Open Geospatial Consortium

Solving the Interoperability and Standardization Gaps

Collective problem solving with geospatial

Nadine Alameh, Ph.D.
nalameh@ogc.org

It’s 2021

http://mars.nasa.gov

Open Geospatial Consortium

Here on Earth

SCIENCEINSIDER | CLIMATE

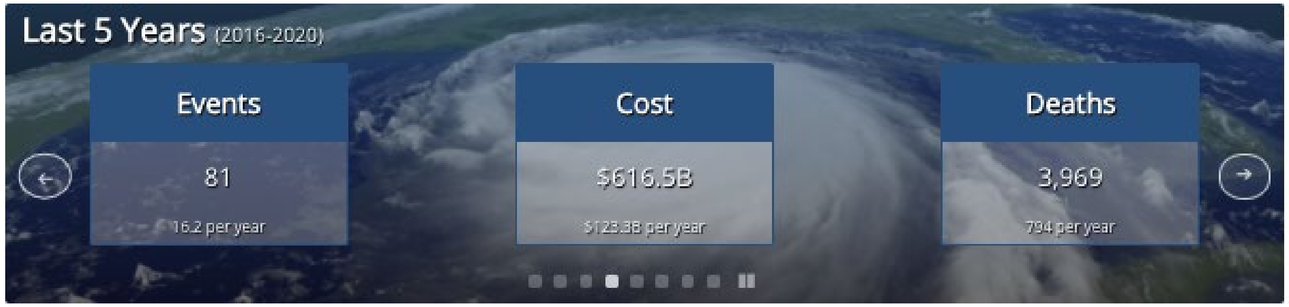
Europe's deadly floods leave scientists stunned

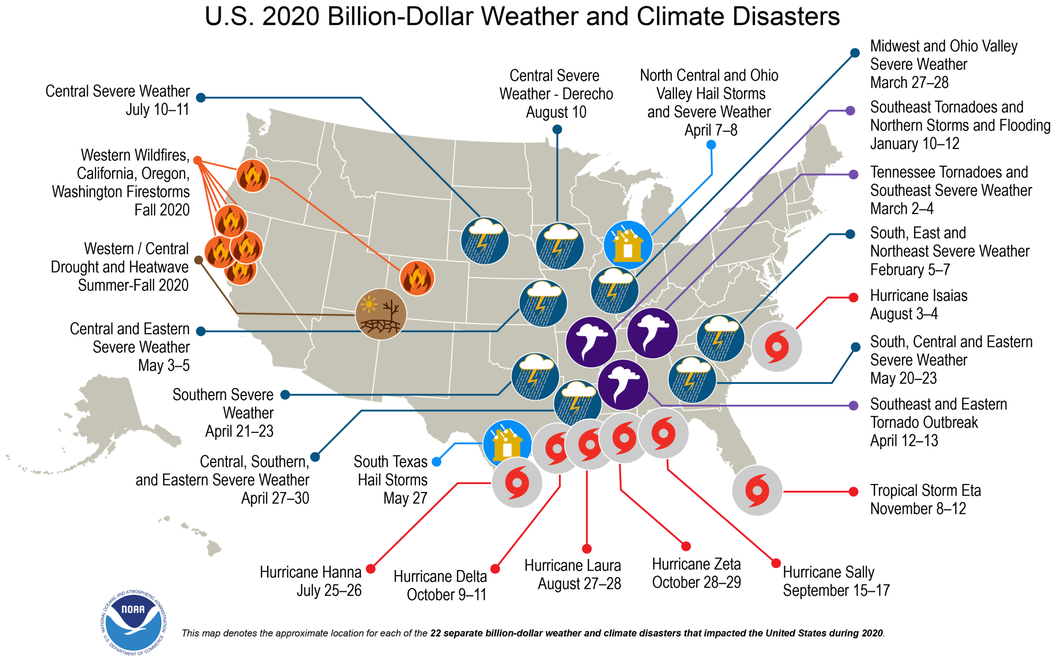
Despite improvements, flood forecasting sometimes fails to flag risks along smaller streams

20 JUL 2021 · BY WARREN CORNWALL

Flash floods caught many communities in Germany, including the town of Insul, by surprise, leading to at least 165 deaths. AP PHOTO/MICHAEL PROBST

Four days before deadly floods swept through western Germany and parts of Belgium last week, Hannah Cloke saw a forecast of extreme rain on a Europe-wide flood alert system to which she belongs. Researchers "were stupidly congratulating ourselves that we were forecasting something so early. ... The assumption was that would be really helpful," says the hydrologist and flood forecaster at the University of Reading. Instead, she was stunned to see scenes of devastation and death despite the ample warnings. "We





2020 sets the new annual record of 22 events - shattering the previous annual record of 16 events that occurred in 2011 and 2017. 2020 is the sixth consecutive year (2015-2020) in which 10 or more billion-dollar weather and climate disaster events have impacted the United States. Over the last 41 years (1980-2020), the **years with 10 or more** separate billion-dollar disaster events include **1998, 2008, 2011-2013,** and **2015-2020**.

Open Geospatial Consortium

Here on Earth

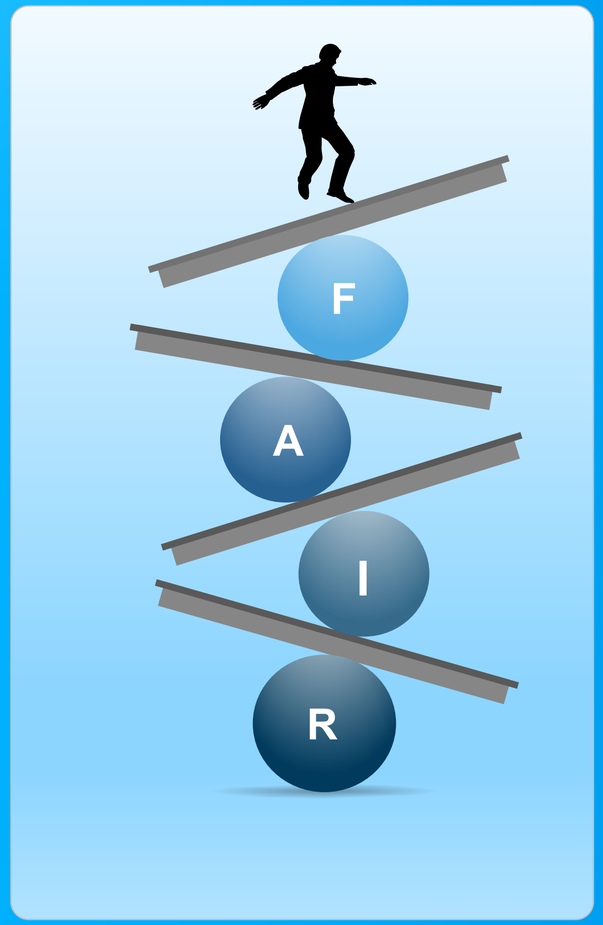
Share Like (2) Comment (1) Apr 16, 2020 9:04 pm GMT 3200 views

Summary of a white paper prepared for the Geospatial Information & Technology Association by Geoff Zeiss and Dr. Sakura Shinoaki

Over the past two decades in the U.S. there have been over 400 fatalities and nearly 2000 injuries attributed to hitting underground infrastructure during excavations. For comparison over the past 20 years in the U.S., there have been about the same number of fatalities (403) resulting from major commercial airline crashes (excluding 9/11). In addition inaccurate and missing information about underground infrastructure increases the risk of construction project schedule and budget overruns. It has been estimated that unreliable location information about underground infrastructure represents a $50 billion to $100 billion drag on the U.S. economy, multiple £ billions in the U.K. and € 1 billion in the Netherlands. Comparing the United States and Japan reveals a startling difference in the number of incidents of underground utility damage during construction. In the U.S. the number of incidents is between 400,000 and 800,000 per year (roughly one or two every minute). For Japan the number of incidents in 2016 was 134. Clearly something can be done to reduce the risk for construction workers and the public.

https://energycentral.com/c/pip/reducing-d amage-underground-utility-infrastructure-during-excavation-costs

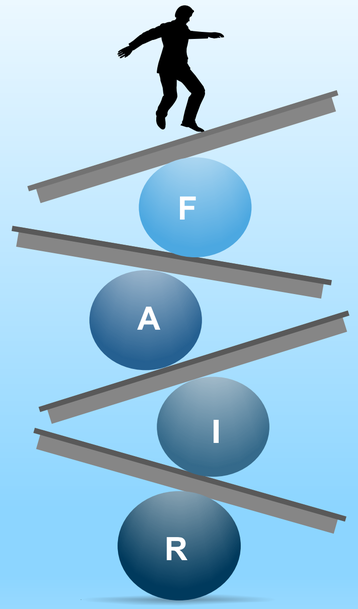
Why?



This is THE time of Geospatial
27 years of community, standards, and impacts

Community: 550+ Members

Problem solvers & innovators



Creating value with geospatial

Open Standards

Best Practices

Proof of Concepts

Deliverables to the world

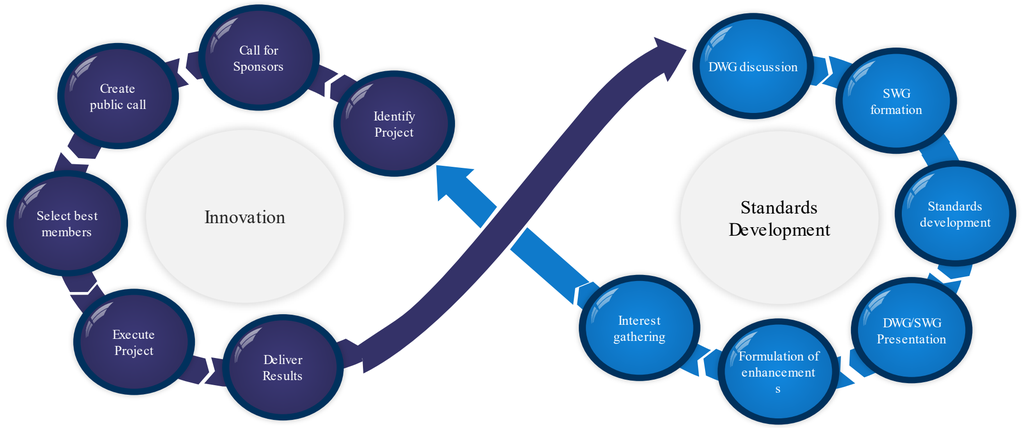
Open Geospatial Consortium

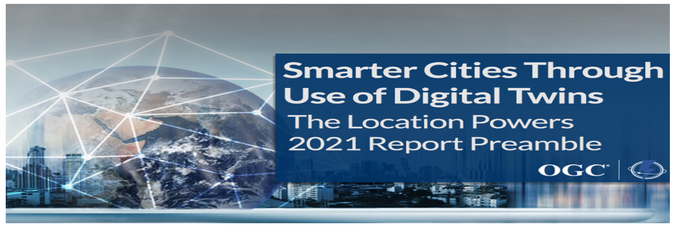
We need standards on many fronts

https://www.ogc.org/standards

Open Geospatial Consortium

We need to collaborate on experimentation



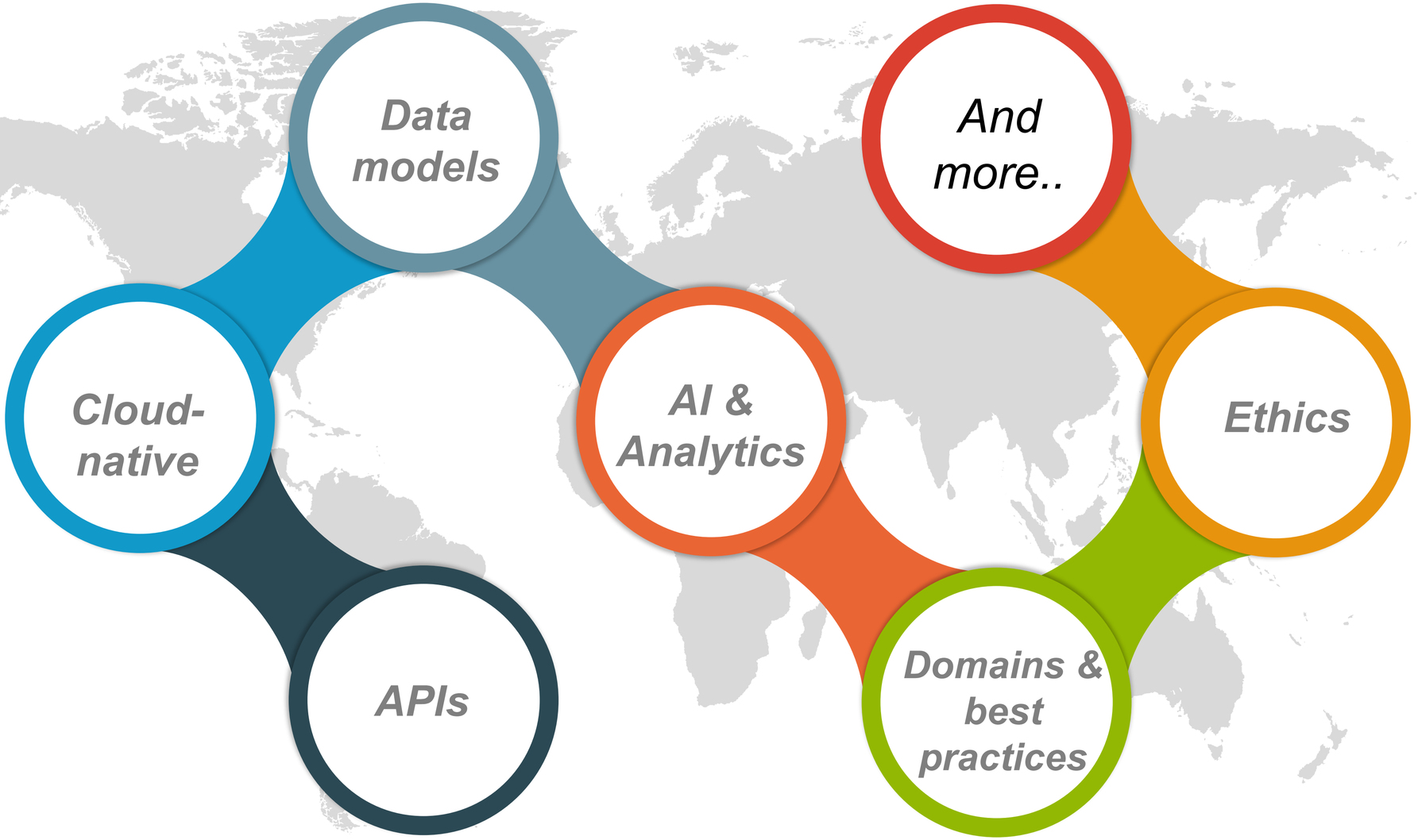


https://www.ogc.org/projects/initiatives/active

Open Geospatial Consortium

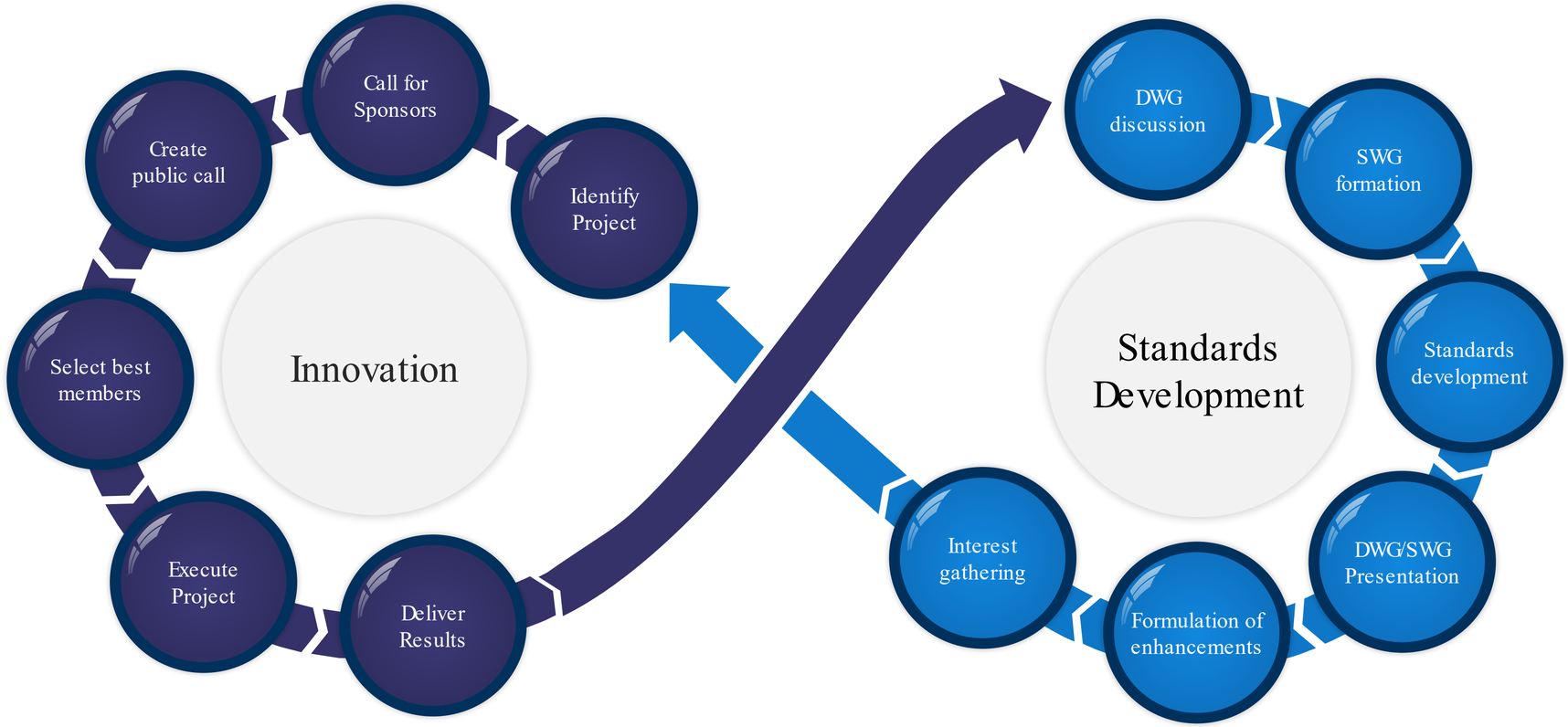
There’s such opportunity to do good with geodata

We have much work ahead of us



Open Geospatial Consortium

How can you engage?



- **Participate an Innovation Initiative**
  - Testbed 18
  - Integrated Digital Built Environment Pilot
  - Climate Change Pilot
  - Disasters and Health Spatial Data Infrastructure
- **Drive standards development and adoption**
  - OGC APIs – geospatial for everyone
  - Models (underground, city, indoor, etc) – powering smart cities & the metaverse
  - Space standards – from tasking to data cubes to analysis to trusted AI and decision-ready information

Open Geospatial Consortium

GOAL – Common Architecture

EOEPCA

EARTH OBSERVATION EXPOITATION PLATFORMS

COMMON ARCHITECTURE

The goal of the Common Architecture is to define and agree a **re-usable exploitation platform architecture** by identifying a set of common building blocks that provide their services through open interfaces

To encourage federation of EPs through an open consensus-based architecture for EPs in the Network of Resources

To provide an **open-source Reference Implementation** of the architecture

COG/Zarr activity in Testbed 17

D046
CREAF

D047
Latitudo40

COG SPECIFICATION ER

COG/ZARR EVALUATION ER

COG

ZARR

D180
Geomatys &
Spatialys

D181
Spatialys &
Terradue

Implementations

COG/Zarr	D046 COG Specification ER	CREAF
COG/Zarr	D047 COG/ZARR Evaluation ER	Latitudo40
COG/Zarr	D180 COG Implementation	Geomatys
COG/Zarr	*D180 COG Implementation	Spatialys
COG/Zarr	D181 Zarr Implementation	Spatialys
COG/Zarr	*D181 Zarr Implementation	Terradue

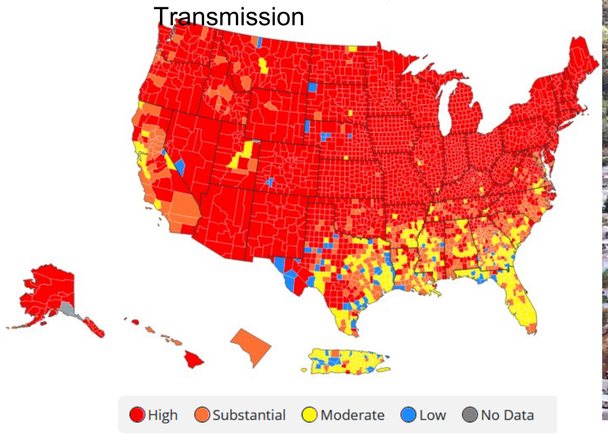
OGC Disaster Pilot 2021

- Goal: Develop standards-based services to support rapid decision making through the full life-cycle of disaster management for multiple hazards
- Capabilities and practices being advanced:
  - ***Rapidly integrate, process and transform*** EO and other data streams for rapid application in DRR
  - ***Analysis Ready Data (ARD) and Decision Ready Information (DRI) services*** – integrating space-based and local data on demand, providing targeted information products for responders
    - Open API's - Optimized Cloud Services
    - Connected and Offline mobile apps
  - ***Optimized web search for disasters*** – connecting local geography with current observations, conditions and predictions

Source: Ministerio de Defensa del Perú/Flickr

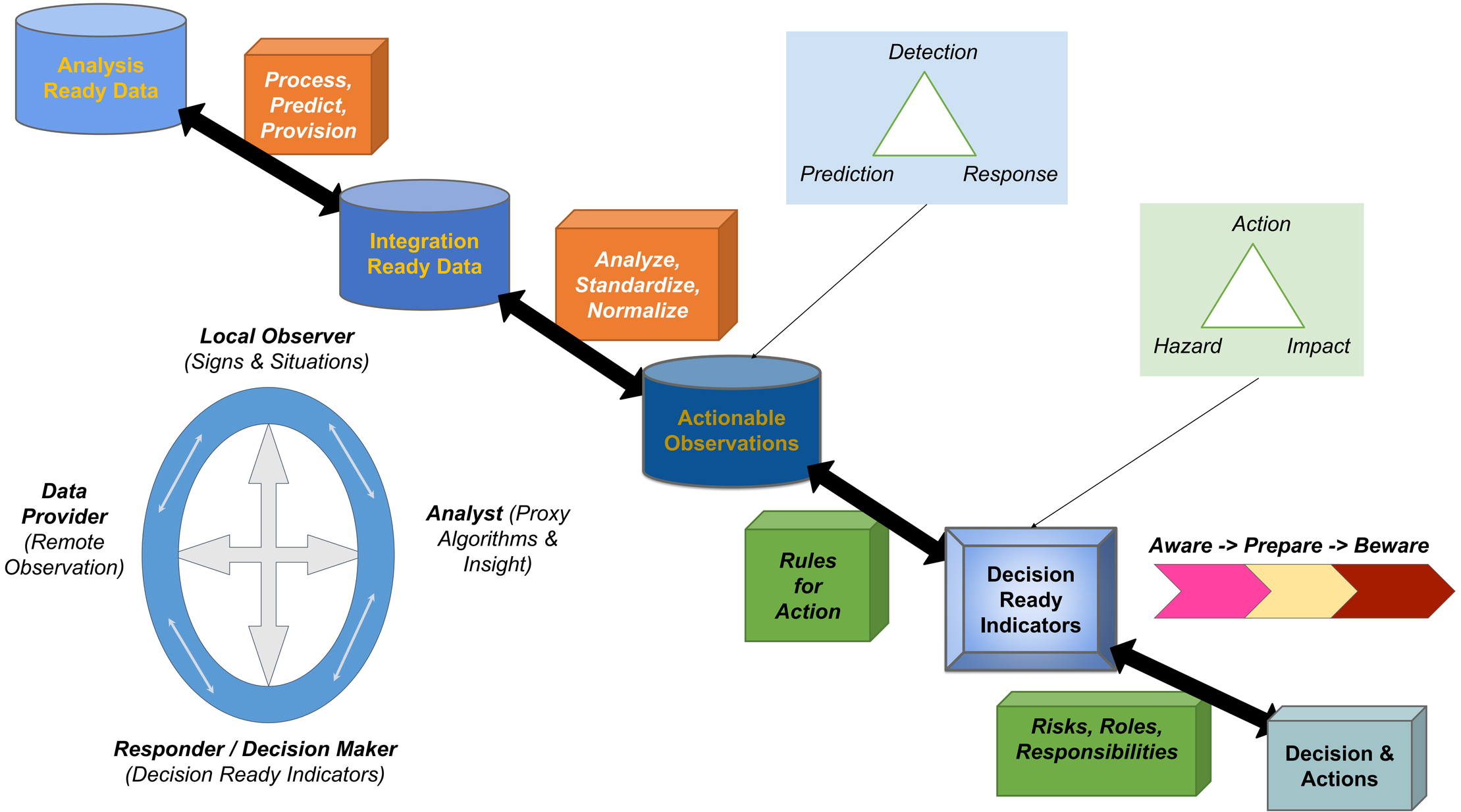
Source: Wikimedia

COVID19 Community Transmission

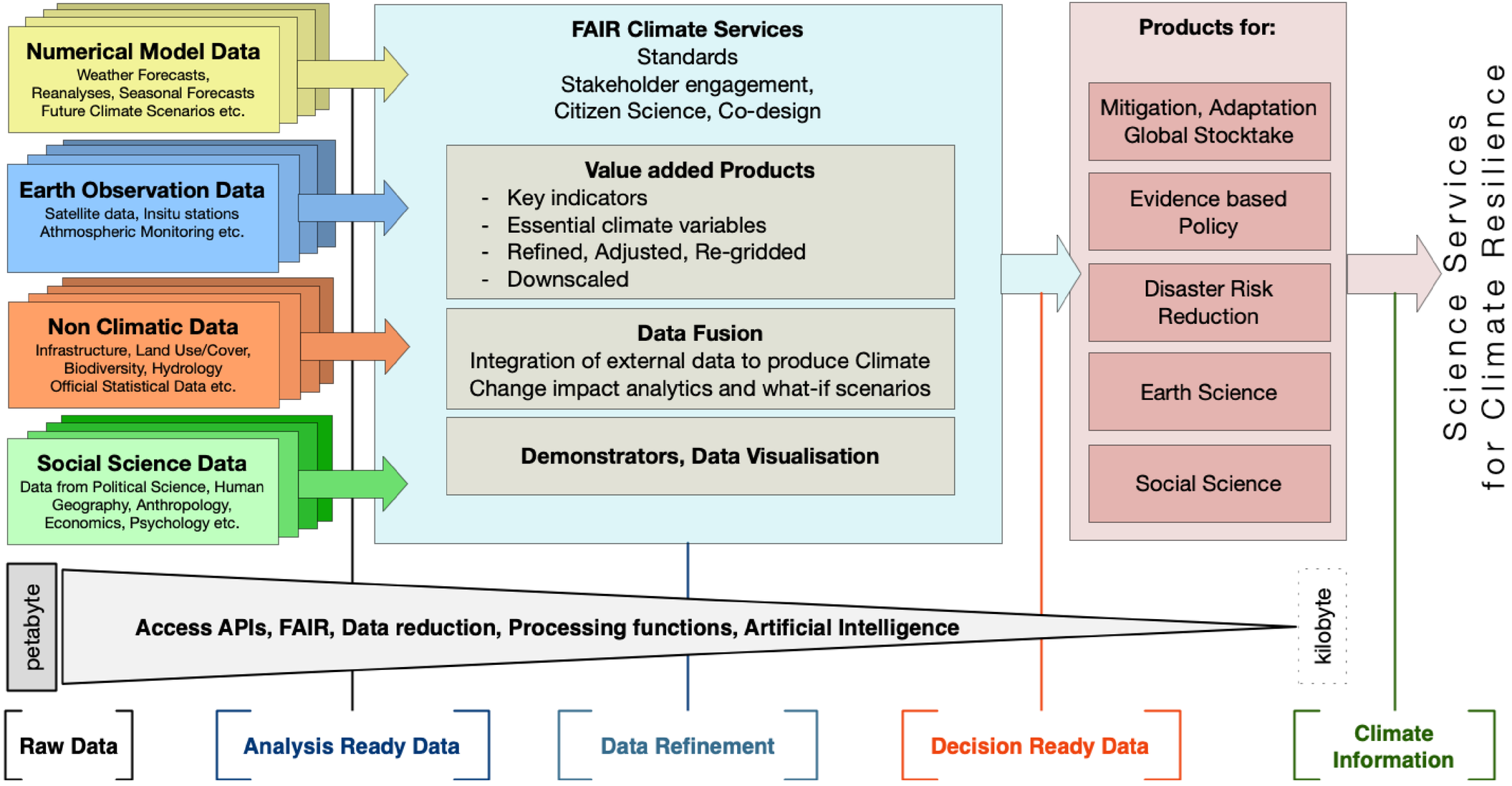


Open Geospatial Consortium

Data -> Action Value Chain



Climate Change Services Initiative 2022-26



Open Geospatial Consortium

Methane detection requires multiple sensors

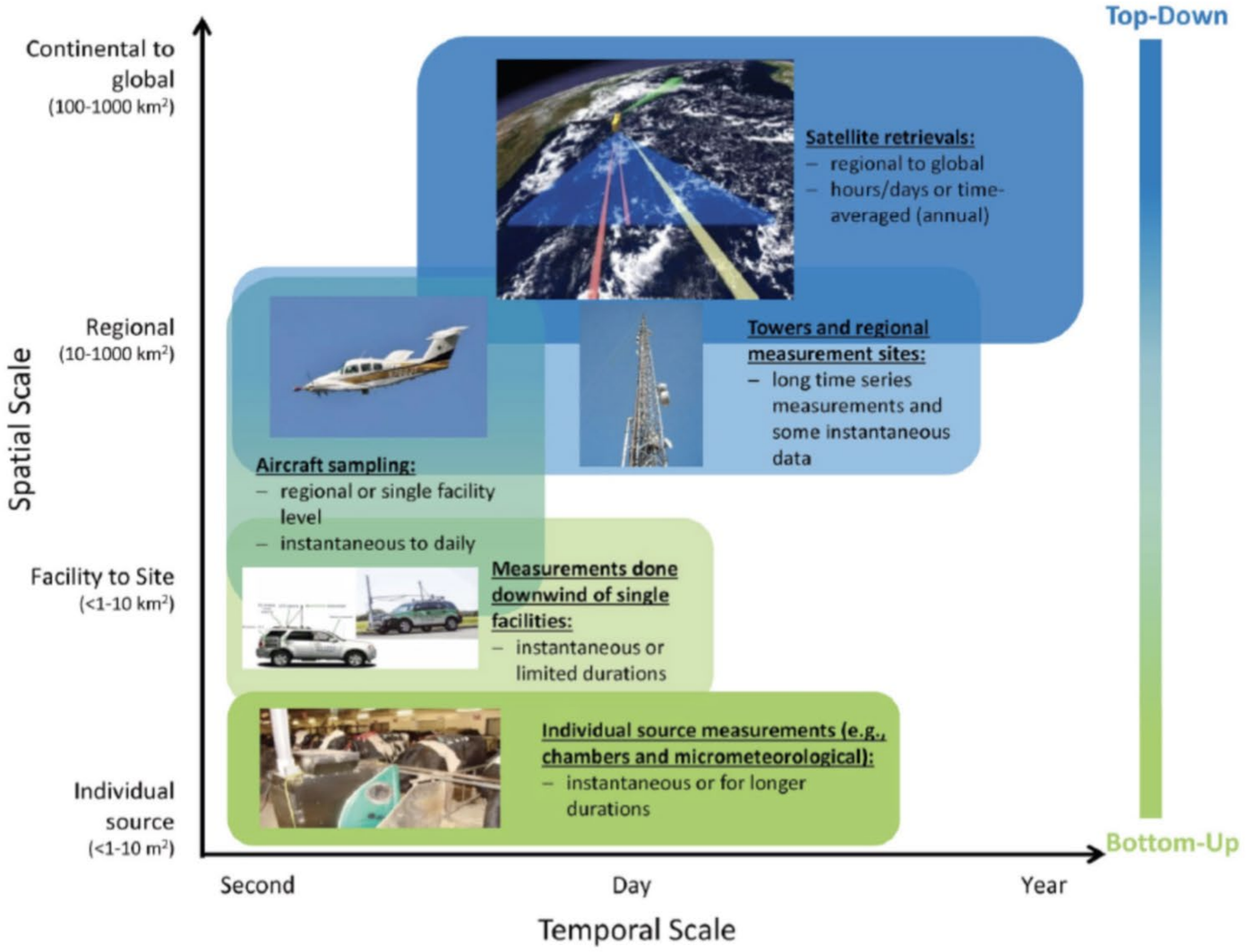


Figure 1. Examples of methane measurement platforms operating across a variety of spatial and temporal scales. (National Academies of Sciences, Engineering, and Medicine. 2018)

Sensor Integration Task in Testbed 17

D030
Botts Innovative

D031
Botts Innovative &
University of Calgary

D032
Botts Innovative &
University of Calgary

SENSOR INTEGRATION FRAMEWORK ASSESSMENT ER

SIF SEMANTIC MODEL ER

MASBUS INTEGRATION ER

MASBUS CLIENT

MASBUS SENSOR THINGS SERVER (MQTT)

D155
University of Calgary

D153
Botts Innovative Research

Sensor Integration: Problem Statement

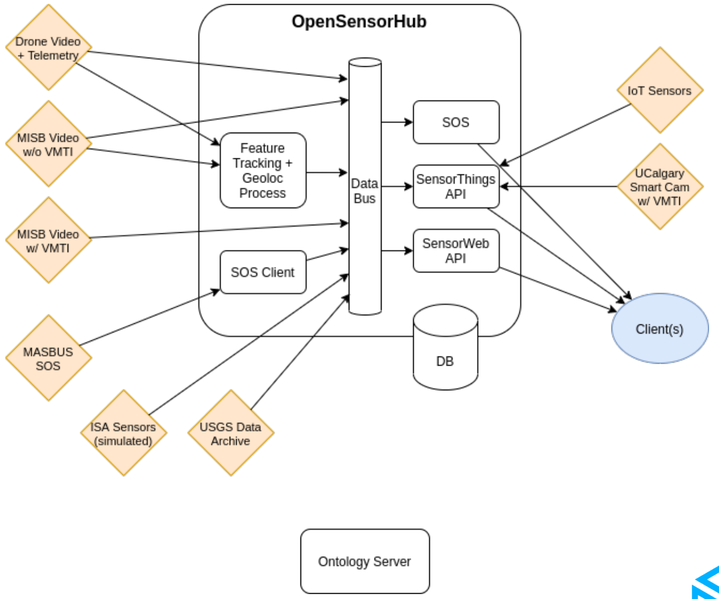
Sensor systems are built using many different standards, formats, and protocols. Sensors must be deployed where they best measure some phenomenon which imposes a constraint on their size, weight, power, and communication capabilities.

This presents a significant barrier to integrating the sensor data and developing structures around a system of sensors. In turn the interpretation and analysis of sensor data is cumbersome.

The testbed is intended to evaluate previous works in this area and propose a standards-based solution or framework to begin structuring a system of sensors.

Sensor Integration: Findings

- Sensor Observation Service (SOS) is not well equipped for discovery if a large number of offerings are provided.
- Transforming/connecting one ontology to another is even more difficult than initially anticipated. Comparing ontologies would become easier if their semantic models contained different abstraction levels of knowledge to determine equivalence and variance.

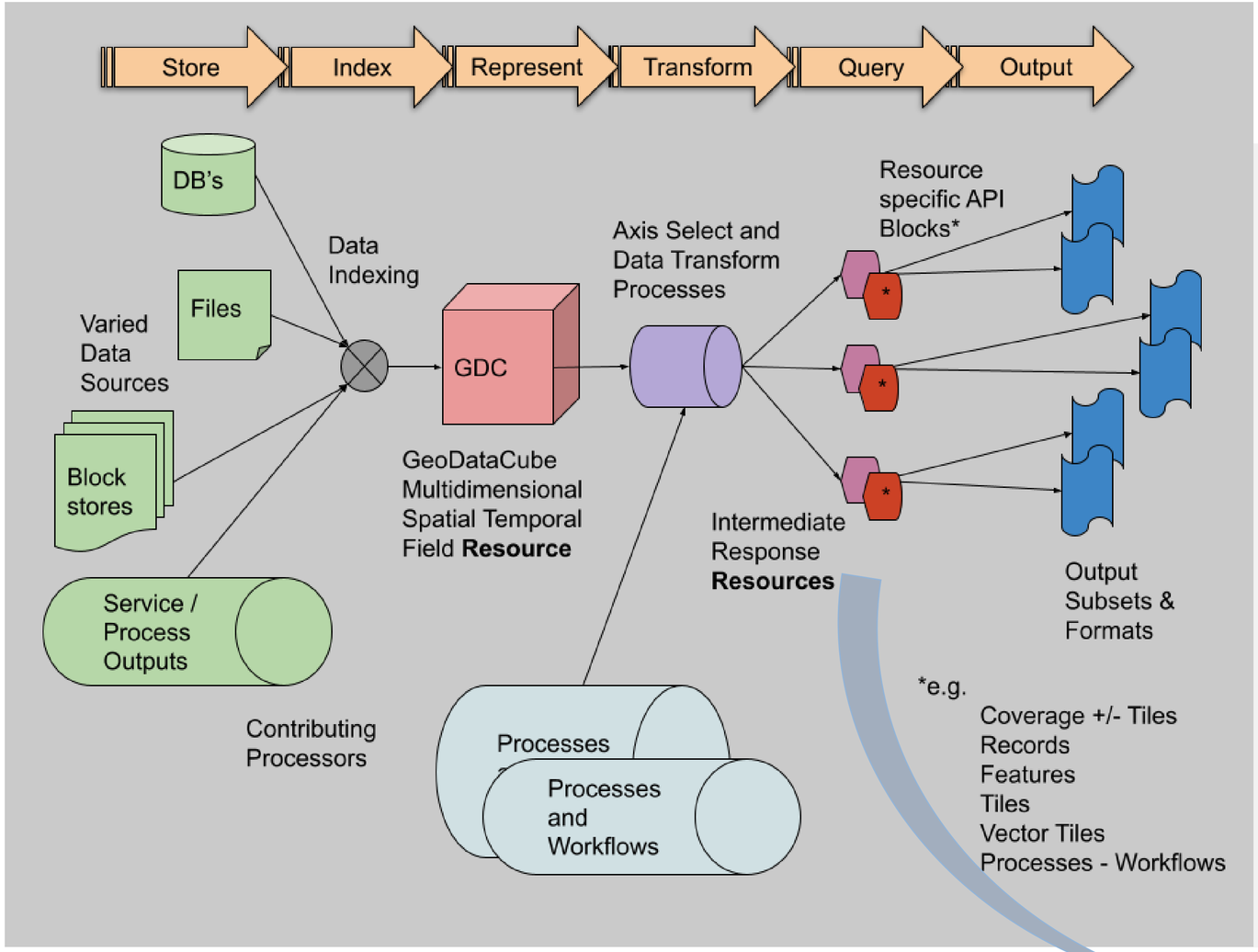


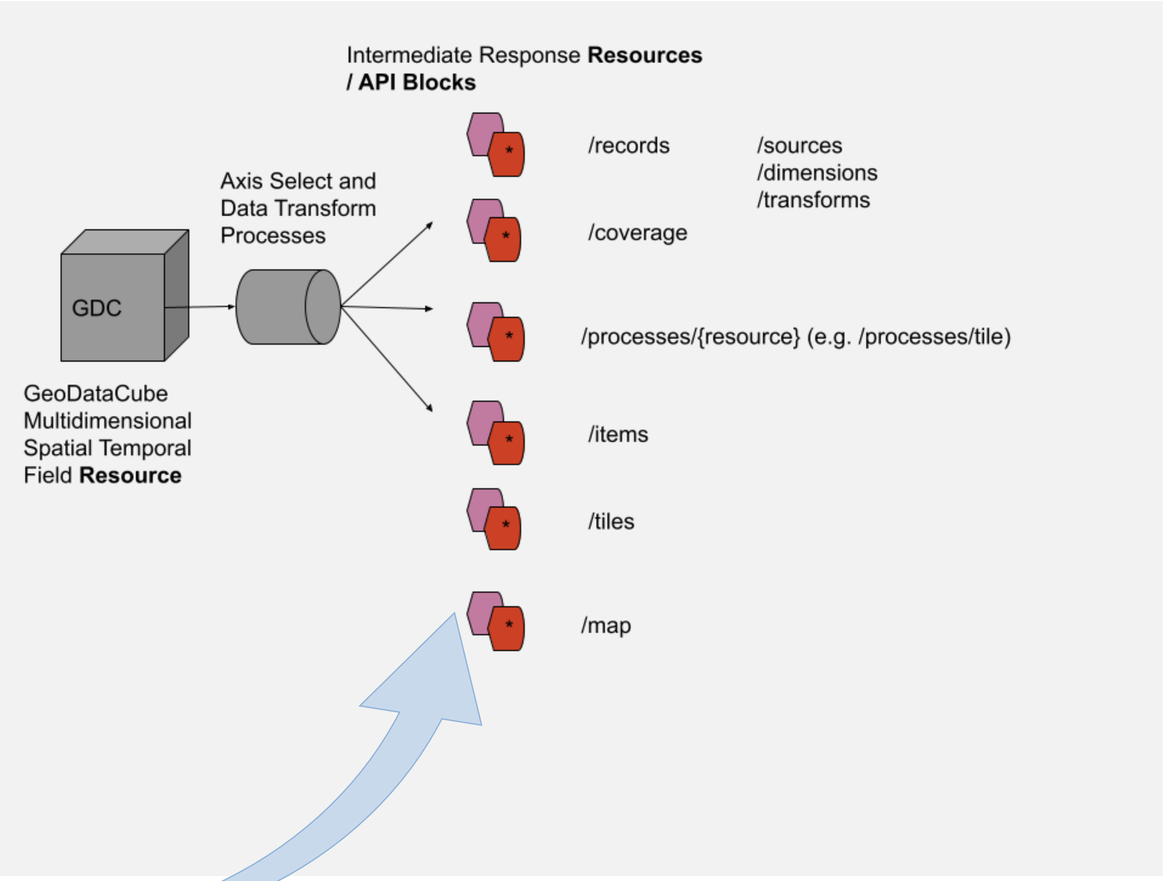
Geospatial Data Cubes

Open Geospatial Consortium

- How do we organize trillions of Earth Observations into a comprehensive – and comprehensible multidimensional resource?
- The answer may be a Geo Data Cube, but what is that exactly: data storage format, index, spatiotemporal field?
- What should a Geo Data Cube API look like that provides access to a Geo Data Cube?
- Should a GDC API be just a combination of other API's (Coverages, Processes, Features, EDR, Records) or something new and different?

Emerging consensus that GDC is a framework of resource and workflow concepts for providing these capabilities:





Geospatial Data Cubes

Open Geospatial Consortium


FINDING YOUR WAY AROUND THE METAVERSE
9TH DECEMBER, 2021 | 12:30 PST
@ THE 121ST OGC MEMBER MEETING
Open Geospatial Consortium

What is OGC?

A hub for thought leadership, innovation, and standards for all things related to location

Our Vision

Building the future of location with community and technology for the good of society

Our Mission

Make location information Findable, Accessible, Interoperable, and Reusable (FAIR)

Our Approach

A proven collaborative and agile process combining consensus-based standards, innovation project, and partnership building

Thank You

Community

500+ International Members
110+ Member Meetings
60+ Alliance and Liaison partners
50+ Standards Working Groups
45+ Domain Working Groups
25+ Years of Not for Profit Work
10+ Regional and Country Forums

Innovation

120+ Innovation Initiatives
380+ Technical reports
Quarterly Tech Trends monitoring

Standards

65+ Adopted Standards
300+ products with 1000+ certified implementations
1,700,000+ Operational Data Sets
Using OGC Standards

Dr. Nadine Alameh
nalameh@ogc.org
Twitter: @nadinesa

Sign up for OGC News
https://www.ogc.org/pressroom