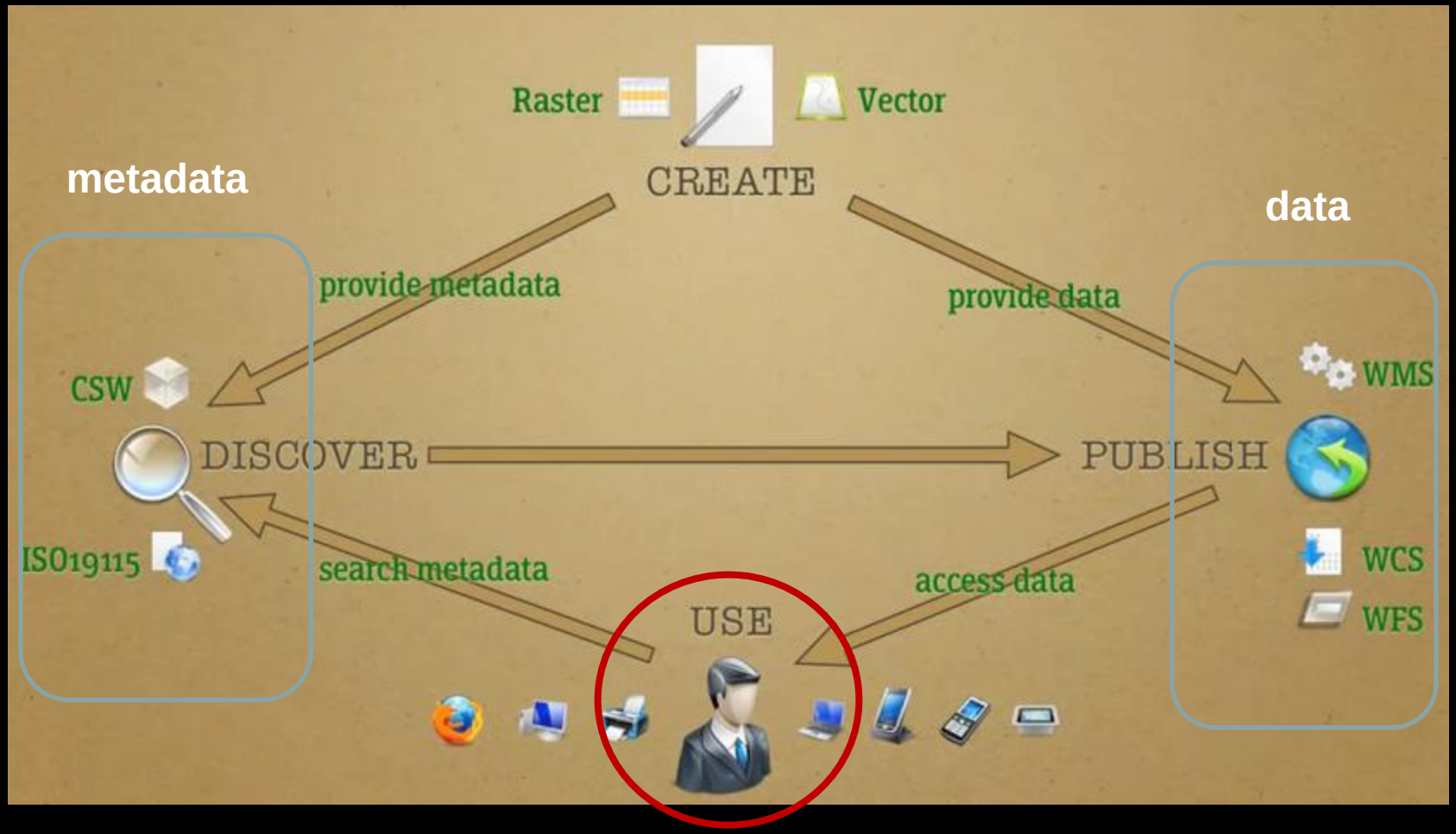
Web Coverage Service (WCS)
HTTP protocol for publishing “coverages” (multi-band raster data) that can be accessed by clients (GeoTiff, HDF)

Metadata

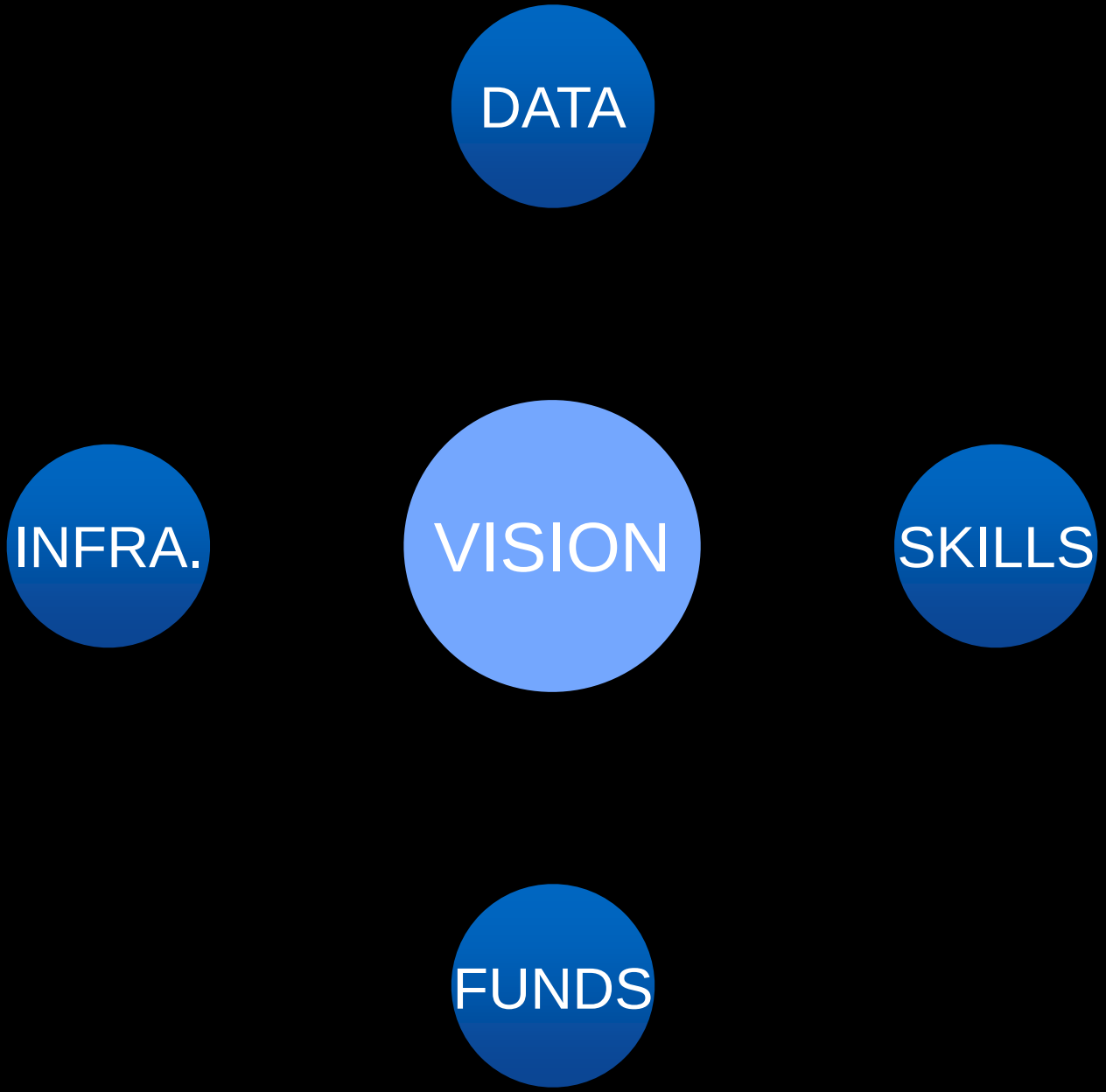
Catalog Services for the Web (CS-W)
Defines several web interfaces for data discovery

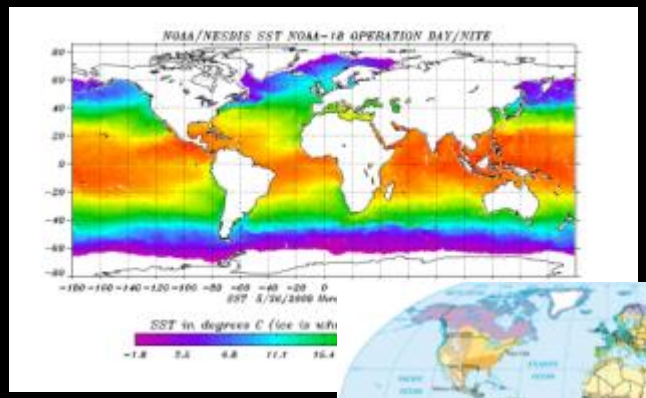
Processing

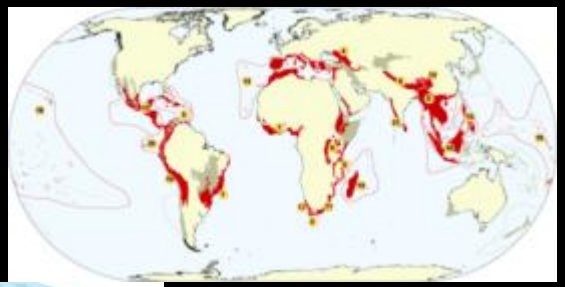
Web Processing Service (WPS)
Defines an interface to share geoprocessing algorithms

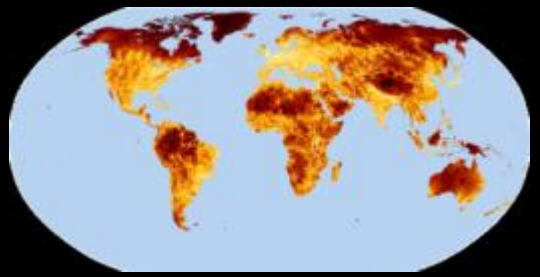


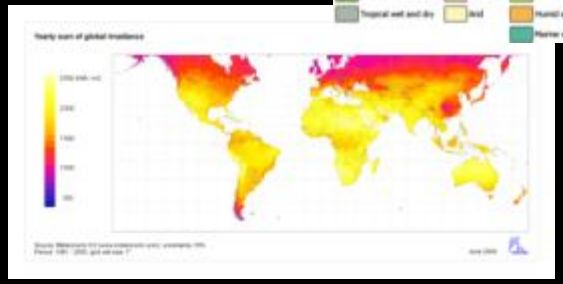
Source: The story of data on the environment http://www.youtube.com/watch?v=9SKOwQDFhYI&feature=related


DATA
INFRA.
VISION
SKILLS
FUNDS





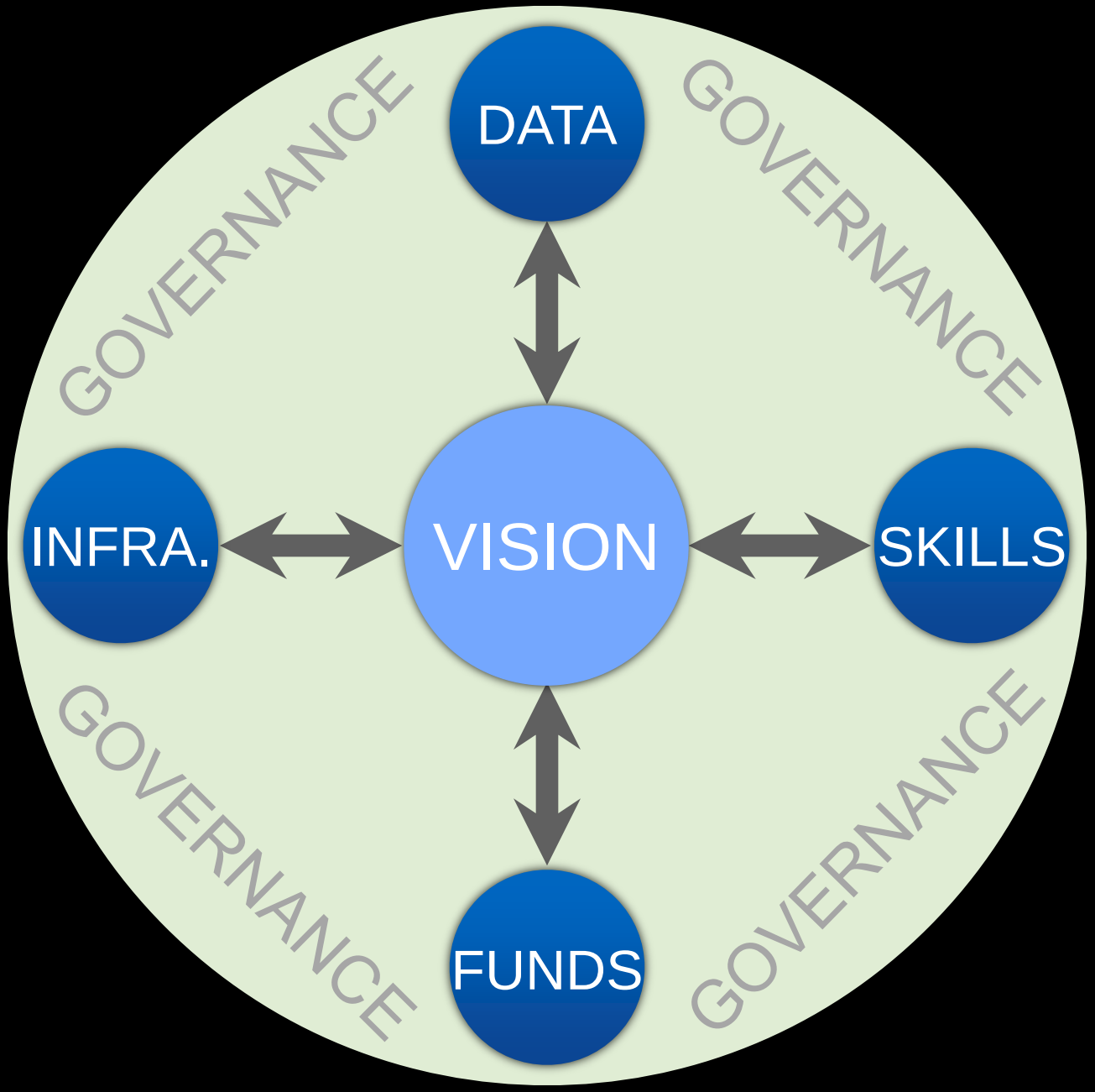




Data are essential for two things:

- Scientific analysis
- Decision making.

Without data and therefore no information, it is difficult to make good sound decisions.

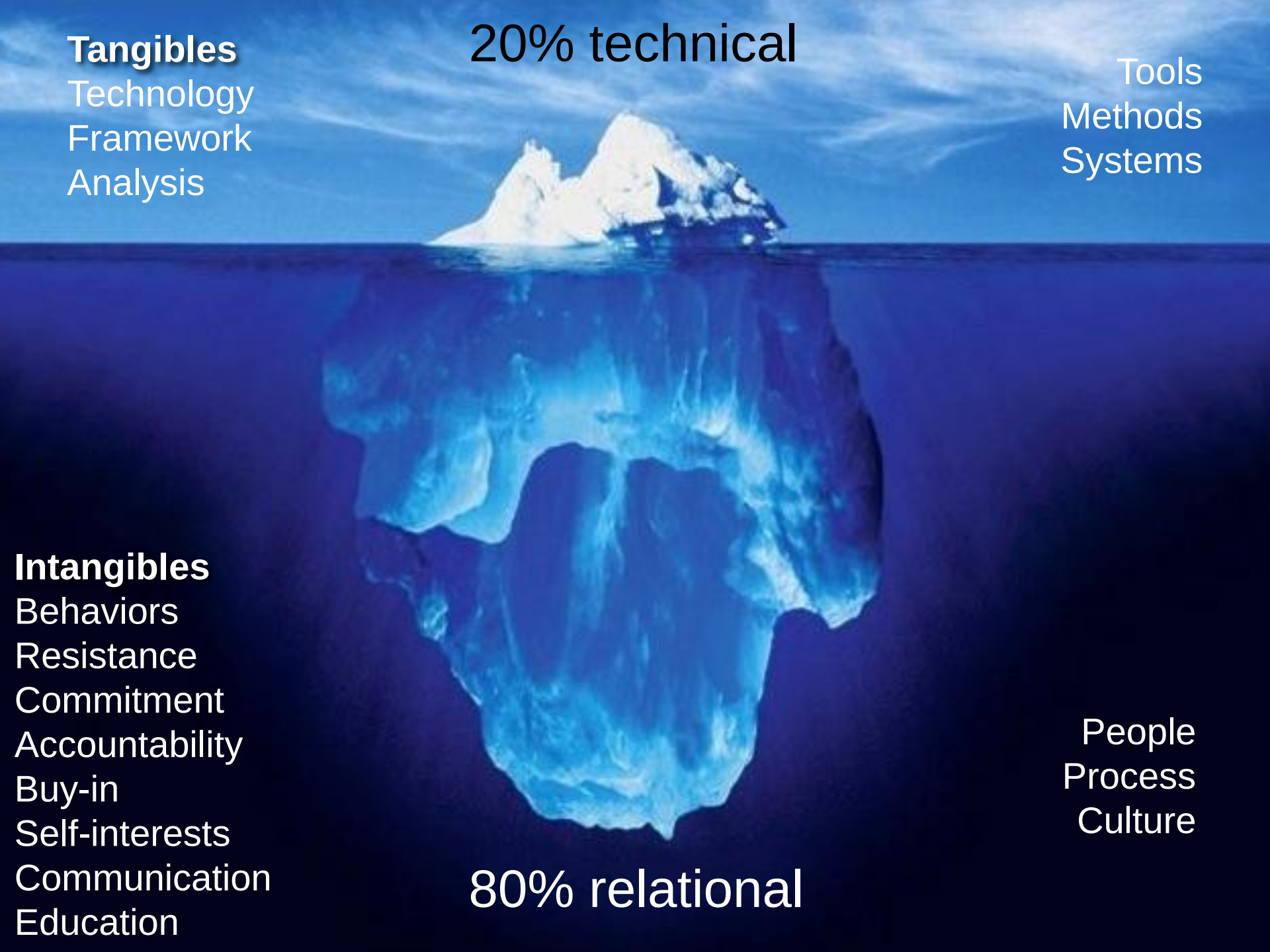

GOVERNANCE
GOVERNANCE
DATA
INFRA.
VISION
SKILLS
GOVERNANCE
GOVERNANCE
FUNDS

“SDIs can be thought as social networks of people and organizations supported by data and technology”

“Technology is cheap, data is expensive, but social relations are invaluable”

Craglia et al. (2009)

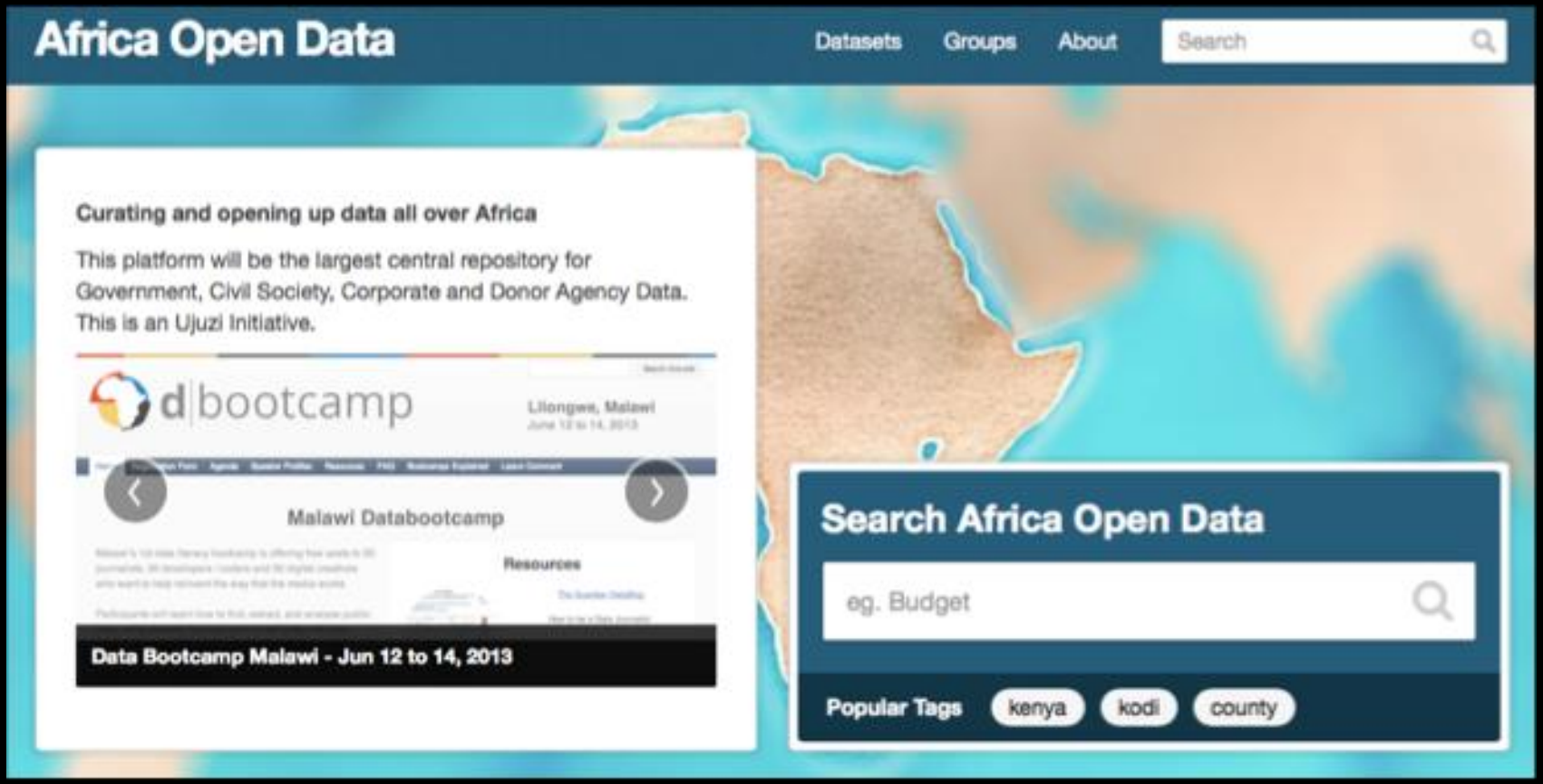
collaboration, cooperation, social relations


20% technical
Tangibles
Technology
Framework
Analysis
Tools
Methods
Systems
Intangibles
Behaviors
Resistance
Commitment
Accountability
Buy-in
Self-interests
Communication
Education
People
Process
Culture
80% relational

Capacity Building

Africa Open Data

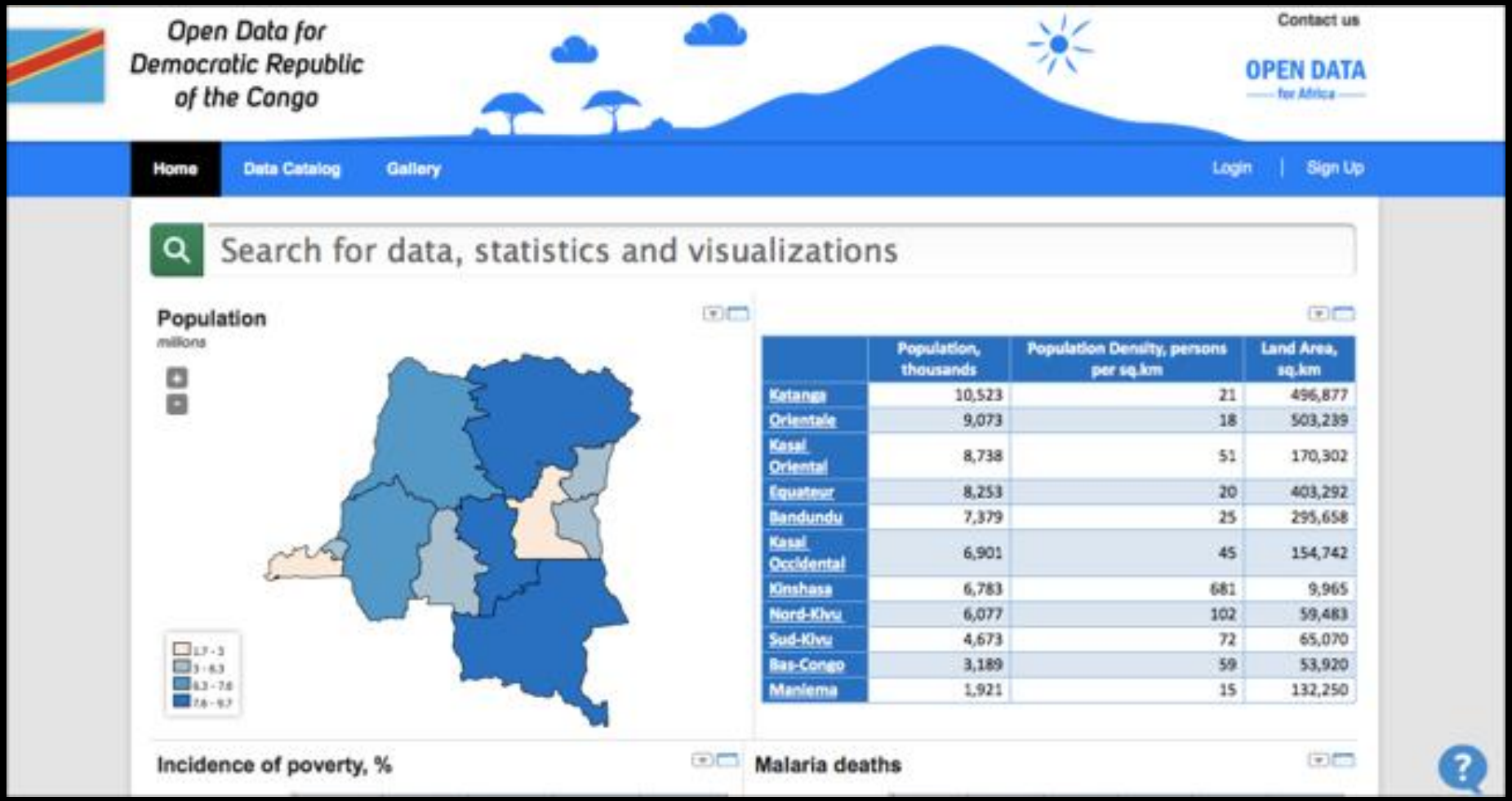
http://africaopendata.org



La «donnée ouverte» s'inscrit dans une tendance qui considère l'information publique comme un bien commun dont la diffusion est d'intérêt public et général.

DRC Open Data

http://drcongo.opendataforafrica.org



	Population, thousands	Population Density, persons per sq.km	Land Area, sq.km
Katanga	10,523	21	496,877
Orientale	9,073	18	503,239
Kasai Oriental	8,738	51	170,302
Equateur	8,253	20	403,292
Bandundu	7,379	25	295,658
Kasai Occidental	6,901	45	154,742
Kinshasa	6,783	681	9,965
Nord-Kivu	6,077	102	59,483
Sud-Kivu	4,673	72	65,070
Bas-Congo	3,189	59	53,920
Maniema	1,921	15	132,250

Without sharing environmental data:

- doing science can be difficult,
- taking sound decisions can be problematic,
- and envisioning a sustainable development can be complicated.

Publicly funded data are a public good, produced in the public interest and thus should be freely available to the maximum extent possible.

Sharing and documenting data is part of the elementary scientific approach.

Enhance scientific accountability and credibility.

Make your data discoverable

Promote GEOSS & OGC

Spending more time in doing science
... and less in searching data!

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Merci

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