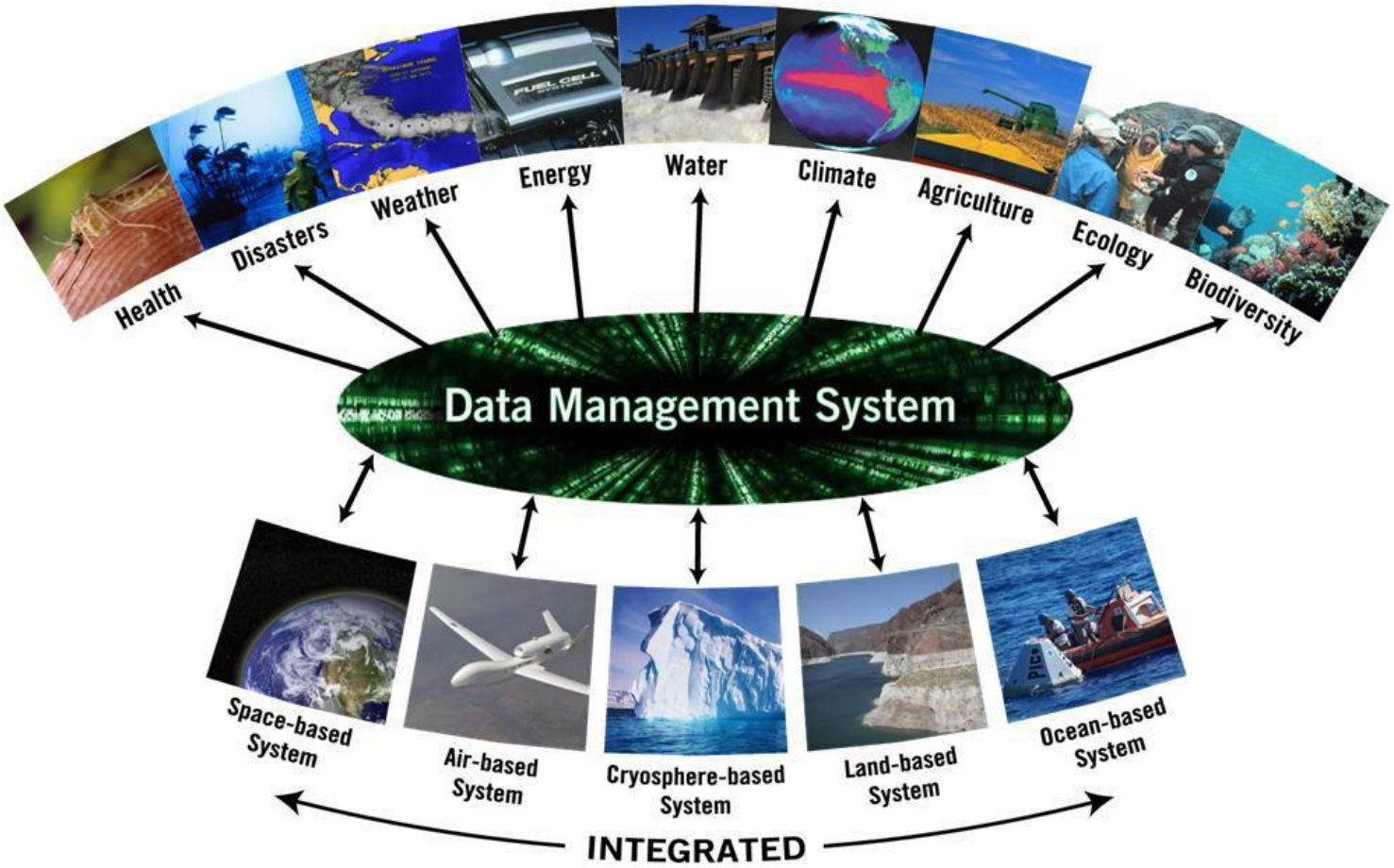
Earth Observation Systems and Datasets in GEO/GEOSS including Citizen Observatories

Alessandro Annoni
European Commission
Joint Research Centre
Institute for Environment and Sustainability
Digital Earth and Reference Data Unit

European Commission

GEOSS in 2005/6



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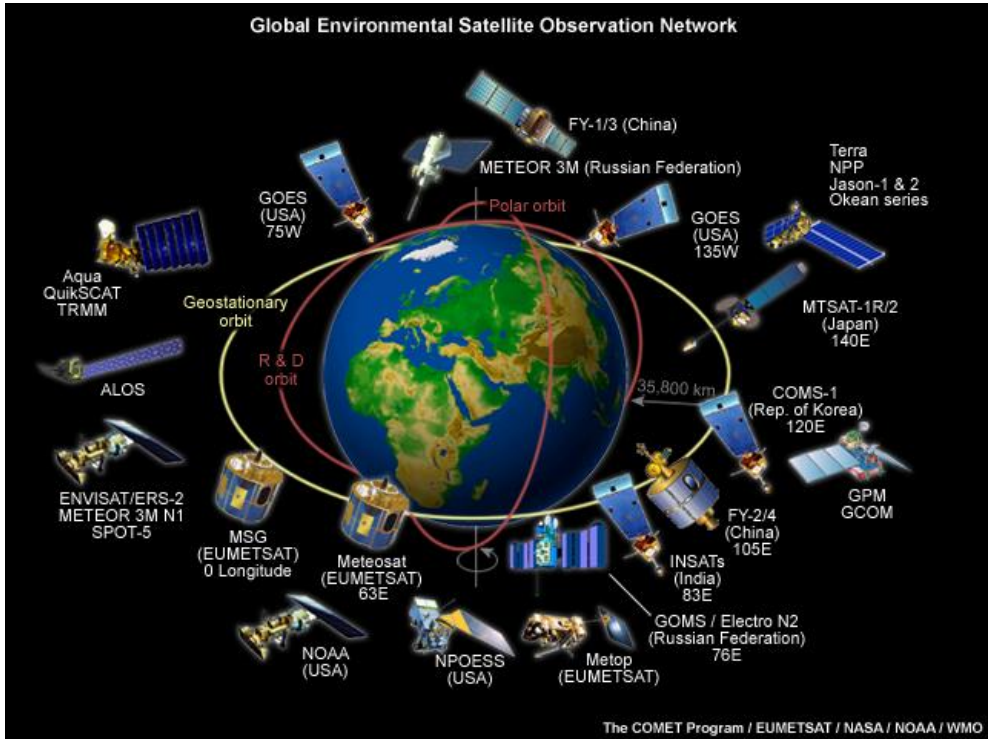
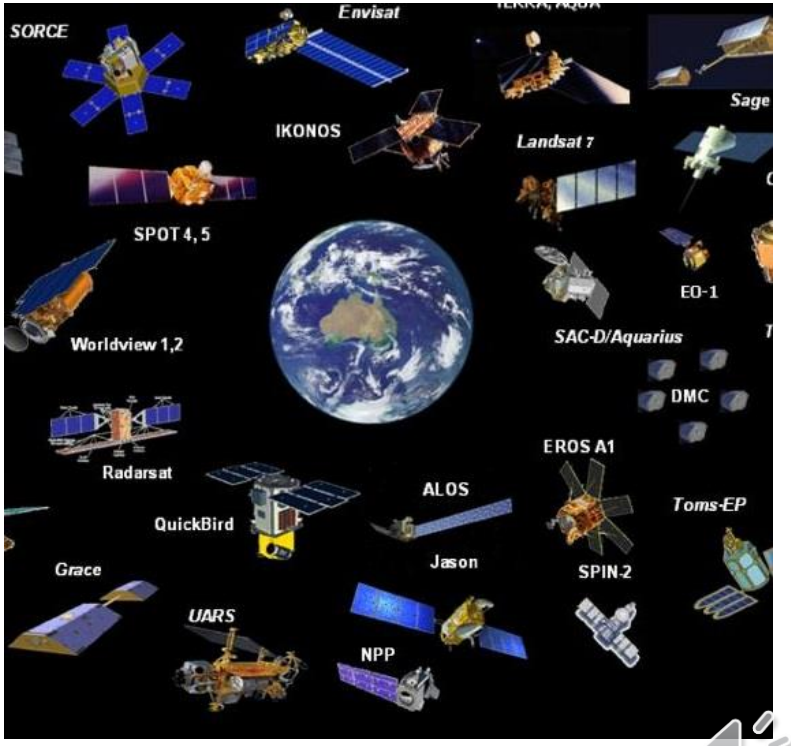
Good progress in Space data capacities

- Good coordination
- Virtual constellations as emerging concept





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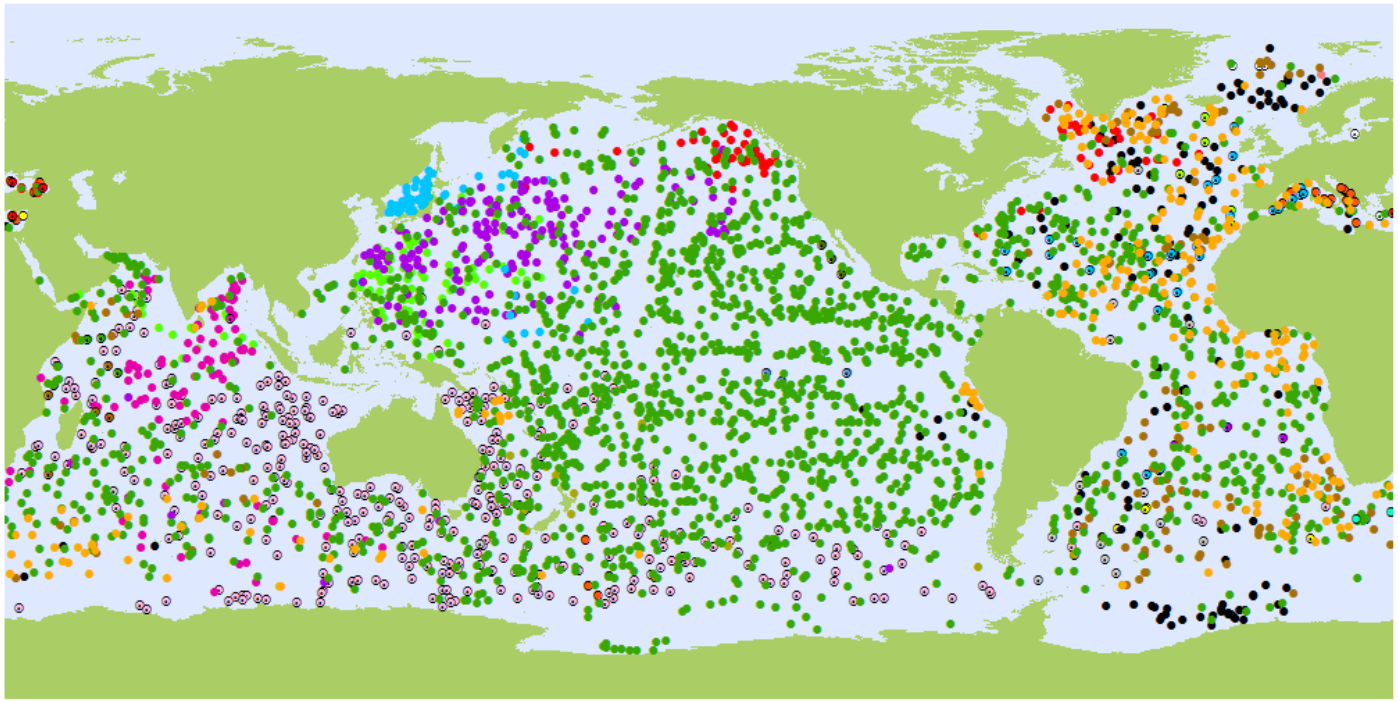
Limited progress on in-situ networks

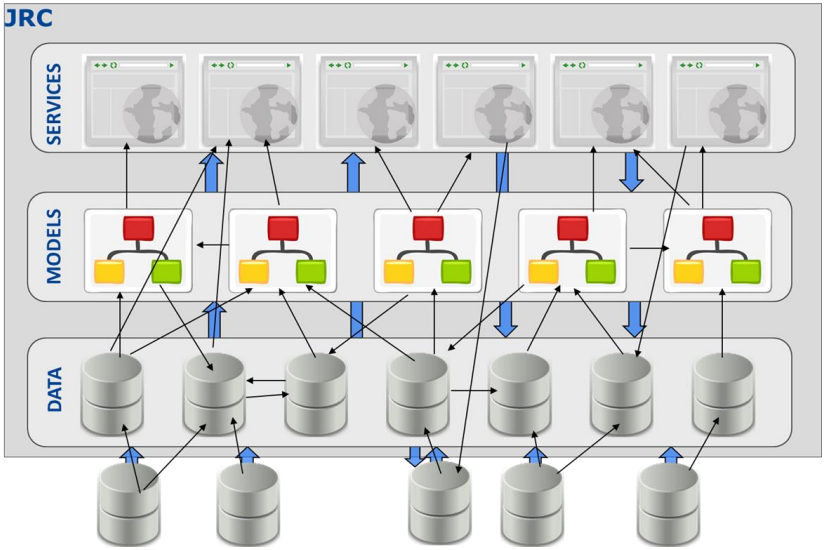
- No coordination, no sustainability (from Research to Operations)
- Large heterogeneity, several gaps, …



European Commission

Proliferation of Systems

- Interoperability challenges (a strict single standard based approach requires significant investments)
- Coordination challenges (in particular for operation)



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Science & Society

GEOSS Common Infrastructure

Data & Information Capacities

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Forestry e-Infrastructure

Service Consumer

Service Consumer

Forestry Service Bus

Service Provider

Service Provider

Service Provider

- Best practices
- Data policy
- ….

Metadata model(s)
Data Model(s)
Encoding Format(s)/Language(s)
Controlled Vocabulary(ies)
….

- Discovery protocol(s)/interface(s)
- Access protocol(s)/interface(s)
- Visualization protocol(s)/interface(s)
- Semantic protocol(s)/interface(s)
- …

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Forestry e-Infrastructure

Service Consumer

Service Consumer

Forestry Service Bus

Service Provider

Service Provider

Service Provider

Meteo-Ocean e-Infrastructure

Service Consumer

Service Consumer

Discipline D Service Bus

Service Provider

Service Provider

Service Provider

Drought e-Infrastructure

Service Consumer

Service Consumer

Drought Service Bus

Service Provider

Service Provider

Service Provider

Service Consumer

Service Consumer

Biodiversity Service Bus

Service Provider

Service Provider

Service Provider

Biodiversity e-Infrastructure

Forestry e-Infrastructure

Service Consumer

Service Consumer

Forestry Service Bus

Service Provider

Service Provider

Service Provider

Meteo-Ocean e-Infrastructure

Service Consumer

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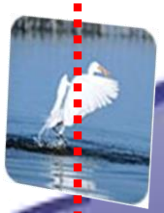
Drought Service Bus

Service Provider

Service Provider

Service Provider



Service Consumer

Service Consumer

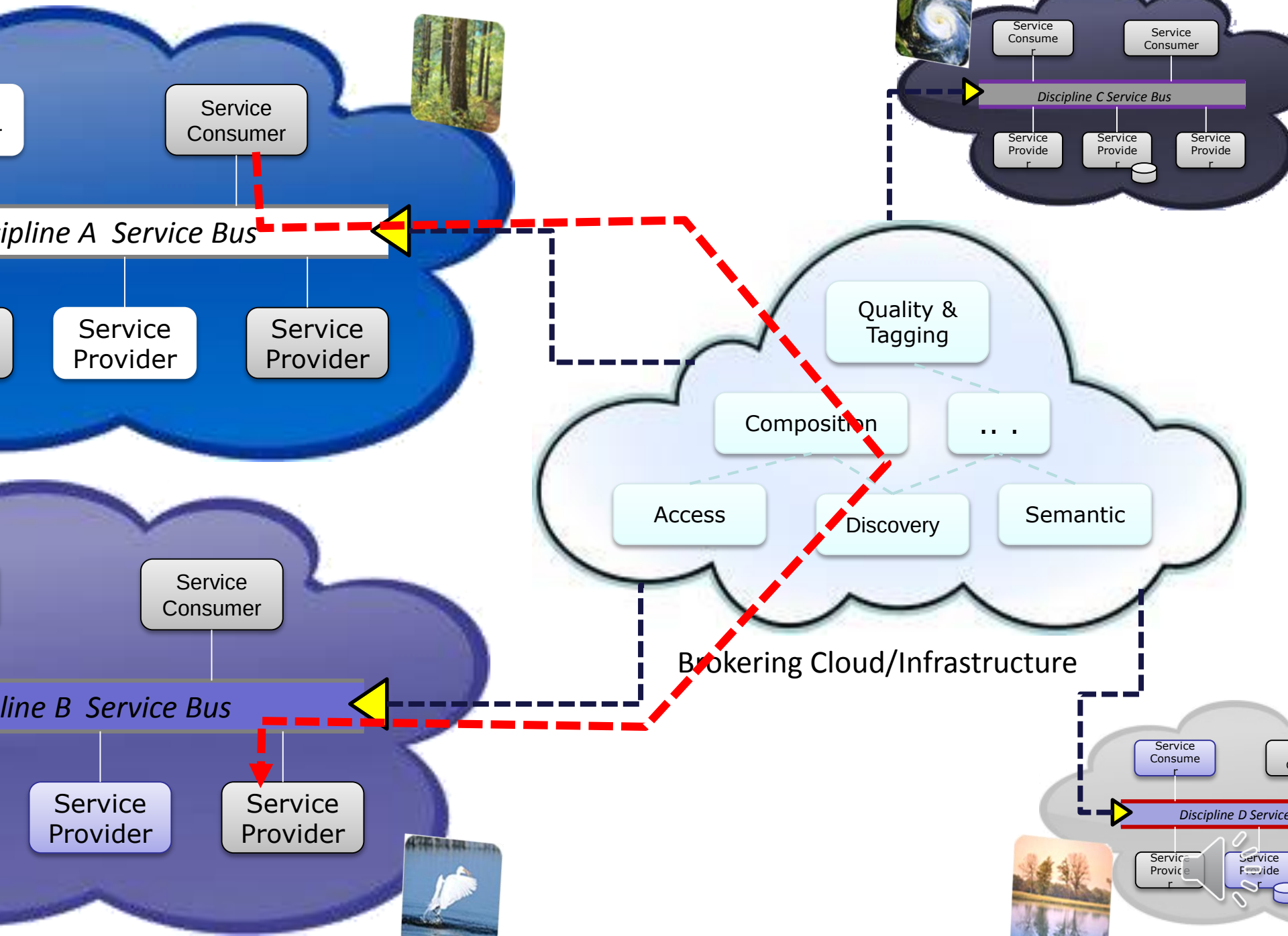
Biodiversity Service Bus

Service Provider

Service Provider

Service Provider

Biodiversity e-Infrastructure


Service Consumer
ipline A Service Bus
Service Provider
Service Provider
Service Consume r
Service Consumer
Discipline C Service Bus
Service Provide r
Service Provide r
Service Provide r
Quality & Tagging
Composition
. . .
Access
Discovery
Semantic
Brokering Cloud/Infrastructure
Service Consumer
line B Service Bus
Service Provider
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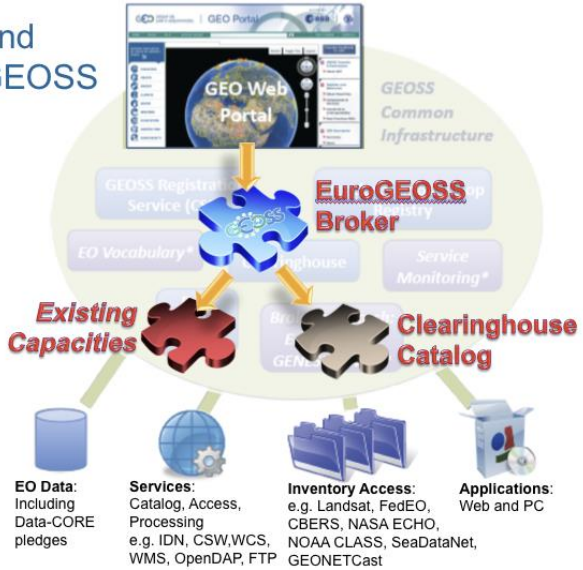
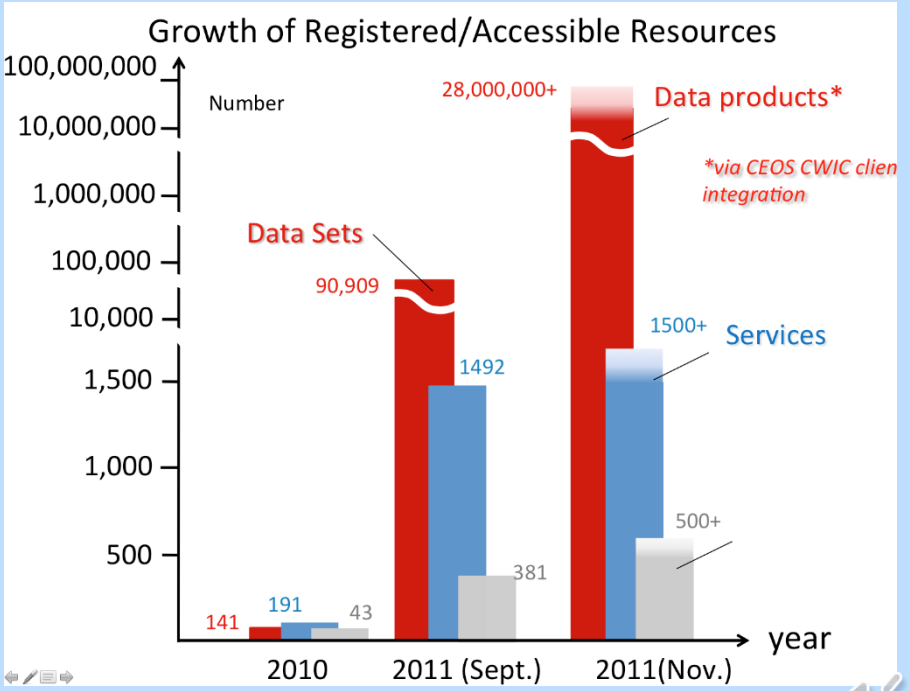
Discipline D Service
Service Provide r
Service Provide r

Brokering adopted in GEOSS delivers visible progress

GEOSS and the EuroGEOSS Broker



Brokering = change in philosophy from interoperability through single standard to building bridges across multiple standards and community practices



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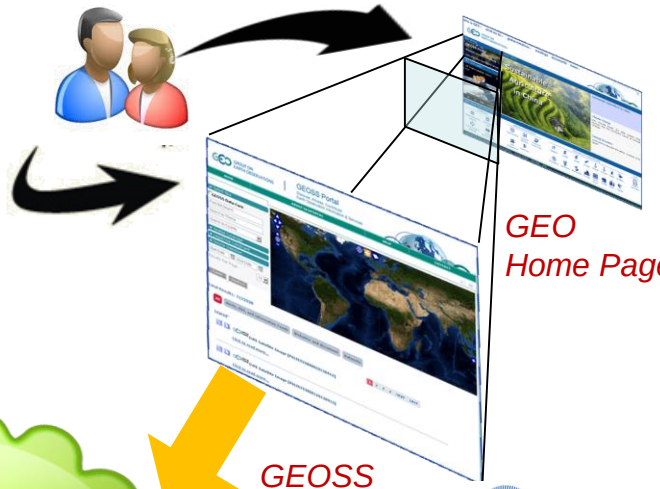
GEOWOW



GEO DAB

GEOSS Portal

esa

Current assets

Joint Research Centre

Current Assets

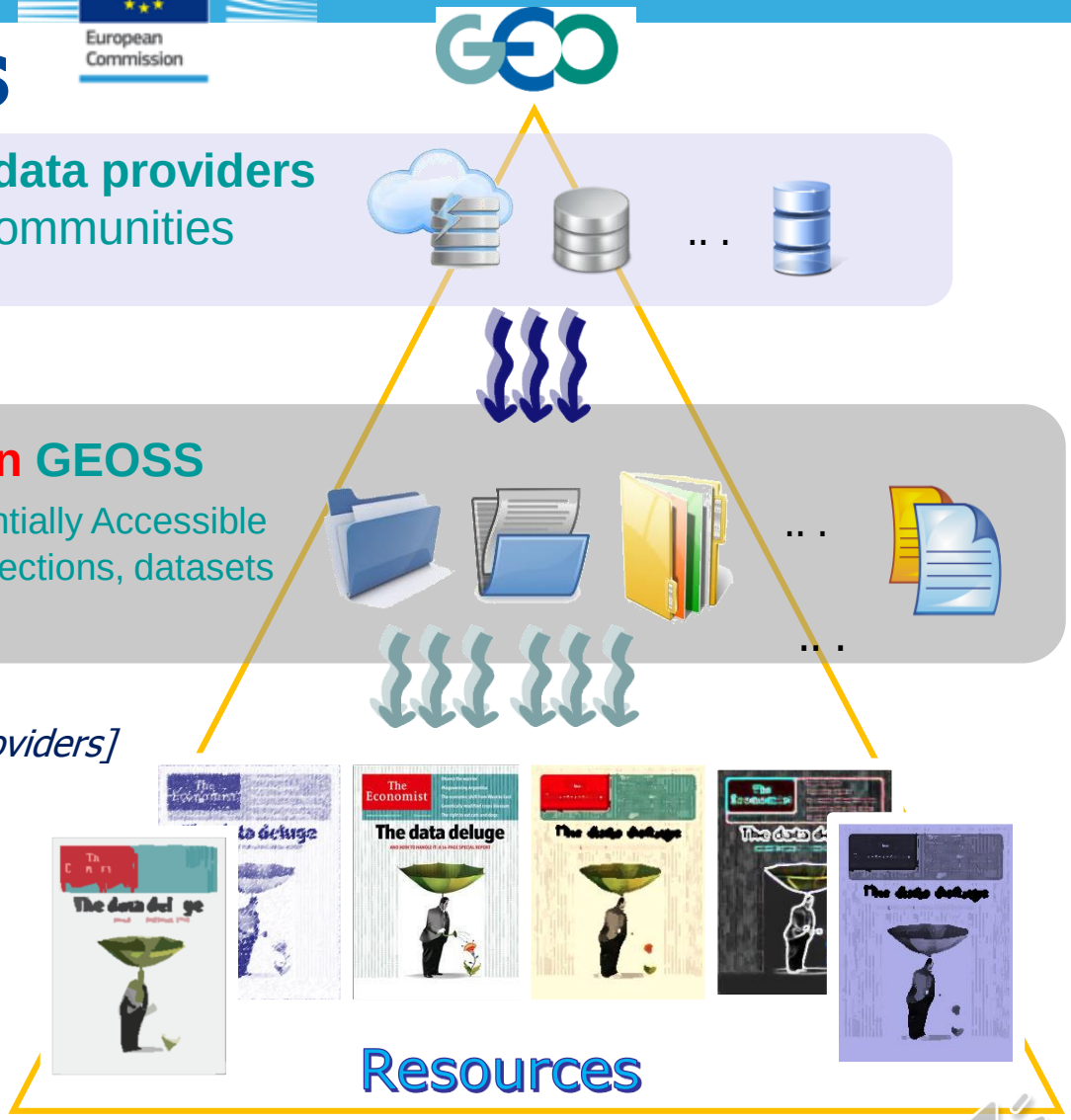
More than **20 brokered data providers** – capacities, systems, Communities

Publish

More than **7 Million (1.2 Million GEOSS Data Core)** Discoverable and potentially Accessible aggregated resources (mix of data collections, datasets and individual images)

Contain [source: data providers]

More than **65 Million (50 Million GEOSS Data Core)** Discoverable and potentially Accessible individual resources (e.g. satellite scenes, rain gauge records)



Is this enough ?

- Are the 2005 assumptions and the GEOSS architecture still valid? Are technological changes properly addressed?
- Can we make GEOSS a robust information systems without significant changes?
- Are GEOSS users satisfied? How to enlarge user's base? What user want in addition to data?
- Are societal challenges properly addressed? How Science 2.0 will impact on GEO/GEOSS?

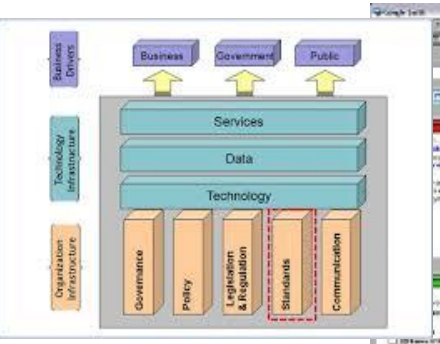
Data collection & Data dissemination

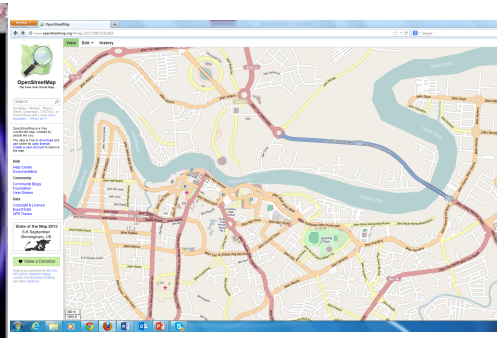
<2000-2014
Government

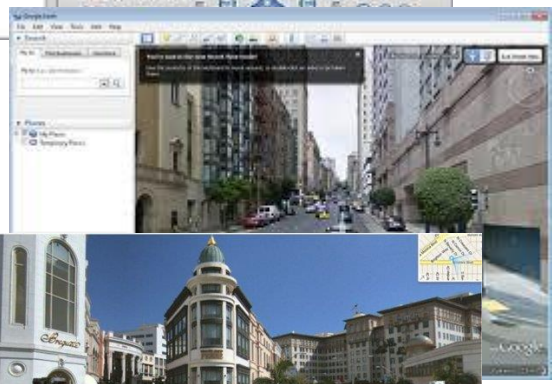
2005-2014
Private Sector

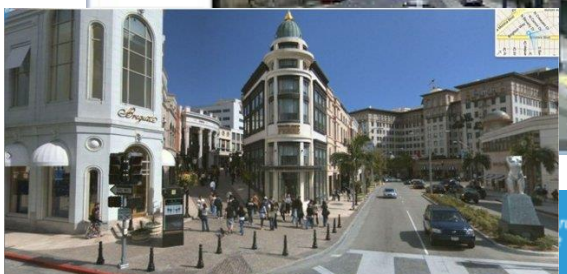
2008-2014
VGI

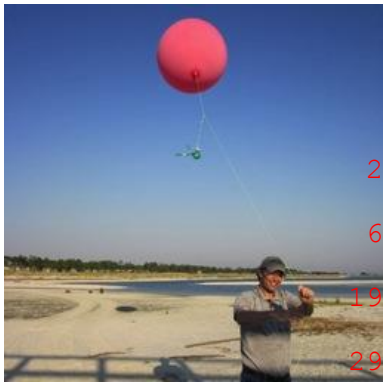
2010-2014
Social media







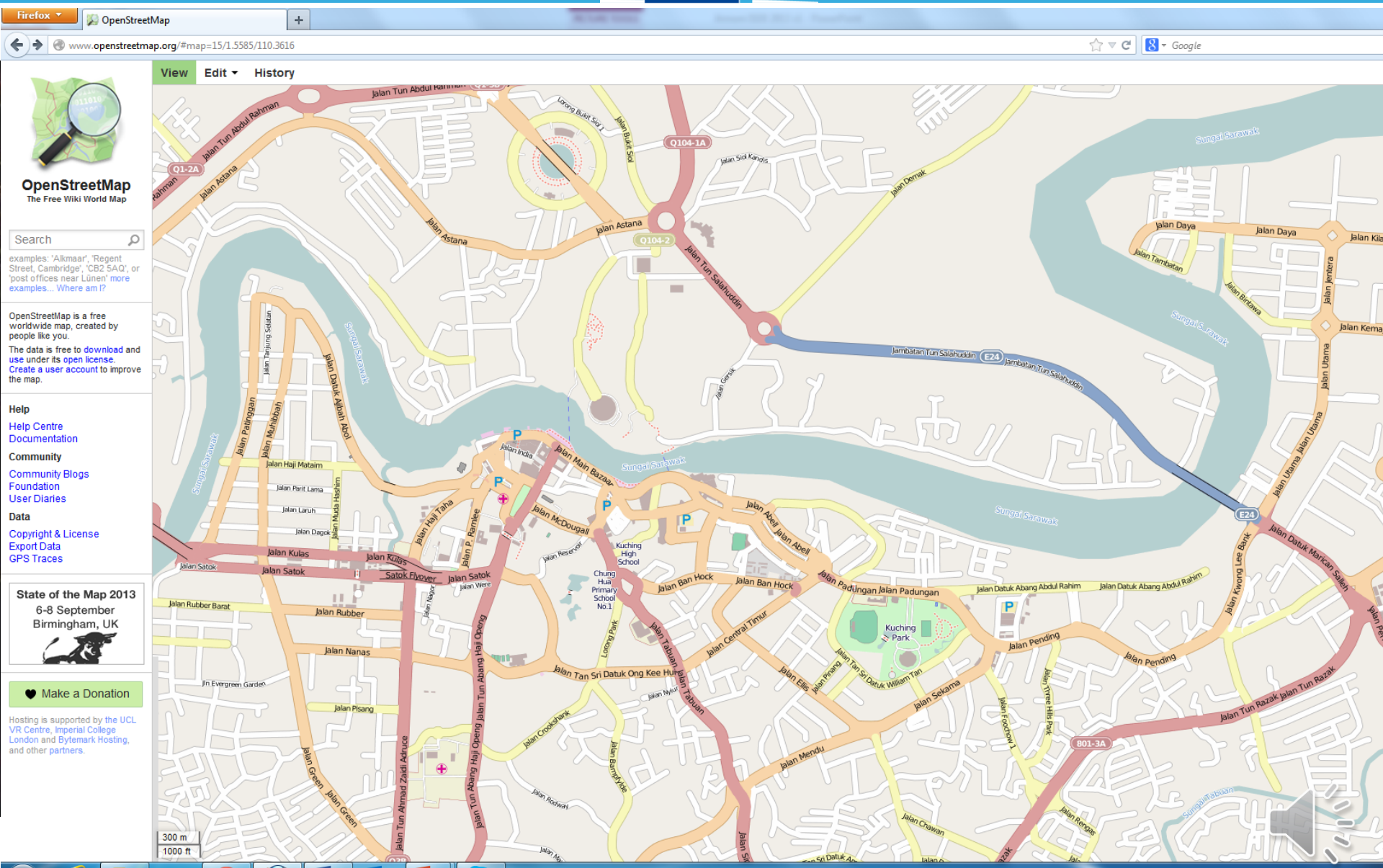




in 1'on the Internet there are...

211,128 Instagram photos upl
514,048 Skype calls made
2,058,005 Tweets tweeted
6,388,848 Dropbox files upload
19,566,471 Google searches made
29,236,123 YouTube videos viewe
34,322,697 Facebook likes
1,139,999,544 Emails sent

Potential alternative to official information
OpenStreetMap



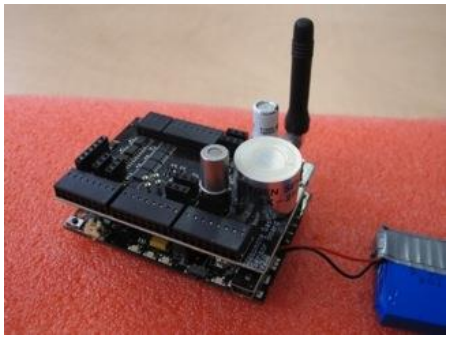
Massive diffusion of cheap sensors provides new opportunities and challenges

- Drones some limitations relating to regulatory framework

- Mobile phones sensing better in some fields than others (e.g. noise)

Public Lab (Publiclaboratory.com) is a community where you can learn how to investigate environmental concerns. Using inexpensive techniques, they seek to change how people see the world in environmental, social, and political term

- Waspmotes need programming and issues of calibration and response time but opportunities high..



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buscar | no g1 | ok

central globo.com | assine a globo.com | todos os sites

AMAZÔNIA

Empresas prometem não comprar de desmatadores

Frigoríficos e supermercados se comprometem a cortar negócios com fazendas embargadas.

- Produtos consumidos em SP ajudam a devastar

Banco do Planeta

Primeira Página
Amazônia no Orkut
Notícias
Vídeos

CONGRESSO

Câmara aprova medida provisória que cria o Fundo Amazônia

Noruega já prometeu doar até US$ 1 bilhão para ações de proteção ambiental.

- Marina Silva quer meta de redução de emissão

amazônia.vc

visualizar: queimadas | desmatamento — Dados fornecidos pelo INPE

6. Protestos virtuais...

Usuários do Orkut que já instalaram o aplicativo

456.483

Protestos contra queimadas e desmatamento desde Setembro de 2008

41.278.524

amazônia.vc

visualizar: queimadas | desmatamento — Dados fornecidos pelo INPE

Grupo de queimadas | Queimada | Ocultar legenda [-]

Grupo de desmatamentos | Desmatamento

18/09/08 - 11h12 - Atualizado em 20/09/08 - 16h57

Senadora usa protestos do Globo Amazônia para defender floresta

Manifestações dos internautas são citadas por Marina Silva no Senado. Ex-ministra quer mais atenção às atividades produtivas sustentáveis.

Do Globo Amazônia, em São Paulo

Tamanho da letra A- A+

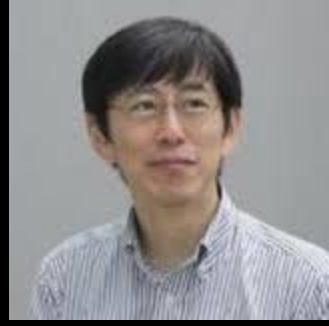
Os milhões de protestos registrados pelos usuários do mapa interativo do Globo Amazônia, que mostra em tempo real a destruição da floresta, já começam a surtir efeito em Brasília.

Em discurso proferido no Senado nesta quarta-feira (17), a senadora e ex-ministra do Meio Ambiente, Marina Silva (PT-AC), citou a mobilização de milhares de pessoas na internet para chamar

Mobile data

European Commission

Ryosuke Shibasaki (Tokyo Univ.)



Mobile GPS Log at 311 Tohoku Earthquake

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.. EO now...

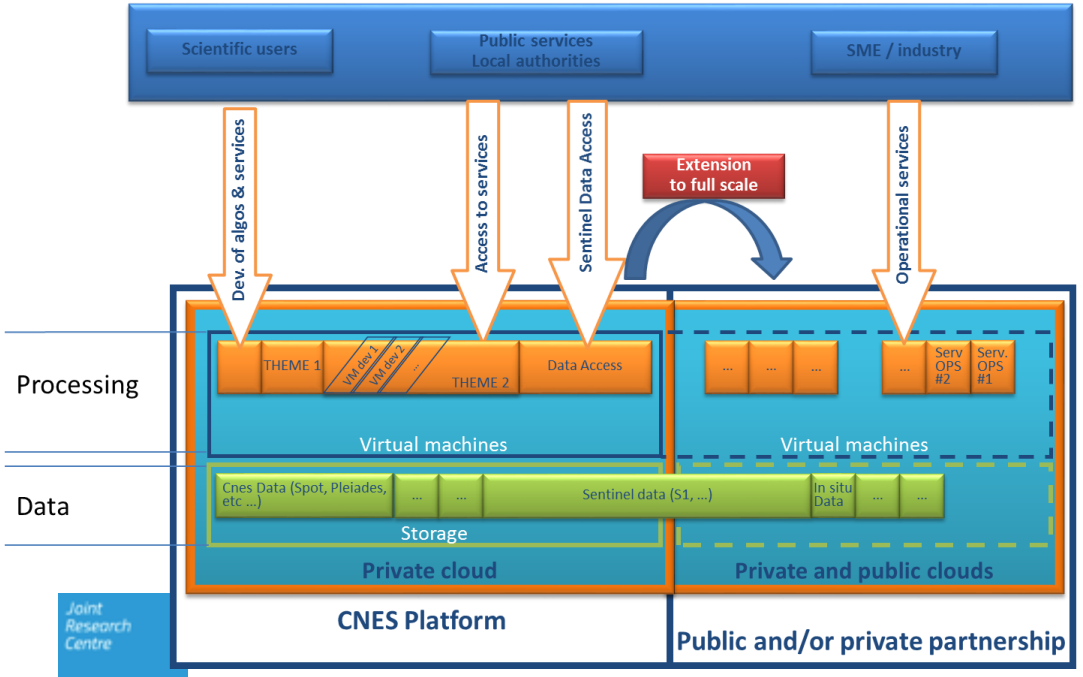
- RS data collected through increasing number of satellites and low cost drones (UAVs),
- In situ data collections gradually evolving as web sensor networks,
- Citizens scientists collect and share data (also using social media) → ethical considerations to be considered,
- Communities of practices adopt different data management practices requiring new solutions for multi-disciplinary interoperability,..
- New technical challenges related to "big data analytic",

.. in other words Earth Observation capacities radically changed … and new challenges emerge: more data, large heterogeneity, variable quality, new processing tools...

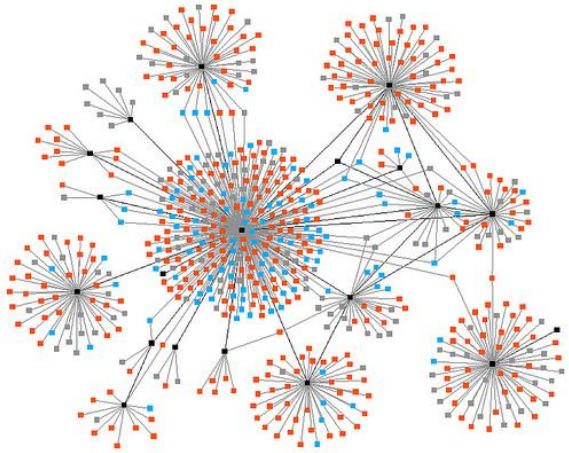
Big Data Tsunami
→ New Data Access models

Bring users to data

BRING USERS & PROCESSING TO DATA (PP)

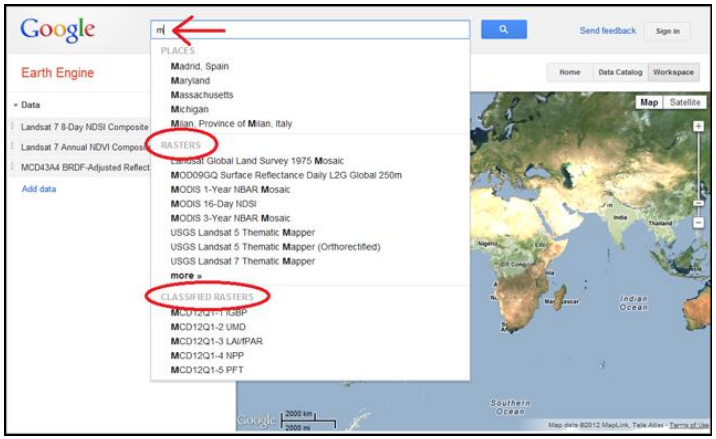


Bring data to users



European Commission

Bring users & processing to data (Private)



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Conclusions

We should benefit from the large amount of data collected, processed and disseminated by the Government, Academia, the Private Sector, **Citizens and Social Media**

Data analytic became a very important aspect where Governments should make major investments (to modernise existing infrastructures and processing capabilities) → *towards a Data Intensive Society*

The contribution of the **Private Sector** could be beneficial but the articulation could take different forms and clear governance should be established to ensure equal access to information

Open Access to data and agreed **Data Management policies** (data curation, data preservation, data citation, …) is the key to fulfil the ambition to make GEOSS a robust information system for EO

Thanks for your attention