

# **Interoperabilidad y el valor de estándares**

Información Geoespacial y Toma  
de Decisiones: actualidad y retos  
*INEGI CentroGeo*

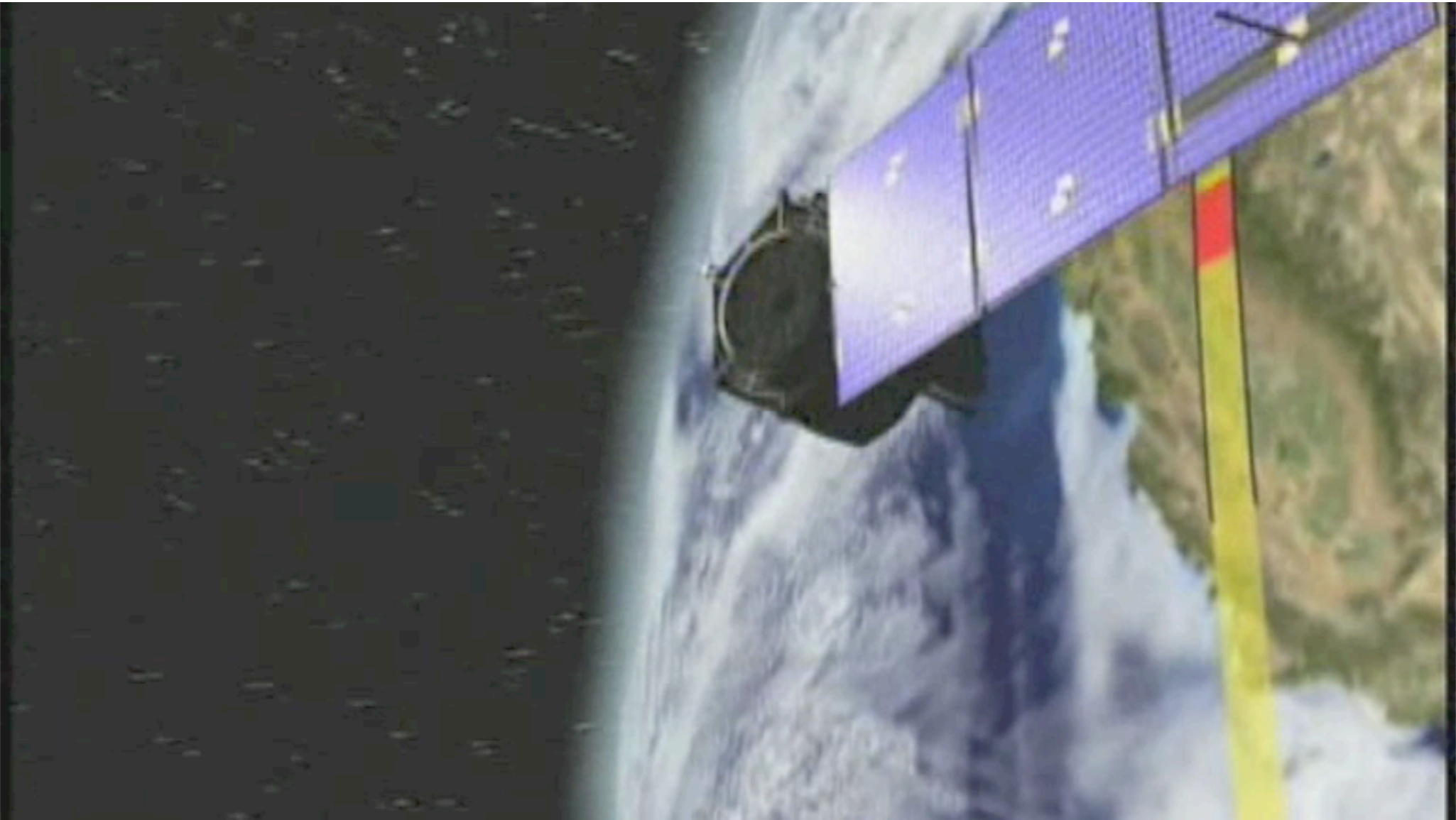
Mexico, CentroGeo, Nov 24, 2010

Luis Bermudez

Director Interoperability Certification, OGC



Ultimate Goal ...



*Internet Map*  
Connection Density



ChrisHarrison.net

Today.. billions of  
connected nodes



Systems do not understand  
each other

# Semantic Problem



Groundwater  
Spring



Well

# Semantic Problem



Groundwater  
Spring

> 10,000 terms



Well

> 9,000 terms

# Different Formats

USGS /NWIS

```
#
# Data provided for site 02081022
#      DD parameter statistic      Description
#      04      00010      00001      Temperature, water, degrees Celsius (Maximum)
#      04      00010      00002      Temperature, water, degrees Celsius (Minimum)
#      04      00010      00003      Temperature, water, degrees Celsius (Mean)
#
agency_cd      site_no      datetime      04_00010_00001      04_00010_00002      04_00010_00003
USGS      02081022      1998-03-18      8.9      8.5      8.6
USGS      02081022      1998-03-19      9.1      8.8      8.9
USGS      02081022      1998-03-20      9.8      9.1      9.4
USGS      02081022      1998-03-21      9.8      9.7      9.7
USGS      02081022      1998-03-22      9.8      9.6      9.7
```

EPA /  
STORET

```
2004-11-19 09:55:00~EST~Water~Dissolved oxygen (DO)~6.3~mg/l
2004-11-19 09:55:00~EST~Water~Enterococcus Group Bacteria~0~cfu/100ml
2004-11-19 09:55:00~EST~Water~Nitrogen, ammonia as N~28.2~mg/l
2004-11-19 09:55:00~EST~Water~Phosphorus, orthophosphate~0.01~mg/l
2004-11-19 09:55:00~EST~Water~Salinity~31.47~ppt
2004-11-19 09:55:00~EST~Water~Temperature, water~10.6~C
2004-11-19 09:55:00~EST~Water~Phosphorus as P~32.37~ug/l
A106A1~2004-11-19 09:55:00~EST~Water~Solids, Total suspended~0.1~mg/l
```





Protocols

```

http://new-ssds.mbari.org:8080/servlet/GetOriginalDataServlet
?deviceID=
&startDataDescriptionVersion=
&endDataDescriptionVersion=
&startPacketSubType=
&endPacketSubType=
&startParentID=
&endParentID=
&startTimestampSec=
&endTimestampSec=
&lastNumberOfPackets=
&numHoursOffset=
&outputAs=
&displayPacketHeader=
&noHTMLHeader=<1 | 0
&delimiter=
&recordDelimiter=
&prependWith=
&convertTo=

```

## Method Summary

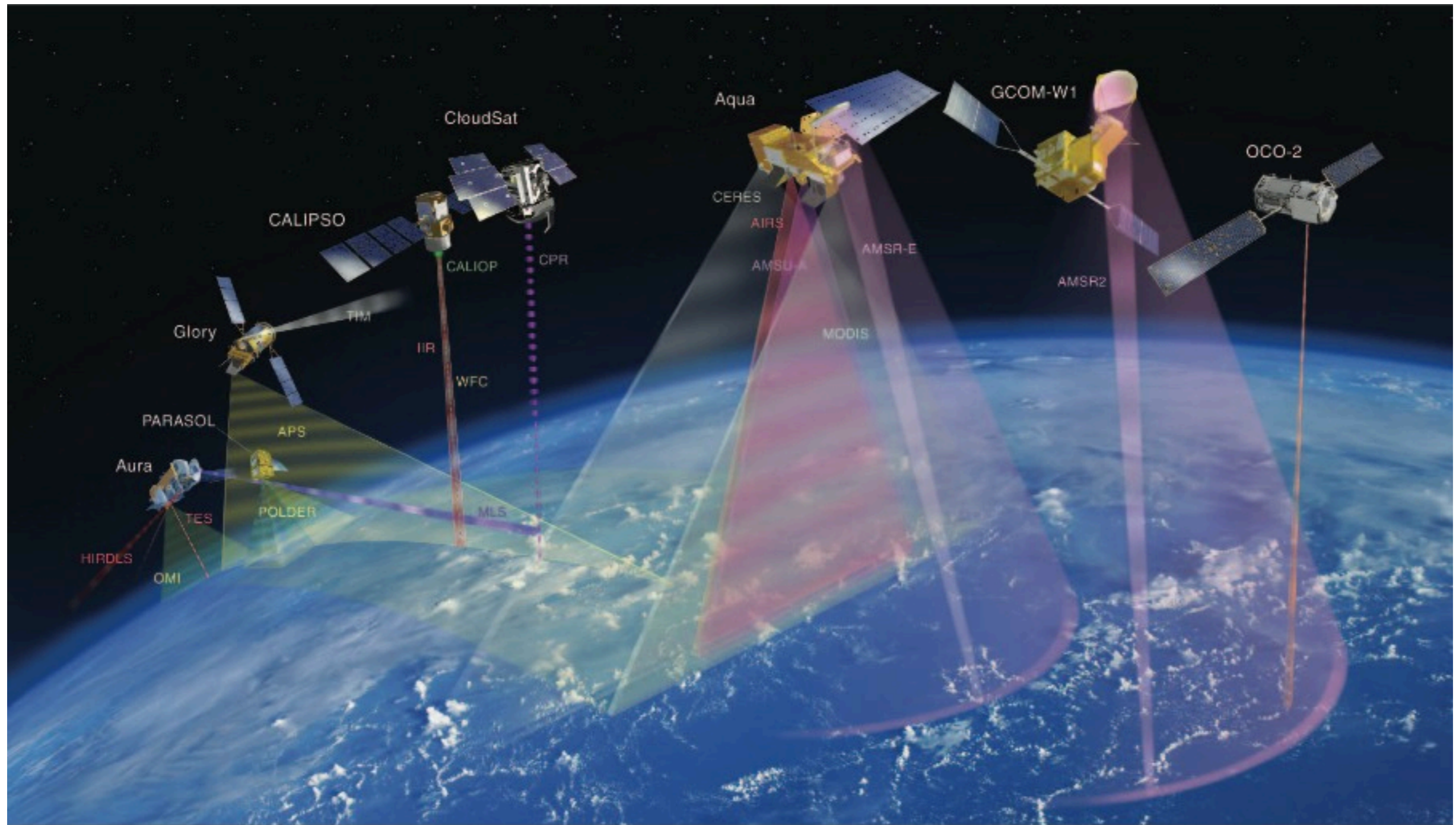
java.lang.String	<p><b><a href="#">getASCII</a></b>(java.lang.String URIData, java.lang.String start, java.lang.String end, java.lang.String downLimit, java.lang.String upLimit, java.lang.String northLimit, java.lang.String westLimit, java.lang.String southLimit, java.lang.String eastLimit, java.lang.String verticalPosition)</p> <p>Answers a String that encapsulates the Data in the specified format.</p>
java.lang.String[]	<p><b><a href="#">getMetadata</a></b>(java.lang.String parameter, java.lang.String source, java.lang.String start, java.lang.String end, java.lang.String downLimit, java.lang.String upLimit, java.lang.String northLimit, java.lang.String westLimit, java.lang.String southLimit, java.lang.String eastLimit, java.lang.String verticalPosition)</p>

Es costoso no ser  
interoperable



Es costoso no ser  
interoperable

Es costoso no ser  
interoperable



**Using OGC standards saves 26%**



**NASA Study, 2005**



Neelie Kroes , Vice President of the European Commission and European Digital Agenda Commissioner.

**“Interoperability boosts competition, we need more of that. .... all concerned parties must agree to a common way of doing things.”**

*Open Forum Europe 2010:*

*'Openness at the heart of the EU Digital Agenda' Brussels, 10th June 2010*



Neelie Kroes , Vice President of the European Commission and European Digital Agenda Commissioner.

**“Formal standards are one way to get there. More transparency in formal standard-setting can lead to more efficient outcomes.”**

*Open Forum Europe 2010:*

*'Openness at the heart of the EU Digital Agenda' Brussels, 10th June 2010*





Kylie Armstrong

Business Development

Western Australian Land Information Authority

Landgate, Australia

“ When you are delivering spatial web services on behalf of **20 government agencies** to more than a **1000 organisations** running their own spatial systems, **you need standards.**”



Kylie Armstrong

Business Development

Western Australian Land Information Authority

Landgate, Australia

**“Using the internationally recognised OGC and ISO standards for both the architecture and web services has been essential to our success.”**

Michael Weiss-Malik,  
Google KML product manager

“What OGC brings to the table is... everyone has **confidence** we won't take advantage of the format or change it in a way that will harm anyone... Governments like to say they can publish to **OGC KML** instead of Google KML “

# Open Geospatial Consortium (OGC)



To serve as a **global forum** for  
and **lead** the development,  
promotion and harmonization of  
**open and freely available**  
**geospatial standards.**

# OGC: Over 400 Member Organizations



**NORTHROP GRUMMAN**



**ORACLE**

**Google**



**BAE SYSTEMS**



**LOCKHEED MARTIN**



**DIGITALGLOBE**



Text  
National Geographic  
Information Institute  
Ministry of Land, Transport and  
Maritime Affairs



**SAMSUNG SDS**



**SEJONG UNIVERSITY**



**Microsoft**



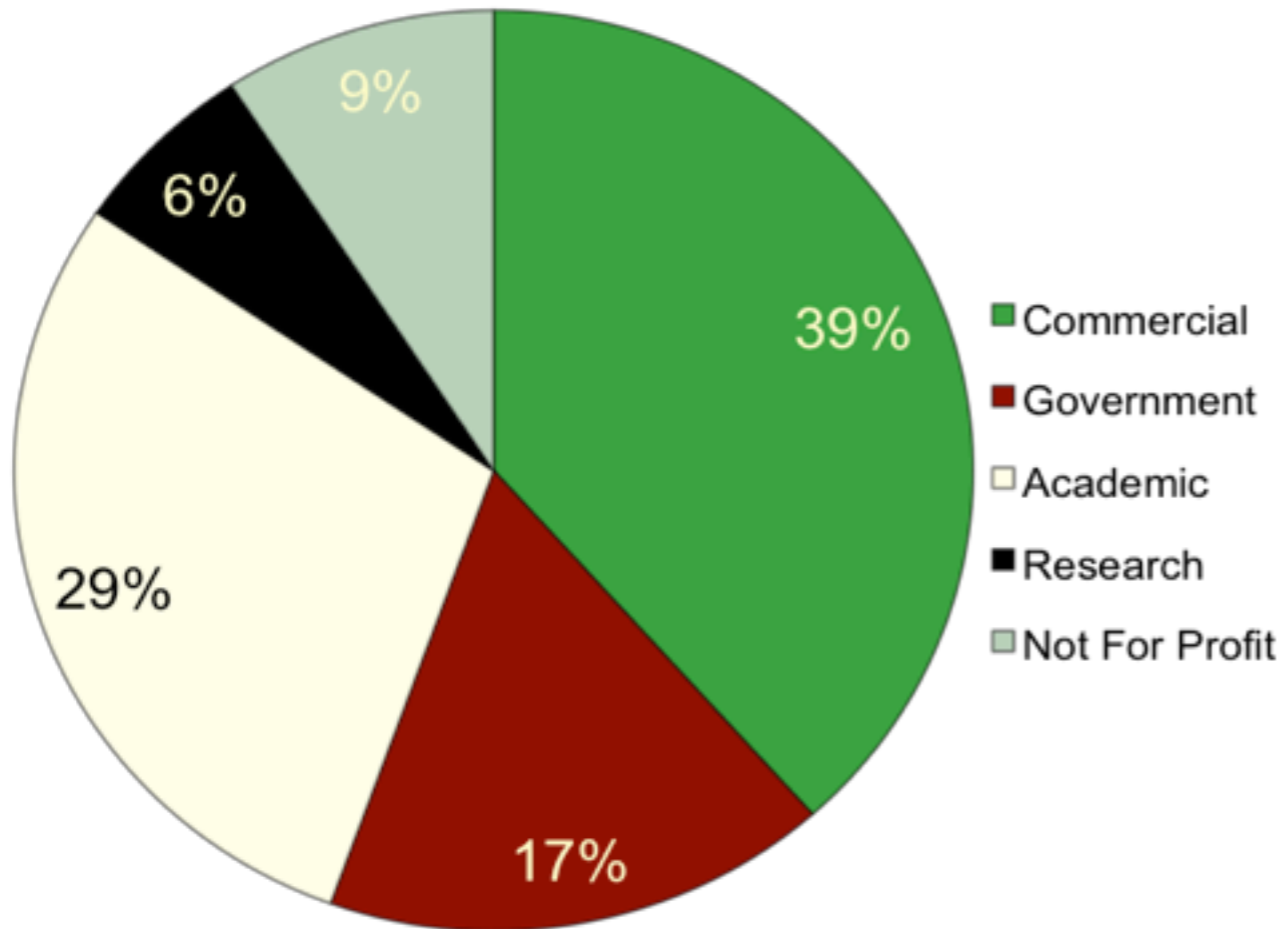
**OGC**

# 400 OGC Members (Sep. 2010)



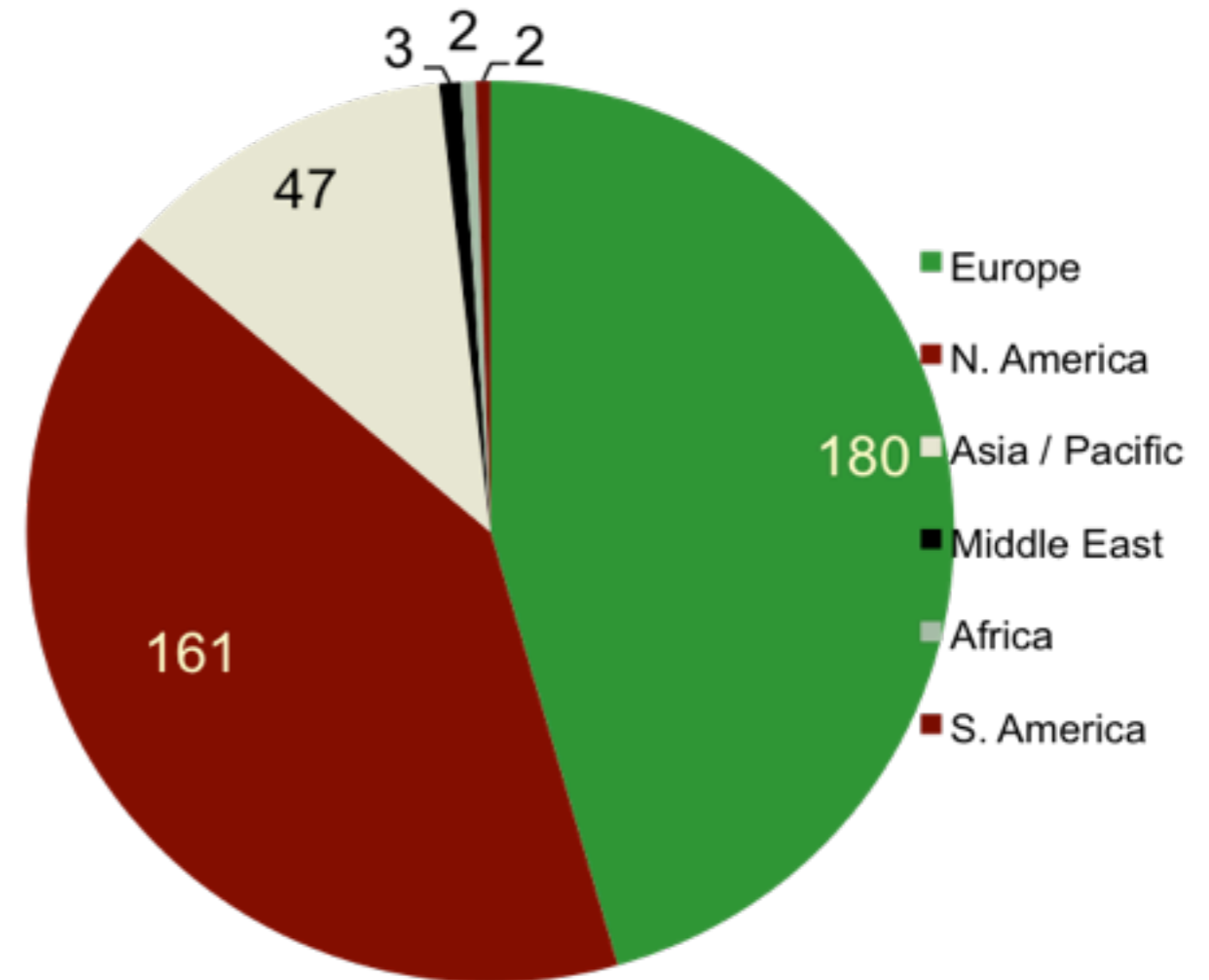
## OGC Membership Distribution

### By Type



## OGC Membership Distribution

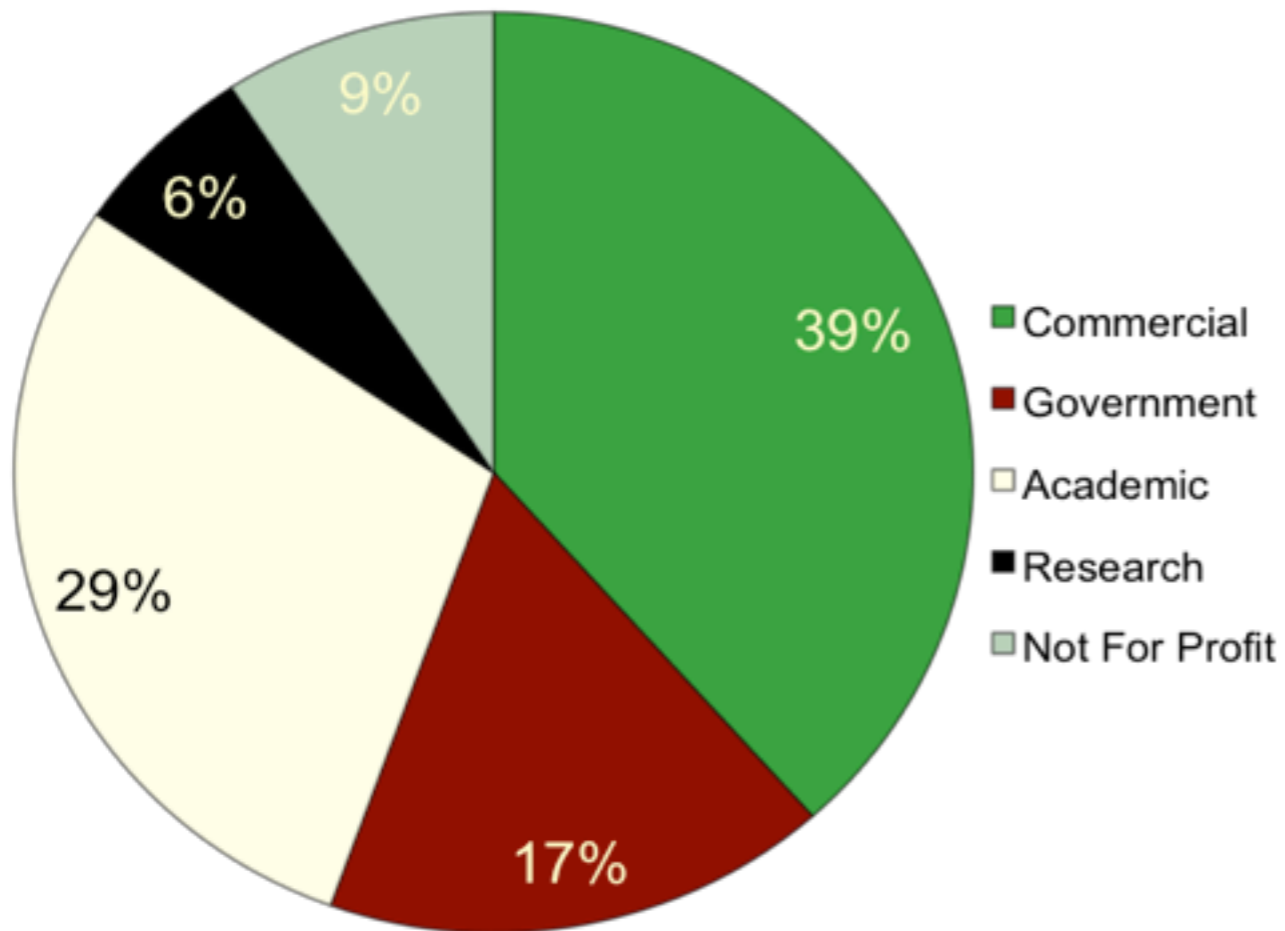
### By Region



# 400 OGC Members (Sep. 2010)



**OGC Membership Distribution  
By Type**



# Significant Government Participation

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- DOD Australia
- Geoscience Australia
- NSW Dept of Environment and Climate Change (Australia)
- Eurocontrol
- European Environment Agency
- European Satellite Centre
- European Space Agency
- EU Joint Research Centre
- UK MOD
- UK MET Office
- METEO France
- BRGM (France)
- Ordnance Survey (UK) ...
- US DHS
- US EPA
- US FAA
- US NASA
- USGS
- US NGA
- US Census
- US NOAA
- JPEO
- Oakridge National Lab
- Natural Resources Canada
- North Carolina Dept of Environment & Natural Resources
- Dept. Science & Technology (India)
- Korea Land & Housing ...



# OGC Alliance Partners

## A Critical Resource for Advancing Standards



... and others  
[www.opengeospatial.org/ogc/alliancepartners](http://www.opengeospatial.org/ogc/alliancepartners)



Making Location Count ...

# 30 + implementation standards



## - **Data Services**

- Sensor Observation Service (SOS)
- Web Coverage Service
- Web Feature Service
- Web Map Service ..

## - **Catalogue Services**

- Catalogue Service

## - **Processing Services**

- Open Location Services (OpenLS)
- Coordinate Transformation Service
- Sensor Planning Service (SPS)
- Web Processing Service (WPS)

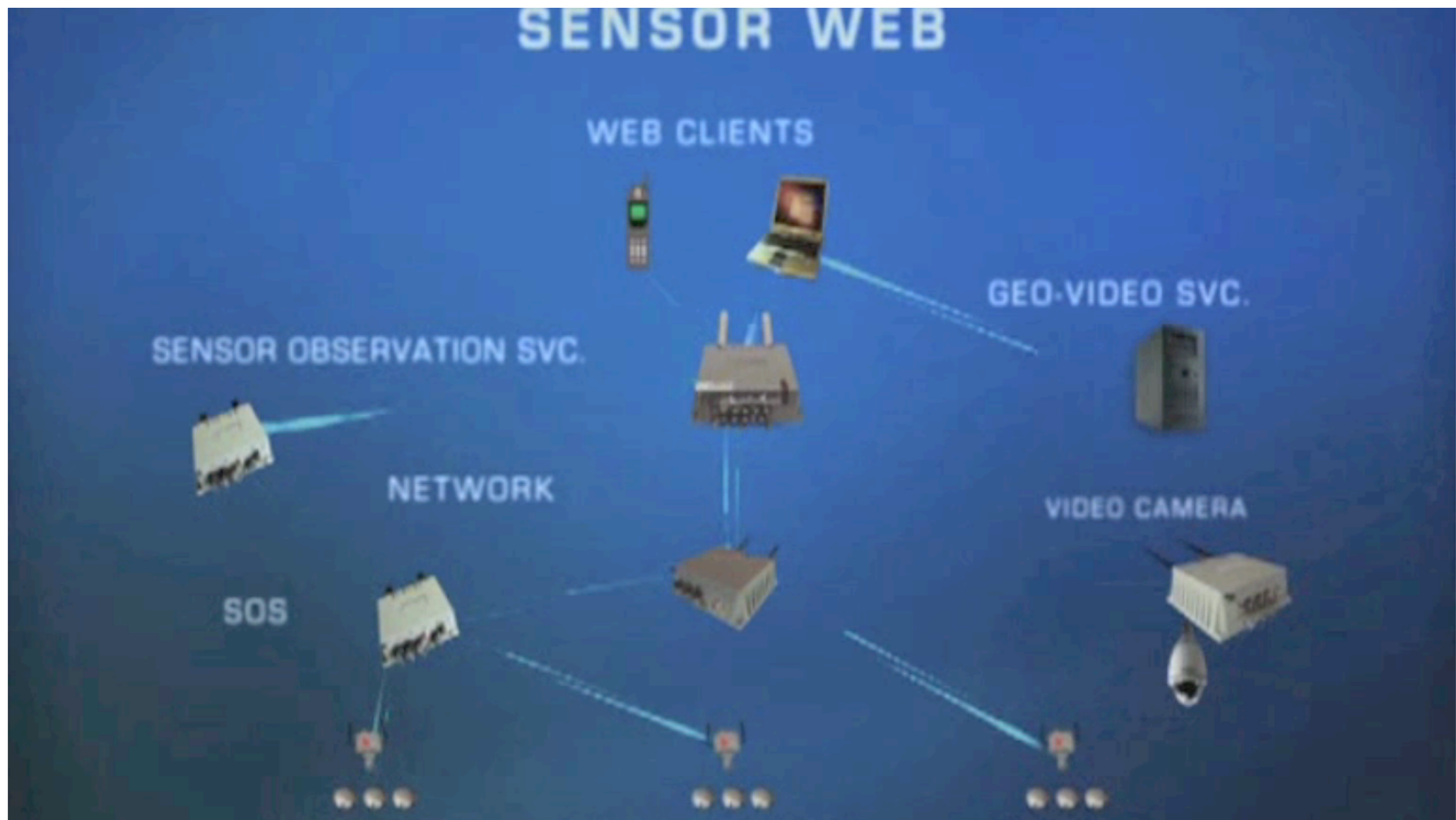
## - **Portrayal Services**

-

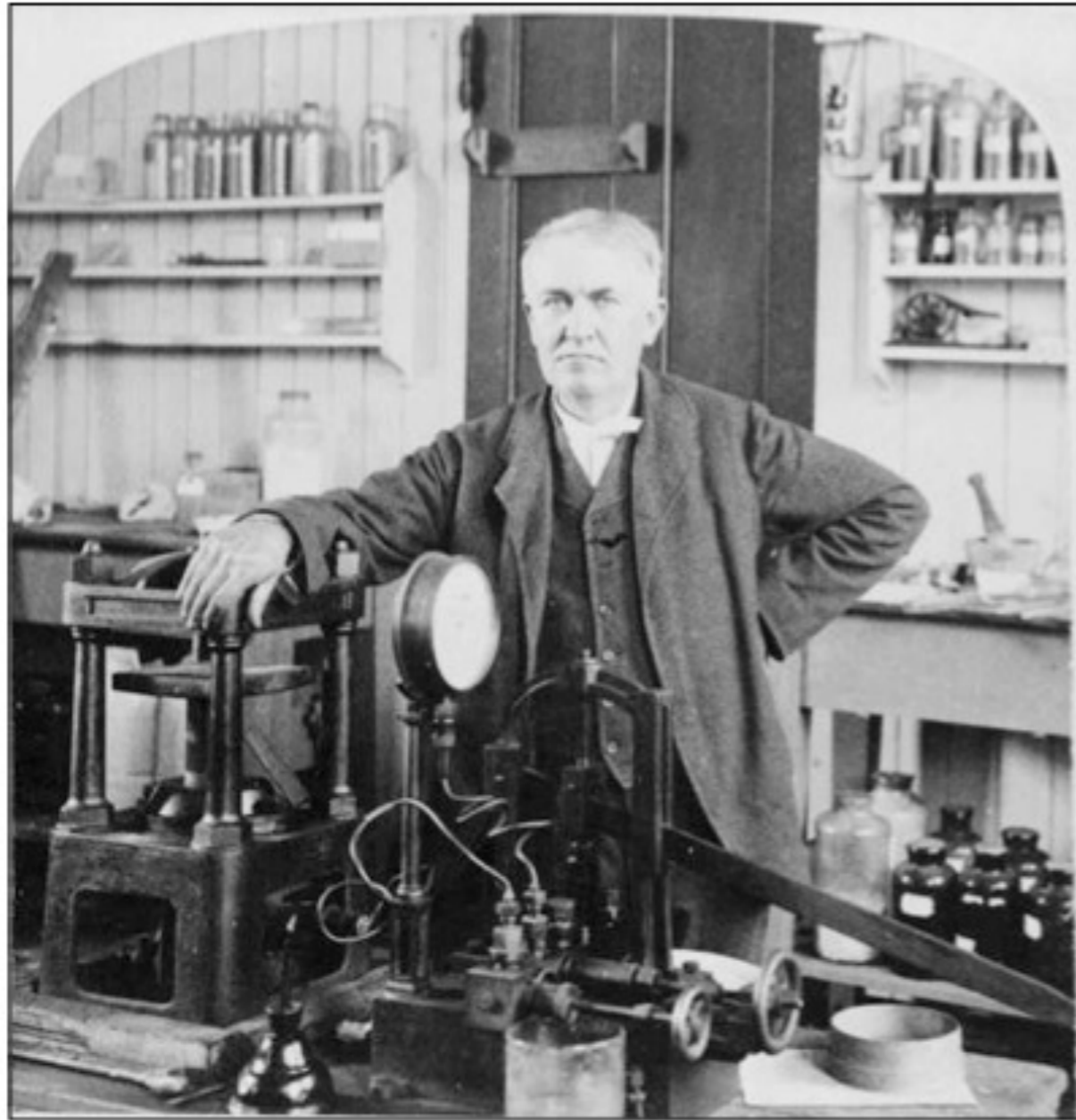
# Encodings and Web Services Framework for OGC Standards

## - Encodings

- Geography Markup Language (GML)
- Styled Layer Descriptor (SLD)
- Transducer Markup Language (TML)
- Sensor Model Language (SensorML)
- CityGML
- Web Map Context (WMC)
- Observations & Measurements (O&M)
- Filter Encoding
- KML
- Symbology Encoding
- GML in JPEG 2000
- .....



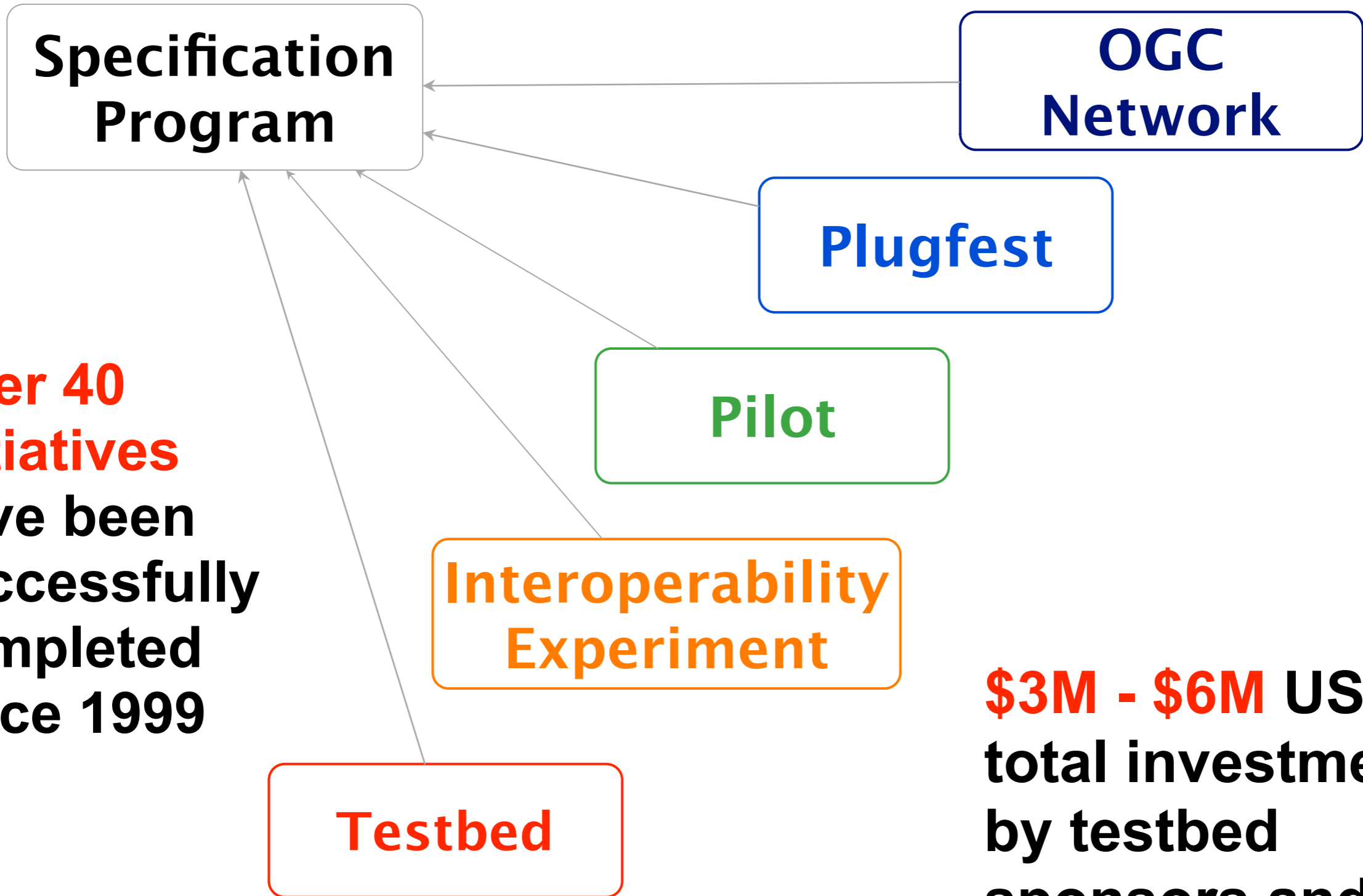
# ..how do we know if a standard works ?



I have not failed, I've just found 10,000 ways that won't work.

*Thomas Edison*

# Interoperability Program Development



**Over 40 initiatives** have been successfully completed since 1999

**\$3M - \$6M USD** total investment by testbed sponsors and participants

# OGC Activities Driven by Community Needs



## Education & Research



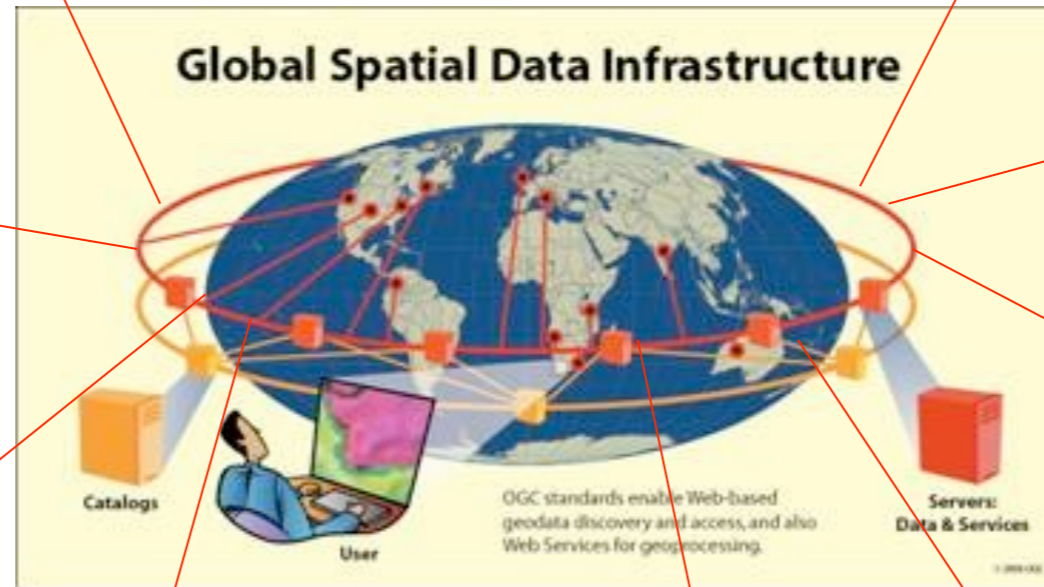
## Sustainable Development



## Utilities



## Health



## E -Government



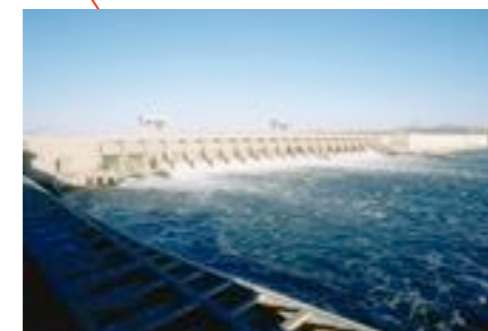
## Emergency Services



## Energy



## Geosciences



## Consumer Services



# For example ...



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Meteorology Domain Working Group  
Lead by WMO



# For example ...

Meteorology Domain Working Group  
Lead by WMO



World Meteorological Organization  
Working together in weather, climate and water

Advancing Practices to share met/  
ocean data

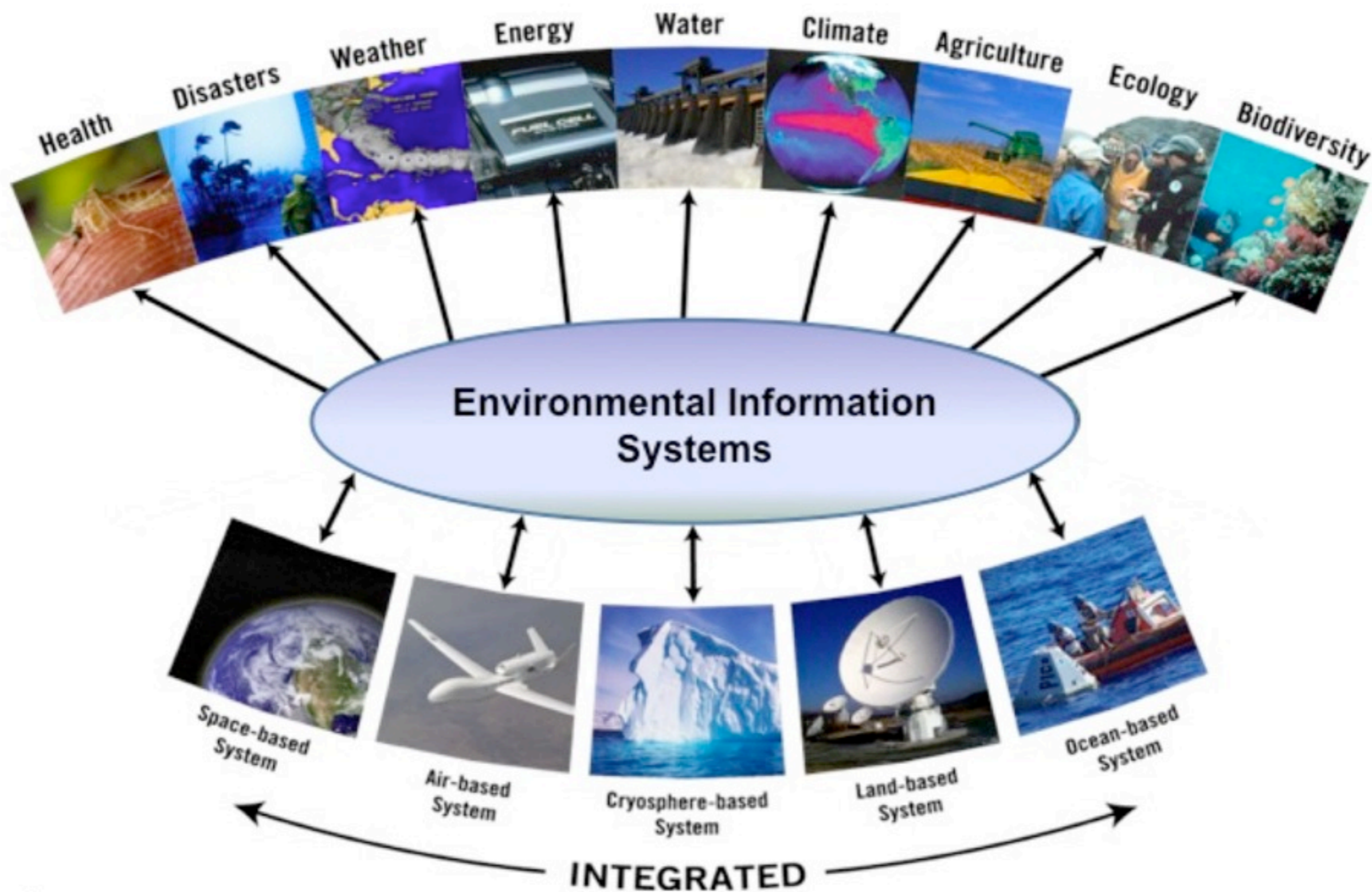
# For example ...



**Emergency and  
Disaster  
Management  
Domain  
Working Group**



# GEOS

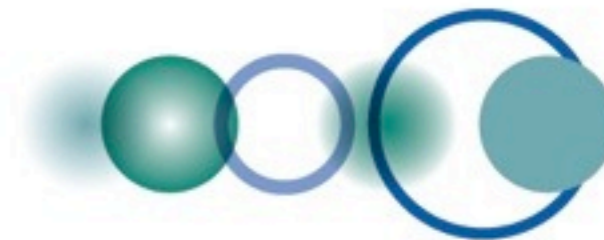




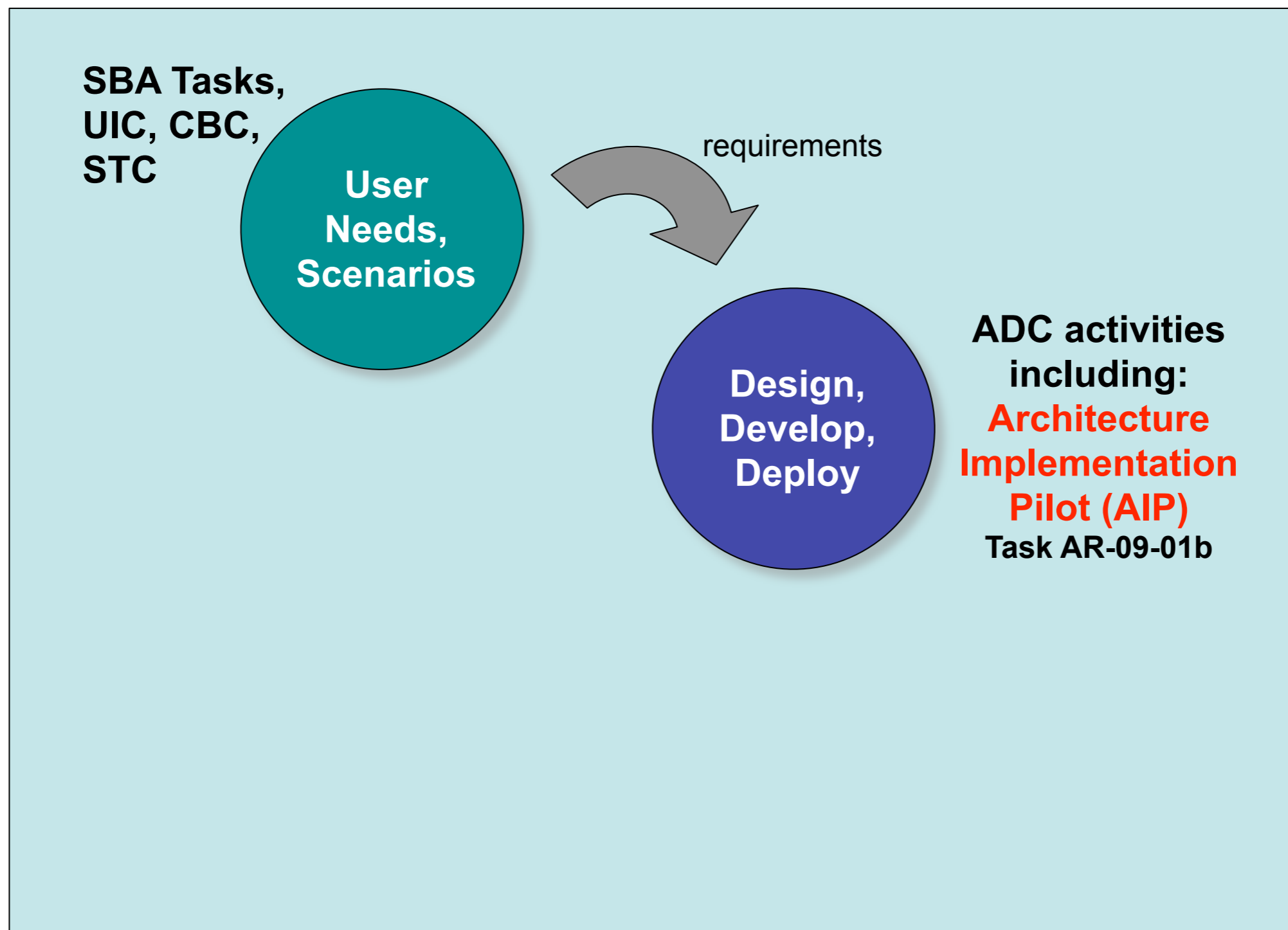
# GEOS Architecture Implementation Pilot

Design,  
Develop,  
Deploy

ADC activities  
including:  
**Architecture  
Implementation  
Pilot (AIP)**  
Task AR-09-01b

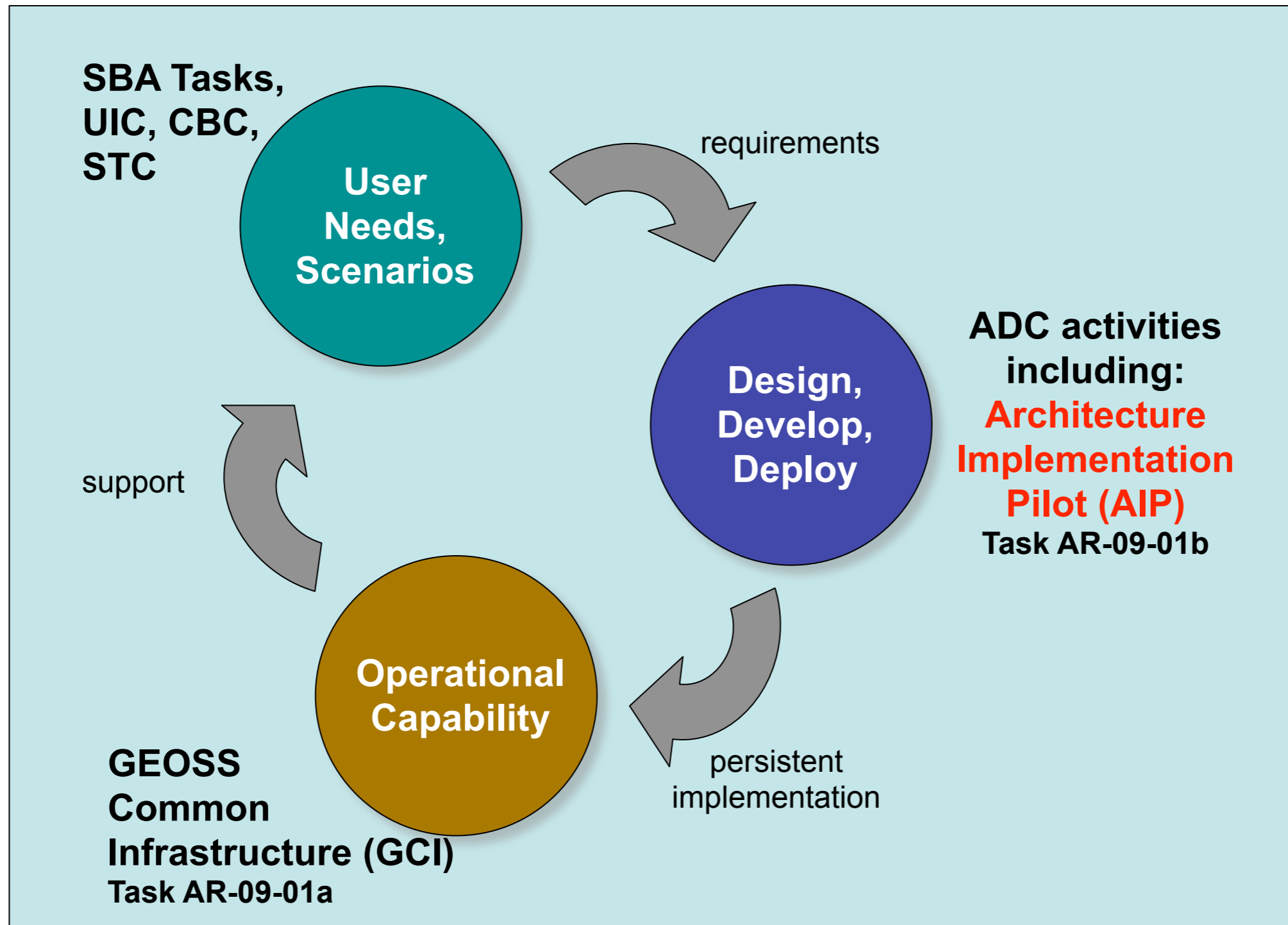


# GEOSS Architecture Implementation Pilot

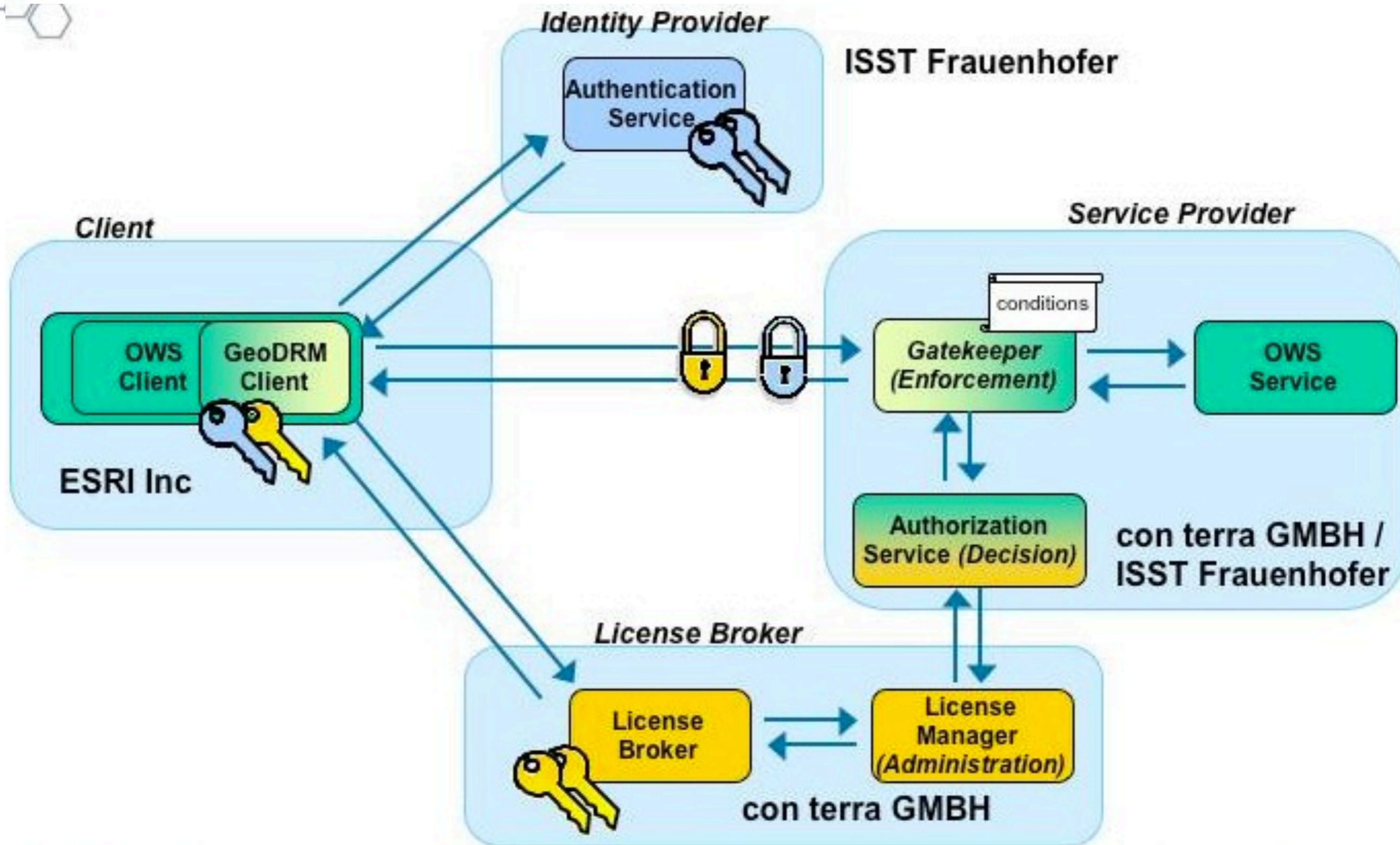




# GEOSS Architecture Implementation Pilot



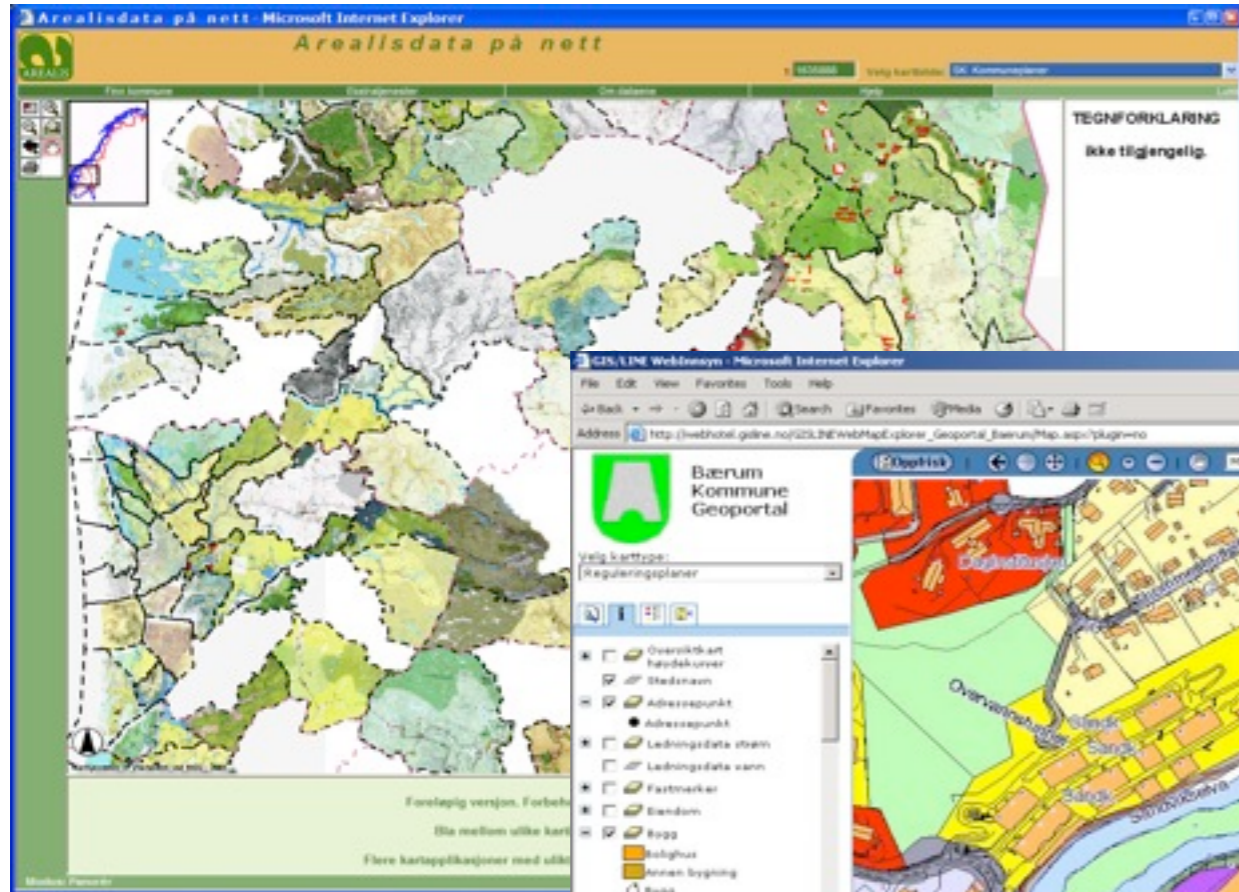
# Security Domain Working Group



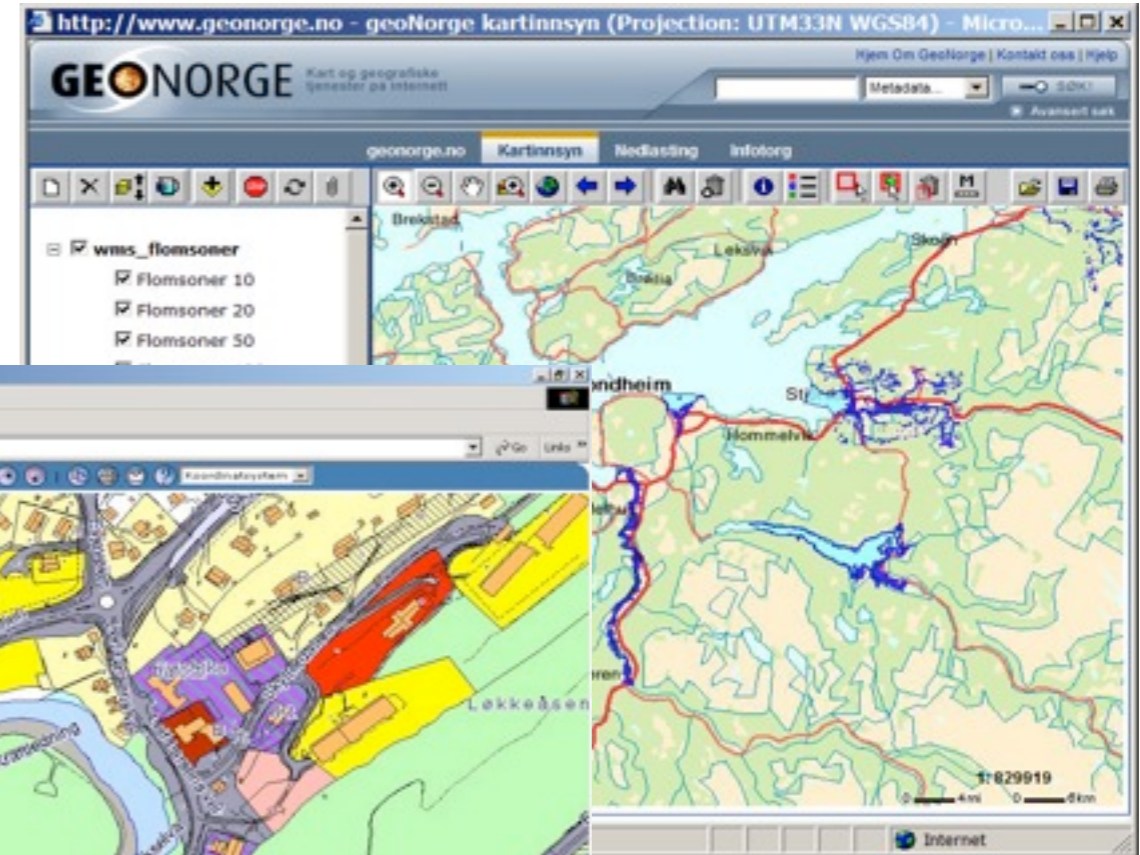
# Digital Norway – Land Use



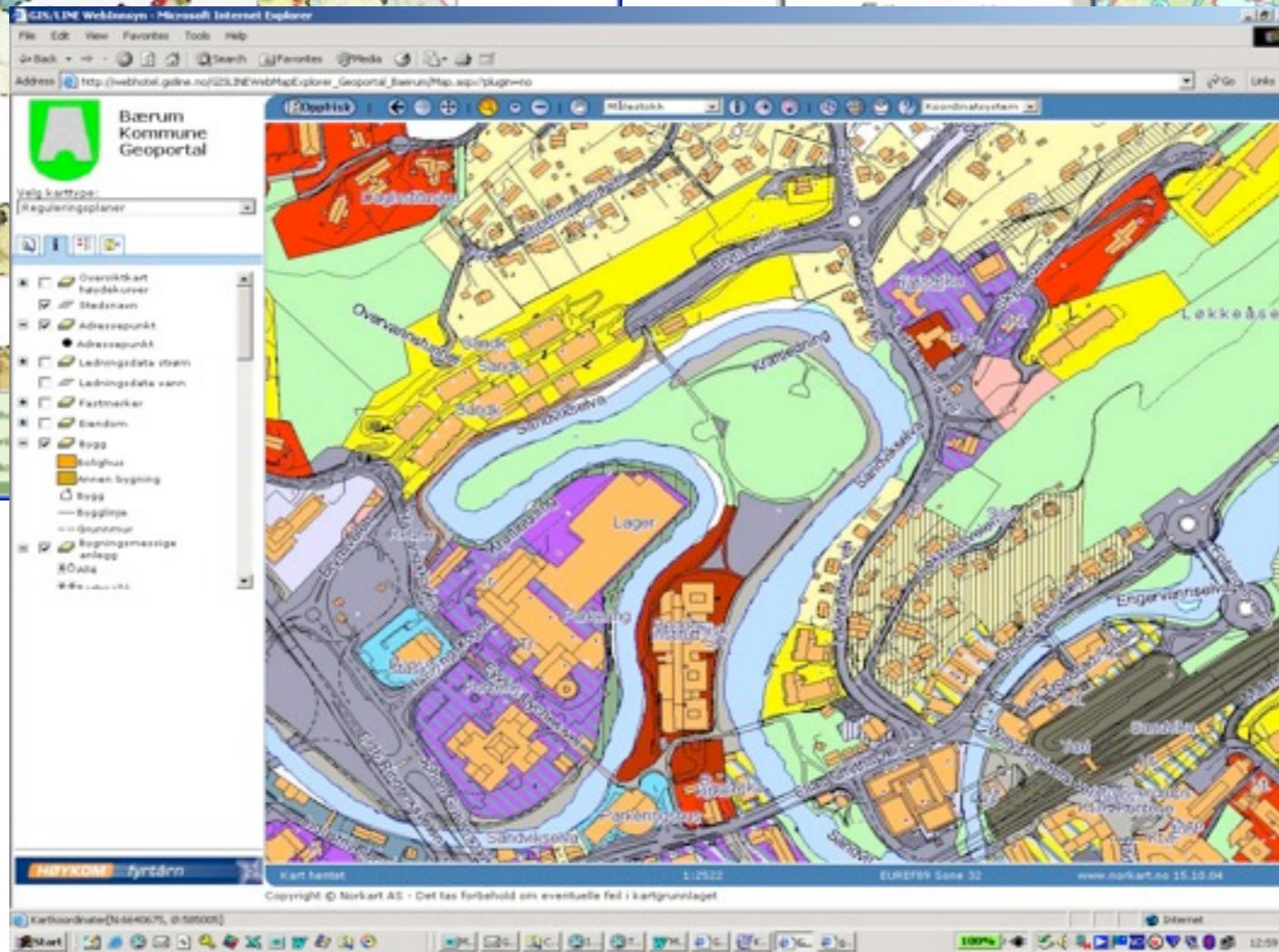
## Municipal Areas



## Flood Risk Areas



- Fisheries
- Waste Water Outflow
- Water Supply



- Demography
- Biodiversity
- Agriculture and Forestry

## Land Use



Making Location Count...



# Debris Flow Monitoring - Taiwan



# Debris Flow Monitoring - Taiwan



# Debris Flow Monitoring - Taiwan



- Typhoons and earthquakes trigger landslides and flooding on a frequent basis



# Debris Flow Monitoring - Taiwan



- Typhoons and earthquakes trigger landslides and flooding on a frequent basis
- OGC standards used with an array of spatial data and sensors to forecast, detect, alert and respond to debris flow situations.



# Debris Flow Monitoring - Taiwan



- Typhoons and earthquakes trigger landslides and flooding on a frequent basis
- OGC standards used with an array of spatial data and sensors to forecast, detect, alert and respond to debris flow situations.
- Rapidly deployed network of debris flow sensors, and distributed services performing sensor data analysis and processing



# Sensor Web Enablement Standards Application Ocean Observation



## Core DIF Standards

These are some of the basic standards and specifications adopted by the NOAA IOOS Data Integration Framework.

- [OGC Sensor Observation Service \(SOS\) specification](#) NOAA IOOS uses this service type to provide access to in-situ oceanographic data in an XML encoding defined by the GML application schema referenced above.
- [OGC Web Coverage Service \(WCS\) specification](#) this service type to provide access to gridded data in binary formats such as NetCDF and GeoTIFF.
- [OPeNDAP information](#) This service type is used to provide access to gridded remotely sensed data such as NetCDF and GeoTIFF.
- [OGC Web Map Service \(WMS\) specification](#) used to provide georeferenced images of data.

4/7 PREDICTIONS RETROSPECTIVES MODELING TEST BED GUIDES & RESOURCES

### Real-Time Data from an OGC Sensor Web

This interoperability demonstration represents an effort to develop a Web Services Architecture for Ocean Observing that is enabling observing systems to move closer to the vision of 'network as platform'. We are seeking participants who would like to serve their in-situ observation data via SOS based Web Services. To learn more, visit the [QOSTethys.org website](#).

2061 Platforms reporting Click the station icons on the map for the latest observations.

Map Satellite Hybrid

Zoom To: - select -

Organizations: - All -

- [QOSTethys.org](#)
- [How it works](#)
- [How to participate](#)
- [Serve your data](#)
- [SOS Registry](#)
- [Google Earth KML](#) Requires GoogleEarth™

All Variables: - All Observed Properties -

Recent observations (green dot)  
No recent observations (red dot)

## IOOS Observation Registry v2.5

### Sensor Platforms Map

[Home] Reporting Date: 05/23/2010

Map Satellite Hybrid Terrain Earth

Zoom

Observations: All Observations

Regions: All Regions

Providers: All Providers

Platform Type

- All Platform Types
- Select a Platform
- Non-Federal Stationary
- Non-Federal Mobile
- Federal Stationary
- Federal Mobile
- Partial Federal Stationary
- Partial-Federal Mobile

Refresh Show All

Types:

Download Results

Filter platforms on the map by selecting from one or more dropdown items above and clicking 'Refresh'. To show all platforms in the Obs Registry (default view) click 'Show All'

Note: all features of this Google map application may not work with the the Internet Explorer 6 browser. Please use Firefox or Internet Explorer 7.

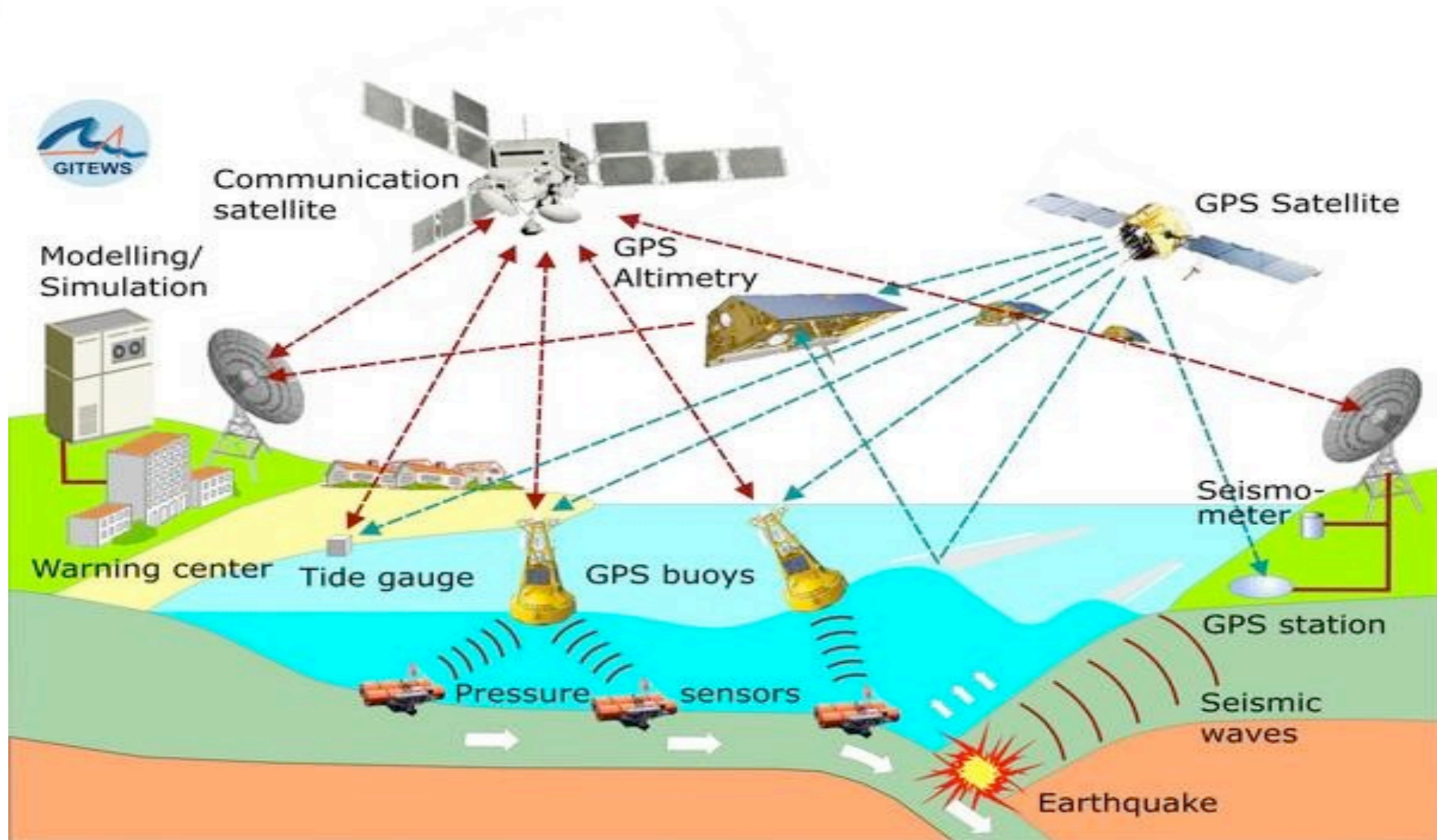
NOAA Coastal Services Center  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

NATIONAL MARINE SERVICES



# Disaster Management

## German Indonesian Tsunami Early Warning System



Source: [www.gitews.org](http://www.gitews.org)



**Where's the ROI?**



# ROI for Implementers



- Easier to integrate
- Easier to market
- More revenue !



From the OGC Network Forum...

“ .... I am currently working on a start-up software company which has concepts applicable to several parts of the Sensor Web Enablement initiative, and standards such as SensorML and O&M...”

# More than 600 implementing and certified products registered



<http://www.opengeospatial.org/resource/products>

## 1) Select a specification

City Geography Markup Language (CityGML) Encoding Standard v.1.0.0

## OpenGIS City Geography Markup Language (CityGML) Encoding Standard 1.0.0

### 2) Jump to Organization -

#### Bentley Systems Inc.

Product Name	OGC Spec
<b>Bentley Map v8i</b>	GML 2.1.2, GML 3.1.1, GMLsf 1.0.0, v8i 1.0.0

#### ESRI

Product Name	OGC Spec
<b>ArcGIS 9.3</b>	WMS 1.3.0, WMS 1.1.1, WMC 1.0, WCS 1.1.0, WCS 1.0, SLD 1.0, GMLsf CAT CS/W 2.0.1, CAT 2.0.2

#### interactive instruments GmbH

Product Name	OGC Spec
<b>XtraServer 3.2</b>	GML 2.1.2, <b>WMS 1.1.1 (compliant)</b> 1.0, Filter 1.0, GML 3.1.1, Filter 1.1, 3.2.1, CityGML 1.0.0, UTDS-CityGML

## 1) Select a specification

Sensor Observation Service v.1.0.0

## OpenGIS Sensor Observation Service 1.0.0

### 2) Jump to Organization -

#### 1Spatial Group Ltd

Product Name	OGC Spec	Type
<b>OSCAR Sensor Observation Service (SOS) 1.0.0</b>	SOS 1.0.0, SensorML Corr 1 1.01, OM 1.0	Server

#### 52 North

Product Name	OGC Spec	Type
<b>52N OX-Framework 52N Sensor Observation Service 1.0.0</b>	WMS 1.1.1, WMS 1.1, WMS 1.0, WCS 1.1.1 c1, WCS 1.0.0, SPS 1.0.0, SOS 1.0.0, SAS 0.9 OM 1.0, OM Sampling 1.0, SensorML 1.0.0, SensorML Corr 1 1.01, SOS	Client Server



# Meet Policy Requirements for Open Standards



- Global Earth Observation System of Systems (GEOSS)
- NATO C3
- US NGA
- [US Federal Geographic Data Committee](#)
- European INSPIRE Directive
- European Space Agency
- Local, national, regional government
- Science and Research



# Spatial Data Infrastructures

Un conjunto de **recursos, normas, tecnologías, políticas, marcos legal, administrativo y organizacional**, necesarios para la efectiva **creación, recopilación, manejo, acceso, distribución, compartición y uso de datos espaciales**.

La **IDEMex** es altamente inclusiva y la sustenta un espíritu de compartir los datos y la información en todos los ámbitos y en todos los niveles.



# What others are doing ...

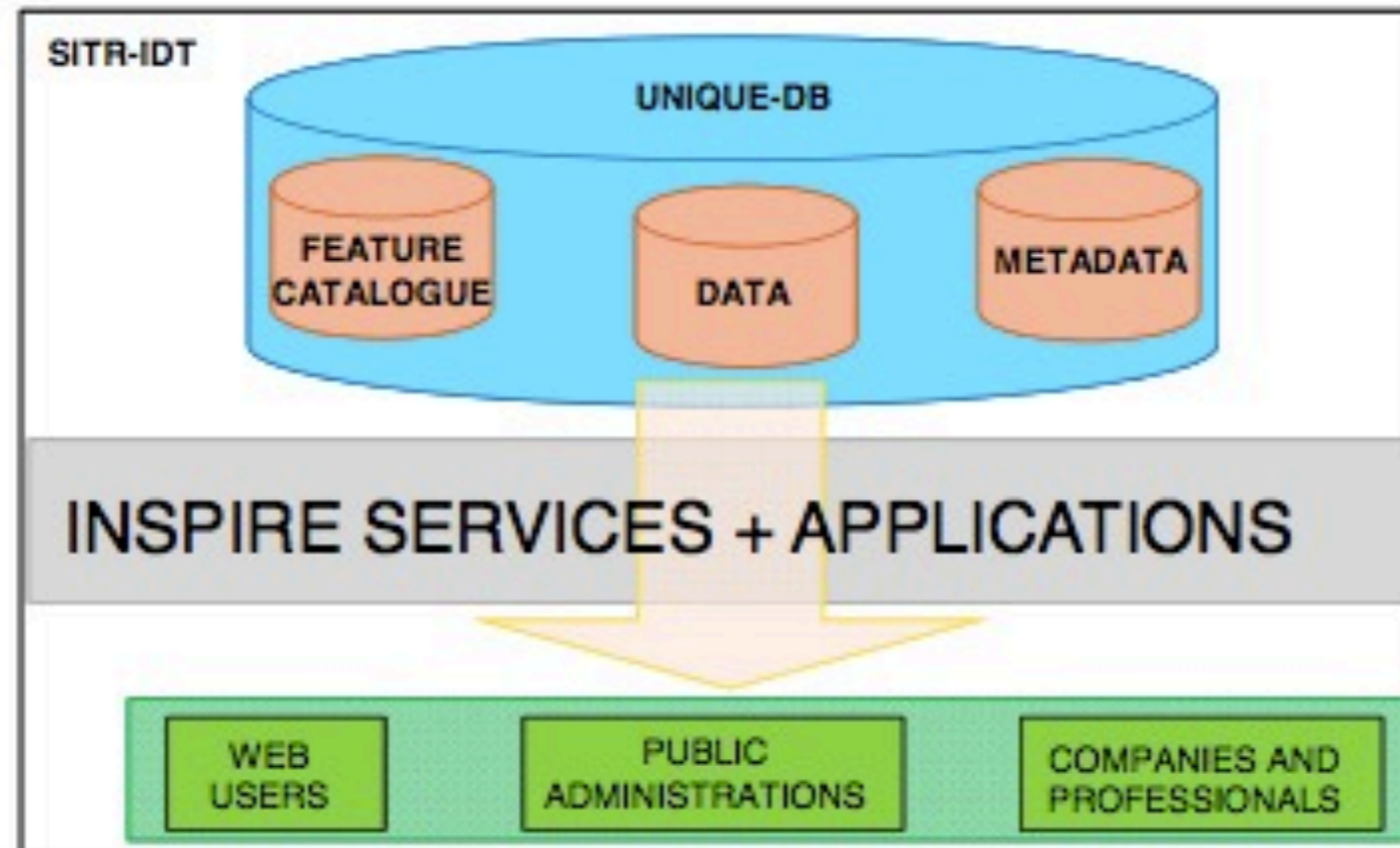


**REGIONE AUTONOMA DELLA SARDEGNA**  
**REGION OF SARDINIA (ITALY)**  
**LOCAL AUTHORITY FOR MUNICIPALITIES, FINANCES AND URBAN PLANNING**  
**DEPT. FOR THE REGIONAL SPATIAL DATA INFRASTRUCTURE**

## **Implementation of INSPIRE Principles: Sardinia Region SDI State of the Art and Further Developments**

# What others are doing ...

## SITR-IDT: the regional Spatial Data Infrastructure of Sardinia



- To ensure the **efficiency** and to reach the **interoperability** it was created according to **INSPIRE** Directive, I.R. and technical guidances.
- **Central, services oriented** architecture

# What others are doing ...



## **Compliance with INSPIRE**

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- **Spatial data services:**
  - Discovery service present, not compliant
  - View service as navigators and OGC-WMS, compliant
  - Download service as direct download and OGC-WFS, compliant
  - Transformation service only for coordinates, not compliant

### **Partial compliance for network services**

# Why Organizations should Use Open Standards ?

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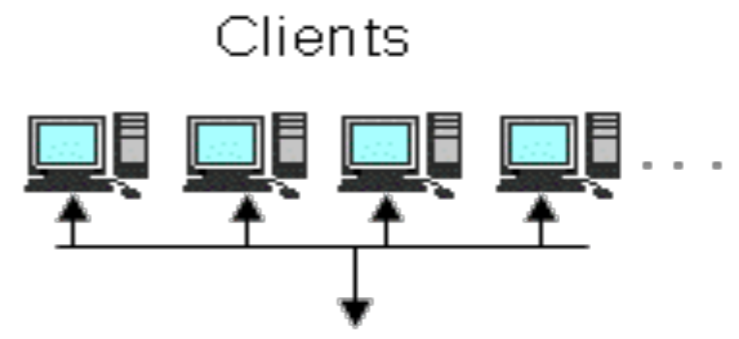
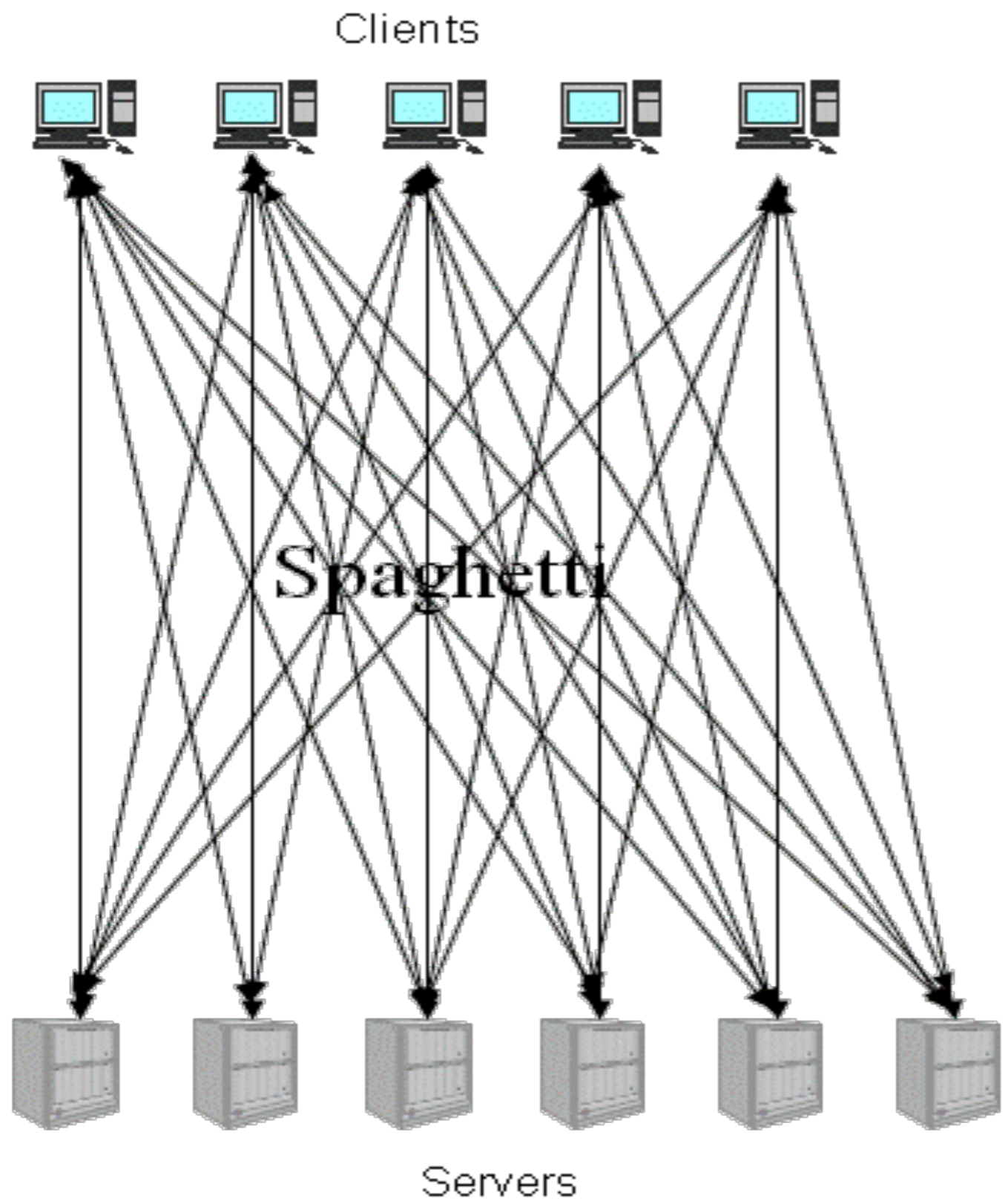
# Why Organizations should Use Open Standards ?

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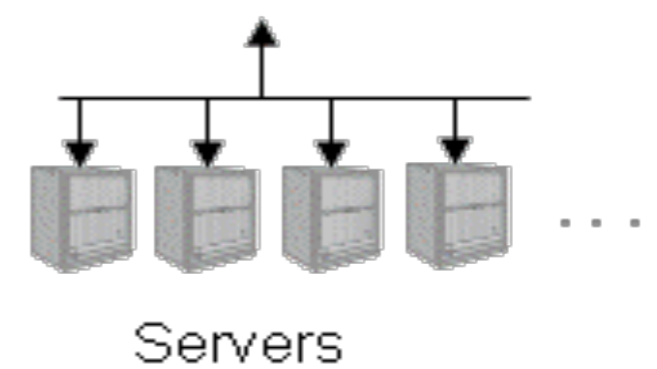


- Avoid custom Integration
- Low lifecycle costs
- Easier to rapidly mobilize new capabilities
- Avoid of duplication of effort

formation Management Approach”, courtesy of Mark Kuzma, DISA



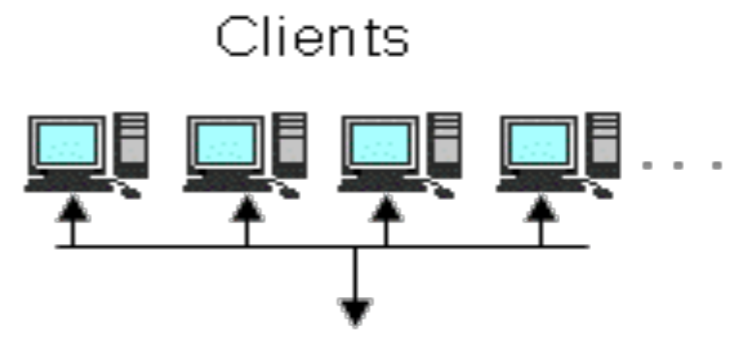
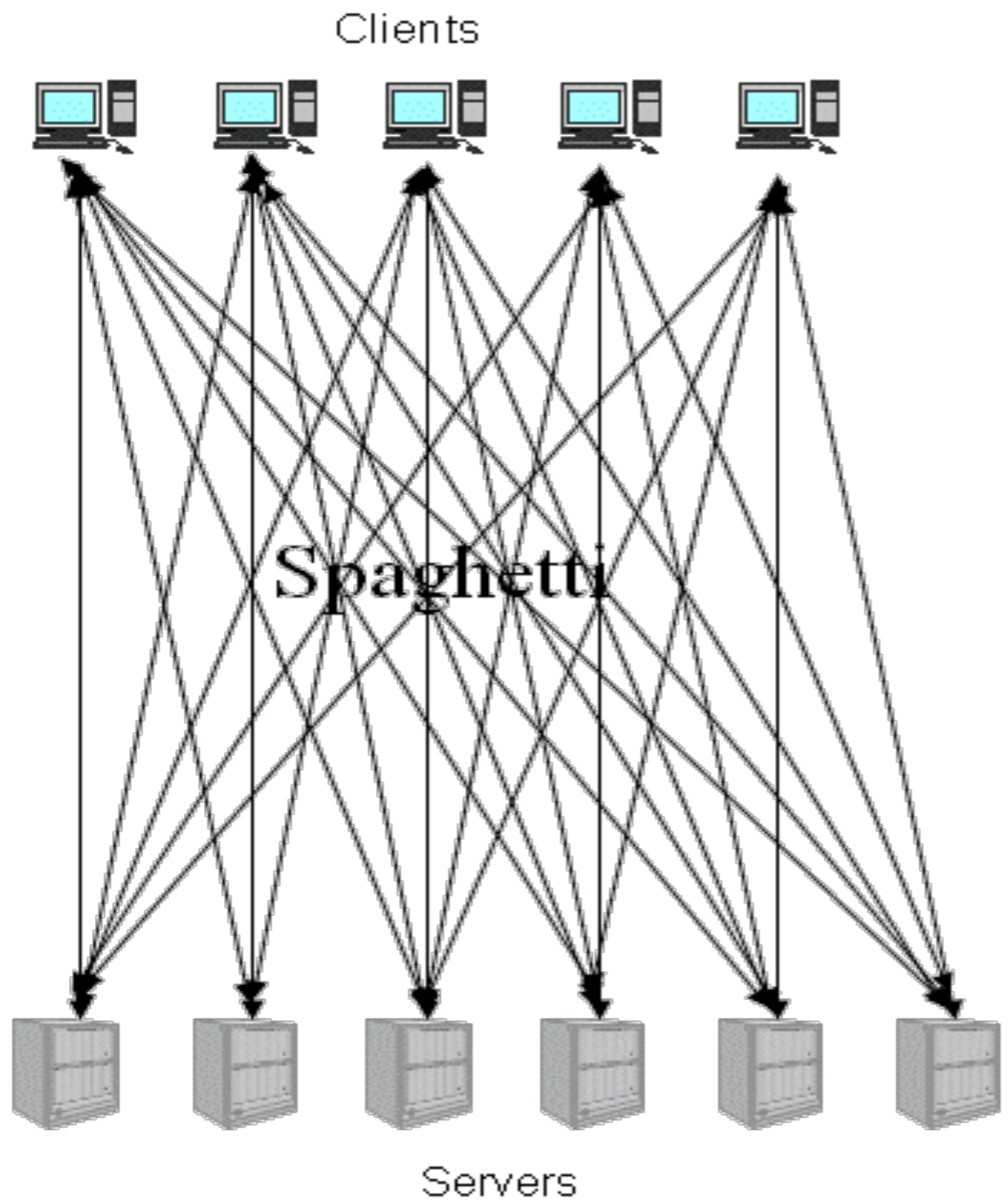
**Sneaker-net**



**COALITION**

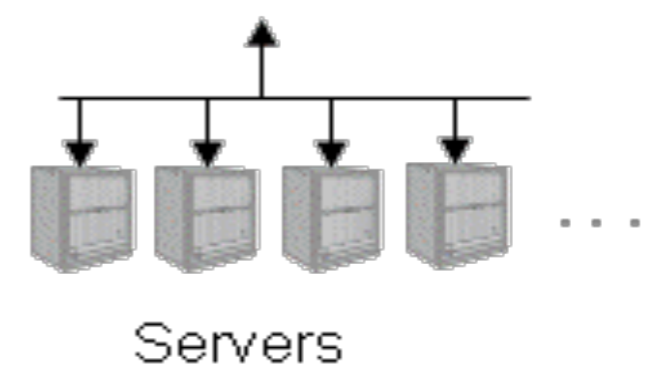
**OPERATIONAL**

formation Management Approach”, courtesy of Mark Kuzma, DISA



**Sneaker-net**

**Open Common Standards**



**COALITION**

**OPERATIONAL**

# Why to become a Member ?

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- Gain application/domain awareness
- Understand user needs/ strategic agendas
- Form partnerships (intra/cross domain)
- Promote well-documented cost savings from using standards-based architectures
- Shape the standards platform, as well as future direction of the geospatial industry

Participate .. shape the future !

# Participate .. shape the future !



# more than technical ....



# Two Announcements

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- Next OGC TC Meeting in the US
- New membership levels





# September 2011: OGC TC/PC Meetings

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**Start:**

Mon, 2011-09-19 (All day)

**End:**

Fri, 2011-09-23 (All day)

**Location:**

Center Green

UCAR/NCAR

Boulder, CO, USA

# New OGC Associate Membership Levels



- **GovFuture Local Government**                      USD \$200
  - includes town-, municipal- or county-level organizations.
- **GovFuture Subnational Government**                      USD \$500
  - includes province- or state-level organizations, e.g., a province of Canada, a state of the United States, a province or state of a country that is a member of the European Union, etc.

Press Release: Nov 23, 2010



# Mil Gracias !

**OGC<sup>®</sup>**

Making Location Count ...

**Luis Bermudez, Ph.D.**  
Director  
Interoperability Certification

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<http://www.opengeospatial.org>