

Geospatial Data Interoperability

Thematic Session: *Modern approaches to acquisition, processing and use of fit-for-purpose geospatial data*

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What is the economic impact of GEO SERVICES

Geo services are:



Geo services global revenues are \$150-\$270 billion per year

Video games industry \$25 billion

Geo services \$150-\$270 billion



Geo services global added value is around \$100 billion per year



Geo services save:



of travel time per year globally

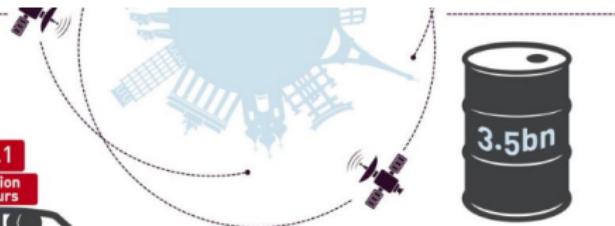
Geo services facilitate competition, leading to savings from reduced prices among infrequently bought goods and services of up to:



Geo services can improve agricultural irrigation, helping to achieve global cost savings per year of:



Source: Oxera (2013), analysis.



Geo services save 3.5 billion litres of gasoline per year—approximately 0.1% of the total world production of 5 trillion litres of liquid oil products

Geo services aid faster emergency response; for example, in England Geo services may have helped to save at least 152 lives per year



Students educated using Geo services can expect

3%

higher average wages five years after graduation than those who weren't

Geospatial data sharing

It makes sense to share spatial data:

- spatial data is expensive and time consuming to produce;
- we need data that we are not able to produce ourselves;
- the data that we produce can be useful for someone else.



<https://www.earthobservations.org>

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Spatial Data Infrastructure - SDI

*The relevant base collection of **technologies, policies and institutional arrangements** that facilitate the **availability of and access to spatial data** (GSDI, 2004).*



Limitations to the implementation of SDI's

Technical

- Computational heterogeneity
- Semantics
- Reference systems

Institutional

- Collaboration models
- Funding model
- Linkage between data units

Policy

- Political stability
- Legislation
- Priorities, sustainability

Legal

- Rights restrictions
- Copyright
- Intellectual property rights

Social

- Cultural
- Capacity building
- Equity



Interoperability

Interoperability, the ability to integrate datasets and related services of different types and from different sources. The main approach to achieve interoperability is through the adoption of standards.

A **Standard** is a documented agreement between providers and consumers, established by consensus, that provides rules, guidelines, or characteristics ensuring materials, products, and services are fit for purpose.

Geospatial standards are meant to facilitate development, sharing, and use of geospatial data and services.



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Geospatial standards



www.opengeospatial.org

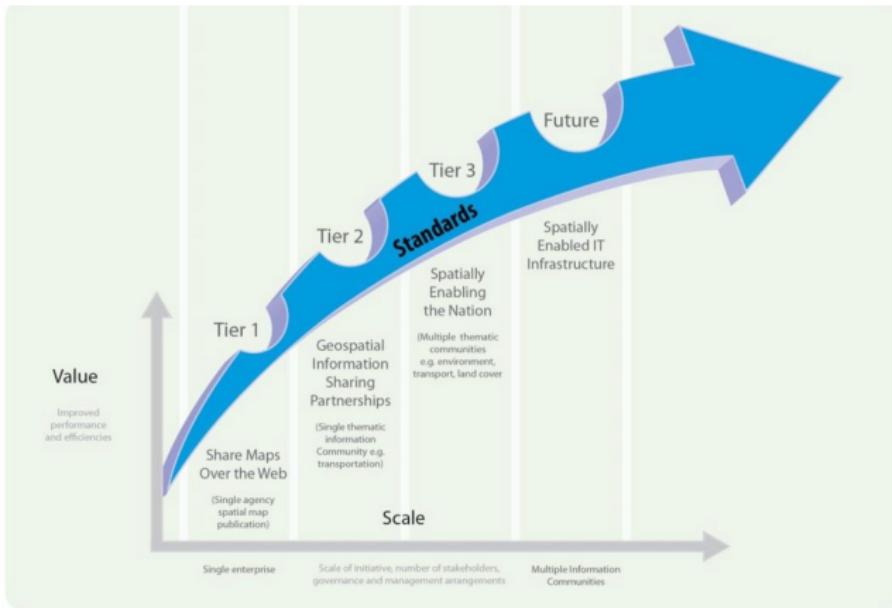


ISO/TC 211

Geographic information/Geomatics

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A maturity model for interoperability based on standards



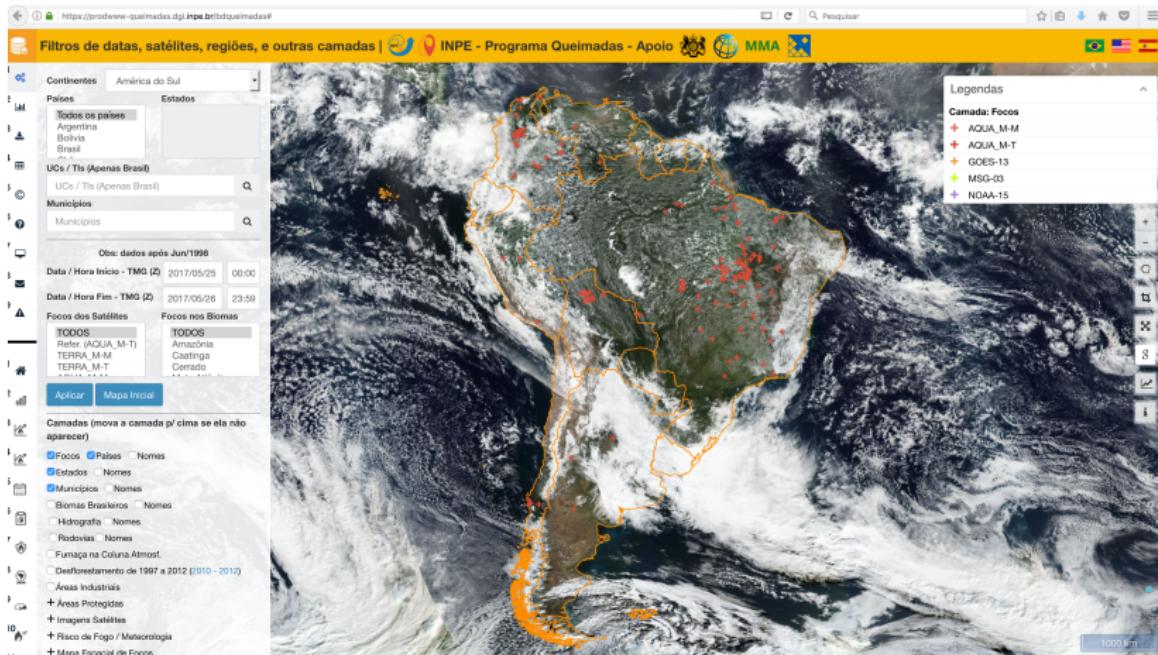
Source: A Guide to the Role of Standards in Geospatial Information Management - (UN-GGIM, 2015)

IBGE's Interactive Maps



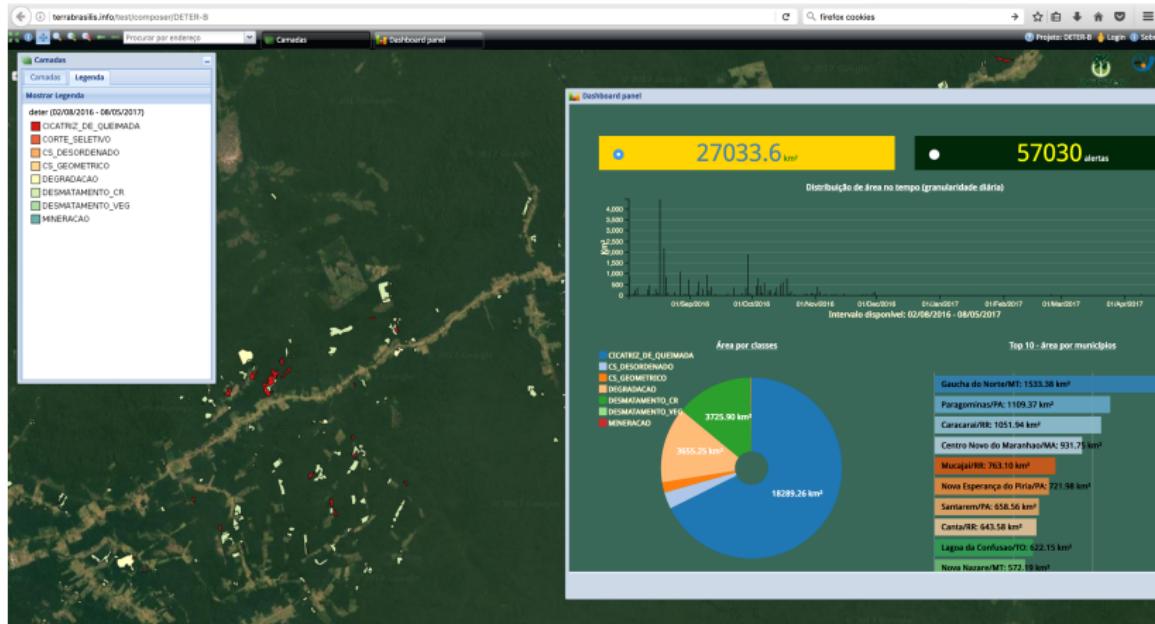
<http://mapasinterativos.ibge.gov.br/sigibge/>

INPE's QUEIMADAS



<https://prodwww-queimadas.dgi.inpe.br/bdqueimadas/en>

INPE's DETER-B



DATAGEO - Sistema Ambiental Paulista

http://datageo.ambiente.sp.gov.br/app/?ctx=DATAGEO#

The screenshot shows a map of the state of São Paulo, Brazil, with its hydrographic sub-basins outlined in blue. The map includes state borders and labels for Paraná, Santa Catarina, and Rio Grande do Sul. A legend on the left lists various data layers such as Base Cartográfica, Base Imagem, Base Técnica, Geologia, Biótico, and Físico. A sidebar on the left contains sections for Camadas Disponíveis, Camadas Selecionadas, Busca por Metadados, and Serviços Externos. The main content area displays a detailed metadata page for "Limite das Sub-Bacias Hidrográficas do Estado de São Paulo". The page includes sections for Mi Distribuição (with options to add to map or download as WMS/WFS/Shapefile), Dados de identificação (with a detailed description, title, date, author, organization, and contact information), and Informações de contato (with email, type, scale, categories, and keywords).

Policies

Infraestrutura Nacional de Dados Espaciais Brasileira



INDE
Infraestrutura Nacional
de Dados Espaciais

Established in Decree N° 6.666 of 27/11/2008 to integrate and harmonize geospatial data existing in government institutions, and to facilitate its location, access and exploitation

Infrastructure for Spatial Data in Europe



The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment.

BSR

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INDE's Geo viewer

www.visualizador.inde.gov.br

BRASIL Serviços Participe Acesso à Informação Legislação Canais

INDE

Visualizador da INDE

Bacias

Busca Tema Instituição Selecionadas Legenda

> Apresentação

> Atlas Nacional de Comércio e Serviços

> Áreas

> Análise de Estruturas Territoriais

> Bancos de Dados Amazônicos

> Biodiversidade

> Mapeamento do Brasil

Brases do Brasil 1:5.000.000

> Cartografia Aeronáutica

> Clima e Meteorologia

> Cobertura e Uso da Terra

> Demografia

> Educação

> Energia

> Geografia

> Geologia e Recursos Minerais

> Georreferenciamento

> Habituação, Saneamento e Urbanização

> Hidrografia

> Infraestrutura e Recursos Hídricos

> Indústria Extrativa

> Limites

> Localidades

> Mapeamento Básico Terrestre

> Monitoramento Ambiental

> Nomes Geográficos

> Padrões

> Planejamento

> PPA

> Redes Geodésicas

> Saúde

> Serviços Públicos

> Socioeconômica

> Soils

> Transportes

> Vegetação

> Áreas Espaciais

> Consulta base

Google Satélite

Google Physical

Google Street

Open Street Map Humanizada

Open Street Map Aquática

Pesquisar

Sair da sessão Convidar WMS

100 km 500 m

1: 27734017

© OpenStreetMap contribuidores
-66.84602, -23.93627

<http://www.visualizador.inde.gov.br/>

INSPIRE Geoportal

<http://inspire-geoportal.ec.europa.eu>



GEOSS Geoportal

www.geoportal.org geo portal

GEO GROUP ON EARTH OBSERVATIONS

land cover

Search Results Number of results: 78

Filters

KEYWORD - imaginettif (78) SOURCE - urn:ogc:service... ORGANISATION

Resource preview not available

UCSRT PPC 1978 - Codice 124

(Organizer: ISPRA, Italian Environment Protection and Technical Services Agency - Data)

UIC_375A/2007 - Terrini modellati artificialmente. Fotointerpretazione con metodologia per punti di campionamento da OFE alla scala nominale 1:10000. Il rilevo e' limitato alla macro classe 100_Terrini modellati artificialmente del sistema di codifica europeo LLC_2006. Filtrato sul codice 124' ...

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Resource preview not available

UCSRT PPC 1978 - Codice 142

(Organizer: ISPRA, Italian Environment Protection and Technical Services Agency - Data)

UIC_375A/2007 - Terrini modellati artificialmente. Fotointerpretazione con metodologia per punti di campionamento da OFE alla scala nominale 1:10000. Il rilevo e' limitato alla macro classe 100_Terrini modellati artificialmente del sistema di codifica europeo LLC_2006. Filtrato sul codice 142' ...

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Geoss Portal

esa

<http://www.geoportal.org/>

Data integration

All these geoportals are great. So good that I wonder...

Is it possible to do more than data overlay?

Can I insert my own data?

Can they provide processing?

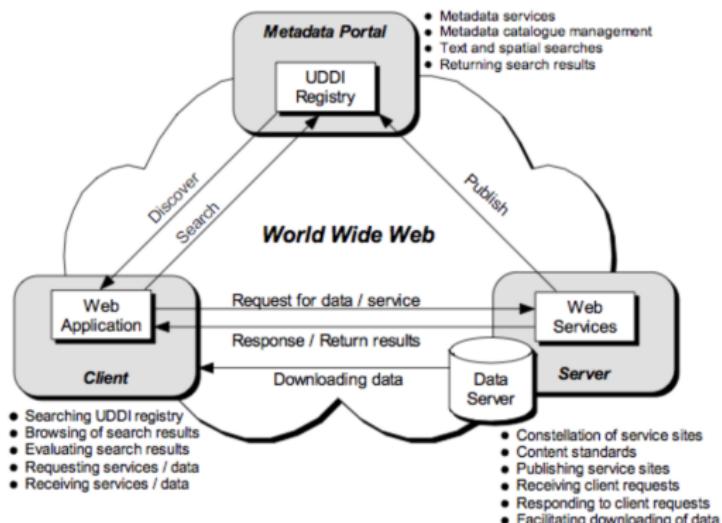
What if I want to do my own processing?

What about big data?

How to move to the upper tiers of the mature model...

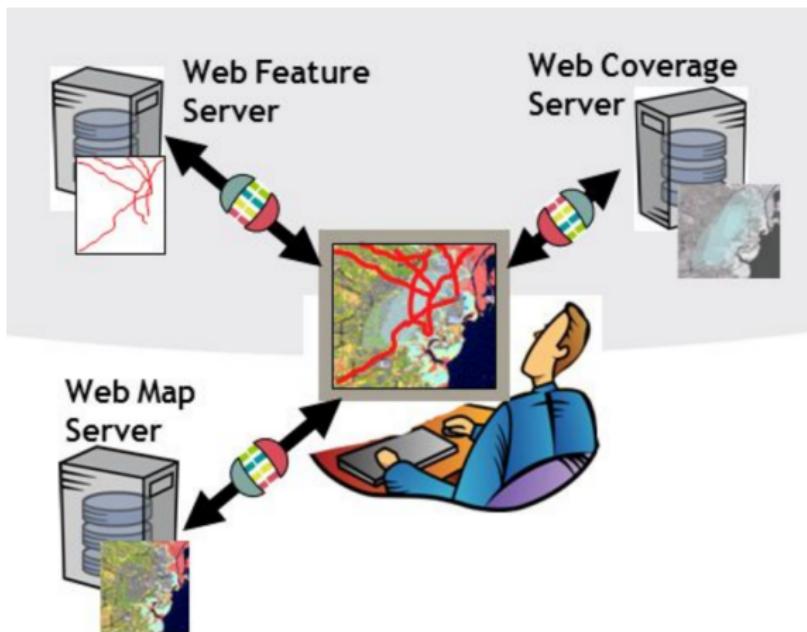


Geographical web services



Source: [Yeung and Hall, 2011]

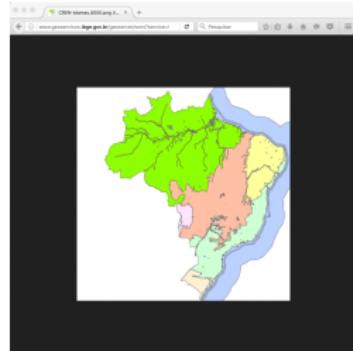
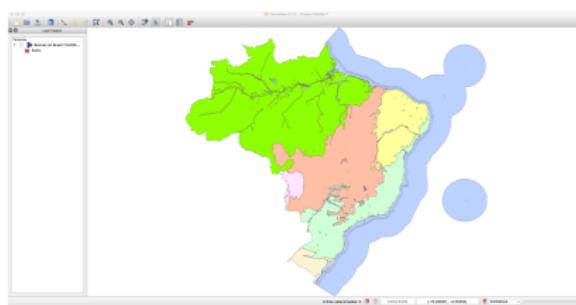
OGC OWS Framework



WMS

www.geoservicos.ibge.gov.br/geoserver/wms?service=WMS&version=1.1.0&request=GetCapabilities

www.geoservicos.ibge.gov.br/geoserver/wms?service=WMS&version=1.1.0&request=GetMap&layers=CREN:biomas_5000&width=512&height=512&format=image%2Fpng&bbox=-80,-34,-34,6.02



WFS

`http://suite.opengeo.org/geoserver/wfs?SERVICE=wfs&VERSION=2.0.2&request=GetCapabilities`

`http://suite.opengeo.org/geoserver/wfs?SERVICE=wfs&VERSION=2.0.2&REQUEST=GetFeature&TYPENAME=usa:states&FEATUREID=states.39`

WCS

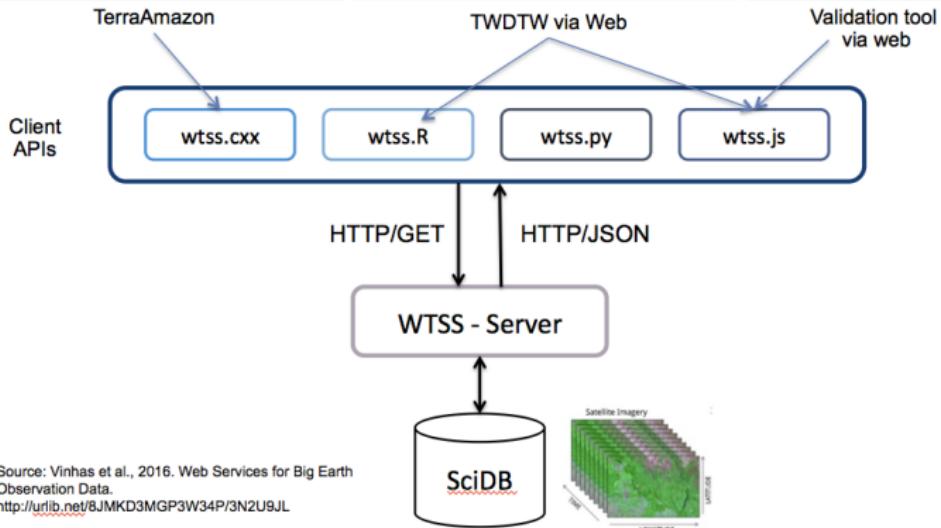
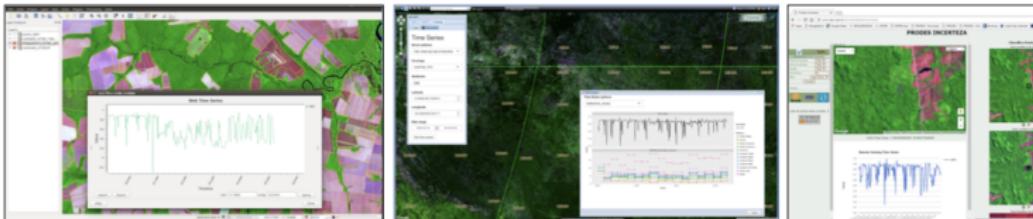
`http://www.ign.es/wcs/mdt?REQUEST=GetCapabilities&SERVICE=WCS`

`http://www.ign.es/wcs/mdt?REQUEST=DescribeCoverage&SERVICE=WCS&VERSION=1.0.0&COVERAGE=Elevacion25828_200`

`http://www.ign.es/wcs/mdt?SERVICE=WCS&VERSION=1.0.0&REQUEST=GetCoverage&COVERAGE=mdt:Elevacion25828_200&FORMAT=GeoTIFF&BBOX=188325,3060650,653825,3255025&CRS=EPSG:25828&RESX=200&RESY=200`

Non-OGC services

Using time series data through a lightweight web service



The tip of the iceberg...

Tangibles: technology, tools, methods

Intangibles: behaviors, resistance, commitment, accountability, buy-in, self-interests, communication, education...

