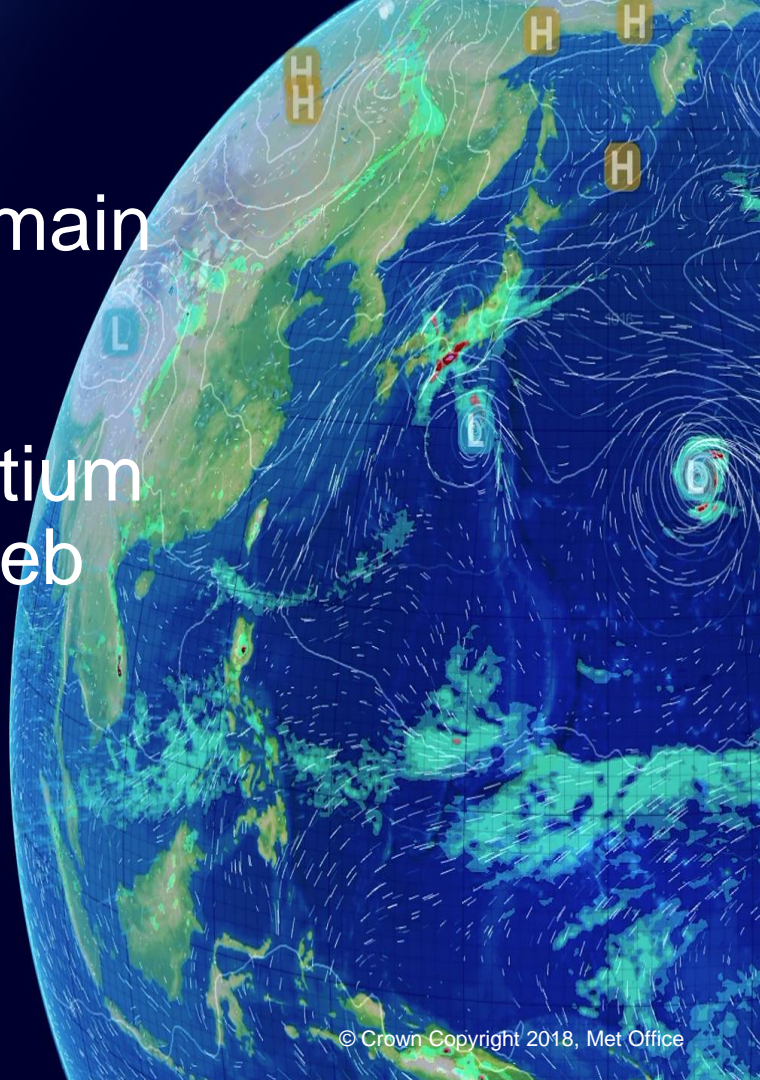# Meteorology & Oceanography Domain Working Group Activities in Open Geospatial Consortium and World Wide Web Consortium

Chris Little, Met Office
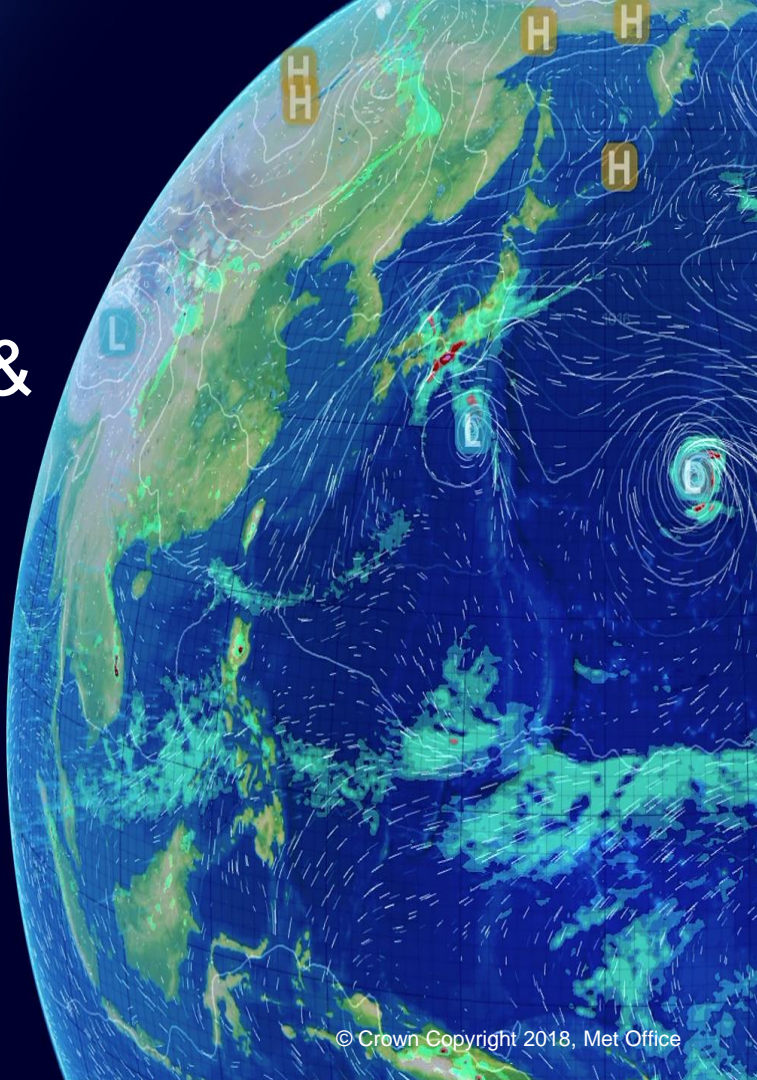   IT Fellow
   OGC Architecture Board

ECMWF Reading, 2018-10-16

# Met Ocean DWG Activities in OGC & W3C

Chris Little, Met Office
  IT Fellow
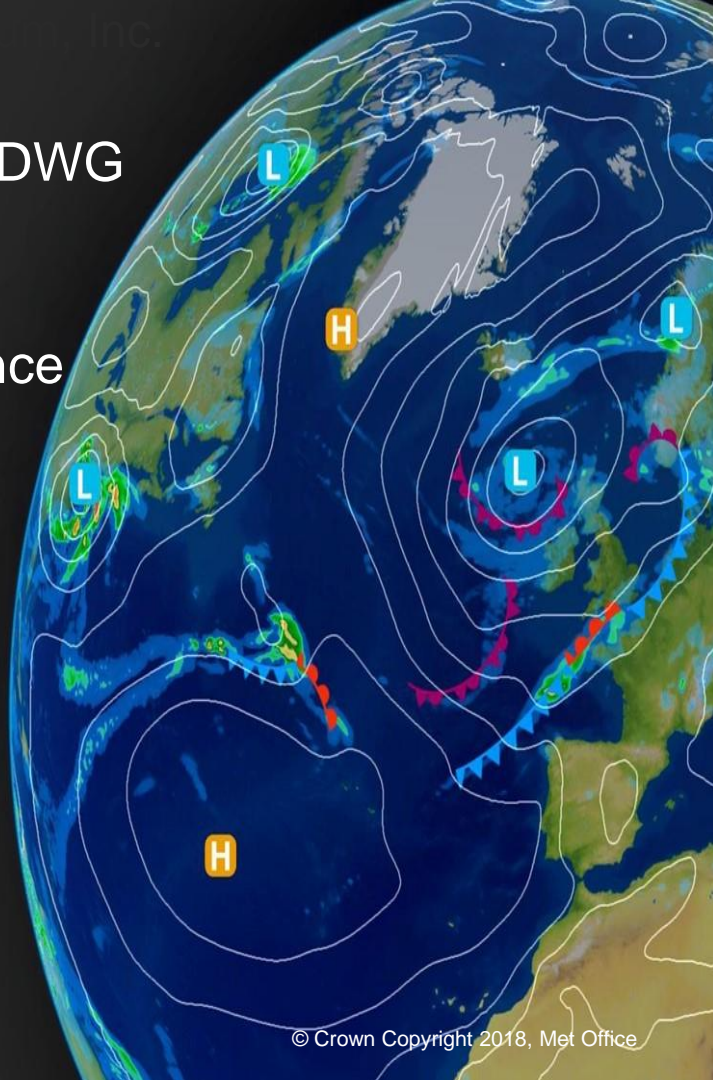  OGC Architecture Board

ECMWF Reading, 2018-10-16

# Met Office

Chris Little, Chair Met Ocean DWG

Co-chairs:

Frédéric Guillaud, Météo-France

Steve Olson, US NWS

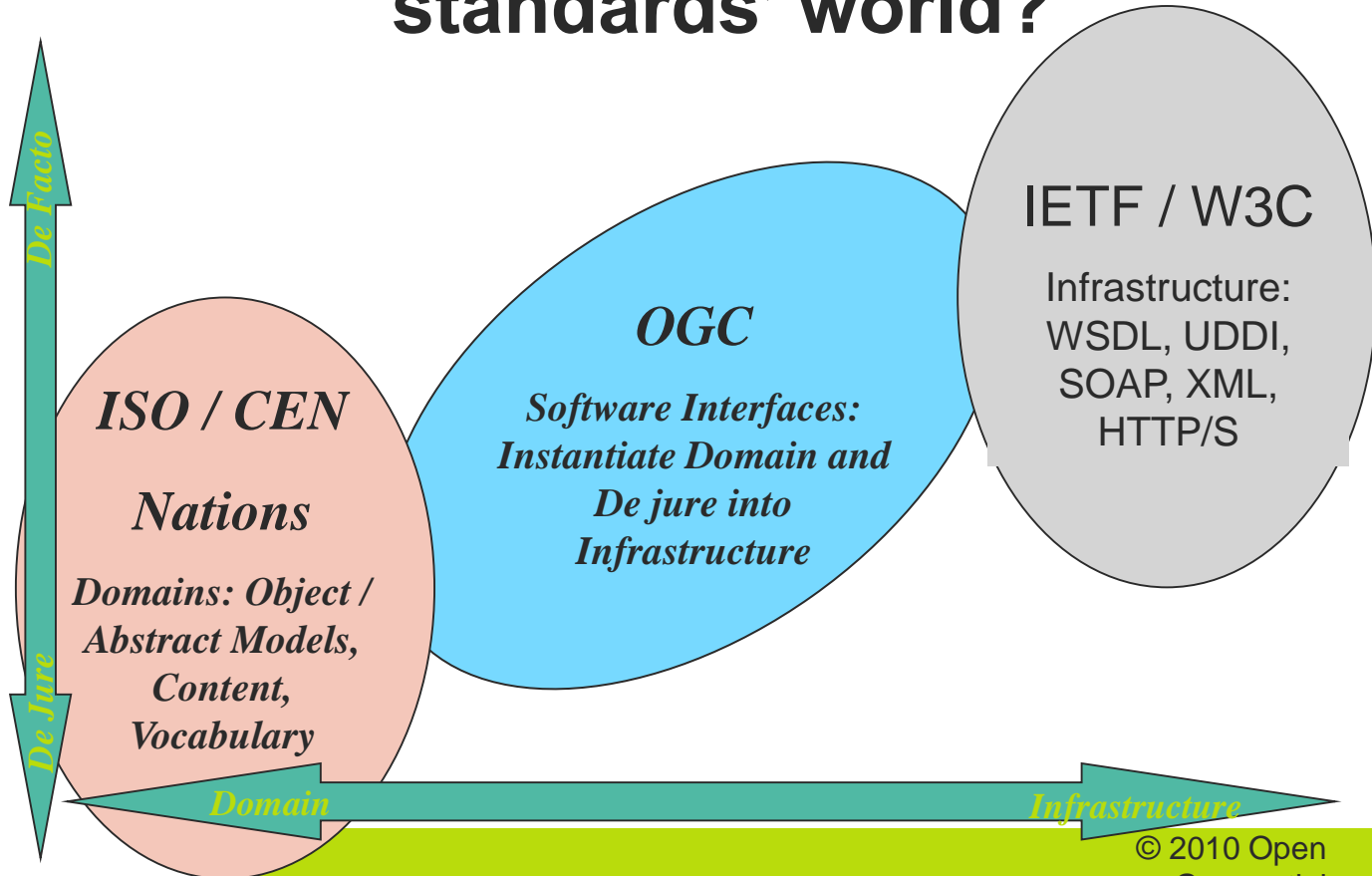# Introduction

**⩘ Met Office**

- OGC Overview

- Other Standards organisations

- Met Ocean Domain WG

- Work done

- Issues

- Current activities, including W3C, ISO

- Questions & Answers

# OGC Overview

- International, non-profit, consortium, established 1994
- Develop publicly available interface standards for geospatial data and services
- **>525** companies, govt. agencies, universities, individuals
- Voluntary consensus processes:
  - Specify
  - Implement
  - Interoperability Experiments
  - Change standards/implementations
  - Repeat
- "The only game in town" for geospatial standards
- Several standards adopted by ISO, WMO and W3C
- Standards specified by Governments (e.g. INSPIRE)
- Significant Open Source community support

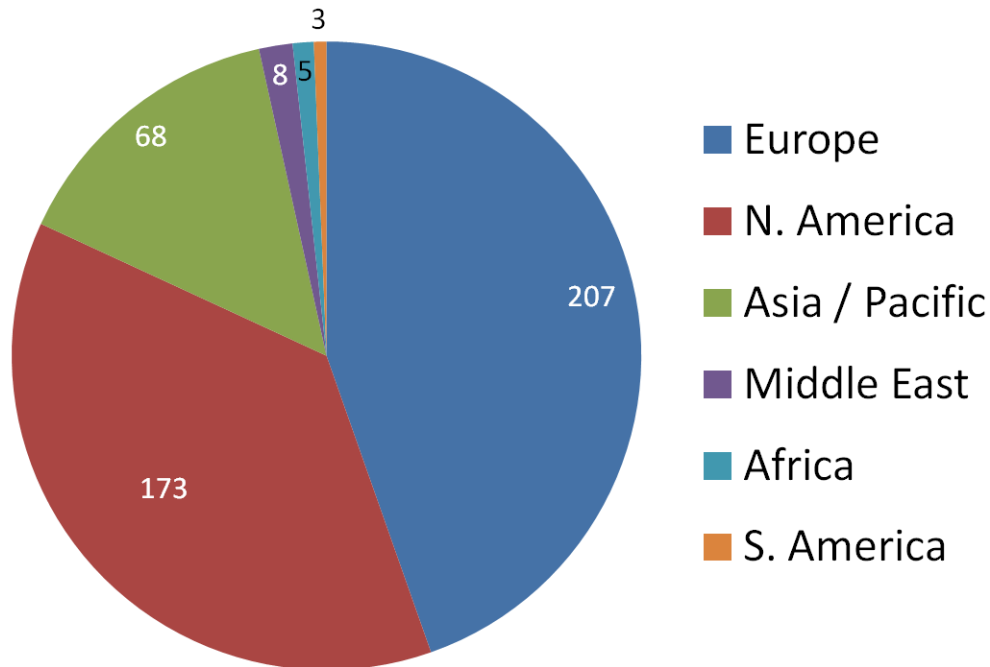# ⚋ Met Office   Other Standard Organisations

- WMO
- ICAO
- ISO
- ITU
- UNESCO/IOC
- IHO
- IMO
- …
- IETF (Internet Engineering Task Force)
- IANA (Internet Assigned Name Authority)
- IEEE (Institute of Electrical and Electronic Engineers)
- …
- W3C (World Wide Web Consortium )
- OASIS (Organization for the Advancement of Structured Information Standards)
- OMG (Object Management Group)
- …

**Met Office**

# Where does OGC fit in the 'standards' world?

*De Facto*

*De Jure*

**ISO / CEN**

**Nations**

*Domains: Object / Abstract Models, Content, Vocabulary*

*OGC*

*Software Interfaces: Instantiate Domain and De jure into Infrastructure*

IETF / W3C

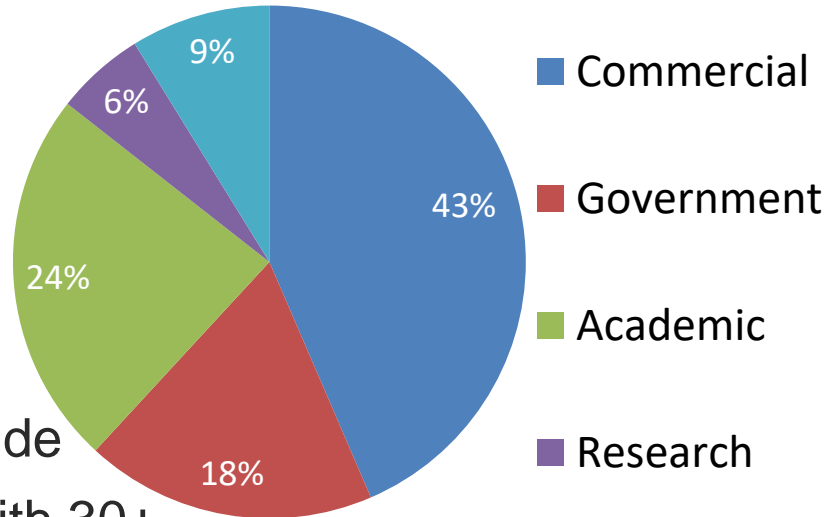Infrastructure: WSDL, UDDI, SOAP, XML, HTTP/S

*Domain*

*Infrastructure*

# OGC: Who and What?

⣿ Met Office

- Funded by members
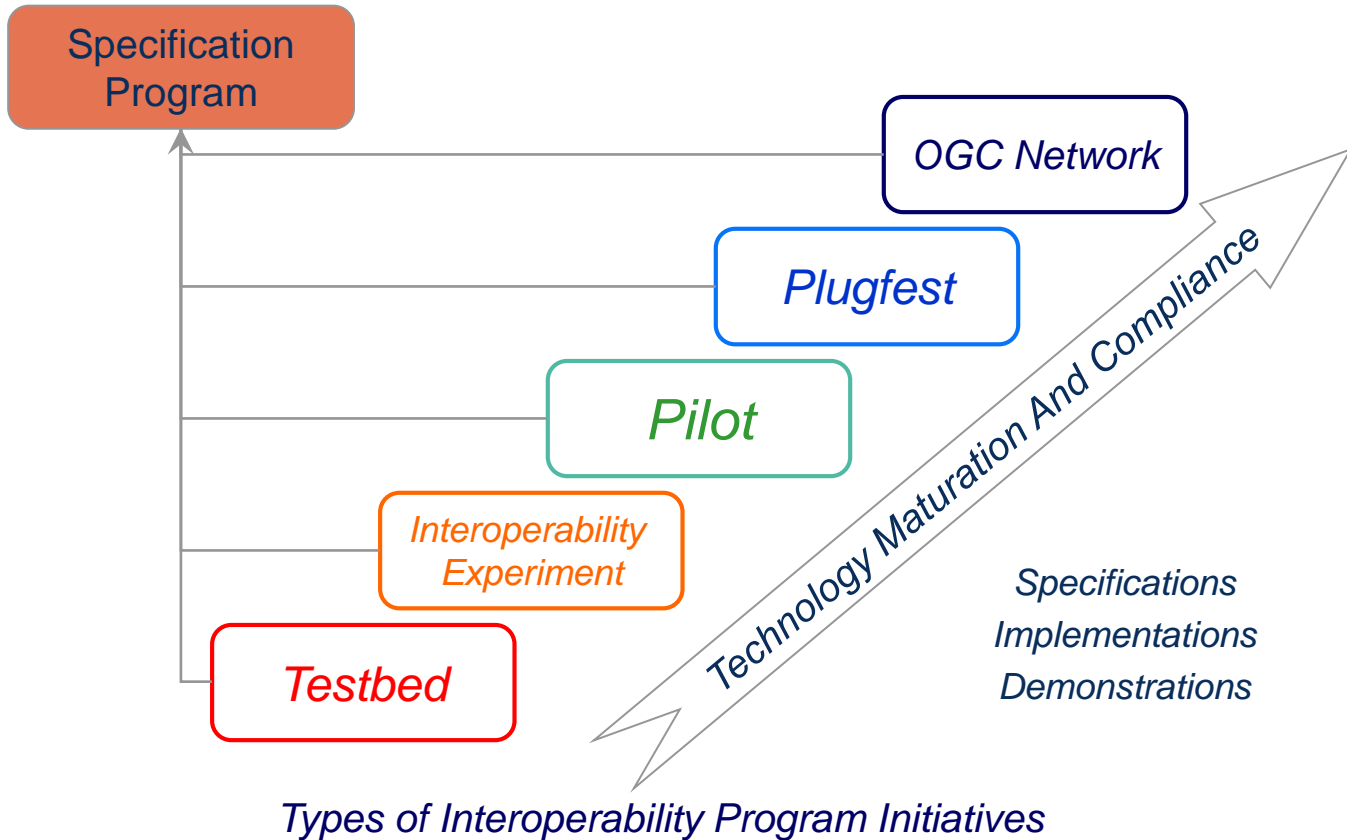- 38 adopted standards
- [Freely available](#)
- Hundreds of product implementations
- Broad user community implementation worldwide
- Alliance partnerships with 30+ standards & professional orgs
- Some standards fast tracked in ISO
- Community standards adopted: e.g. KML, GeoTIFF, LAS

**OGC Membership Distribution**



- 43% Commercial
- 18% Government
- 24% Academic
- 6% Research
- 9%

Met Office — OGC Interoperability Program

Specification Program

OGC Network

Plugfest

Pilot

Interoperability Experiment

Testbed

Technology Maturation And Compliance

Specifications
Implementations
Demonstrations

*Types of Interoperability Program Initiatives*

# OGC Specifications - How?

**≋Met Office**

- Voluntary consensus processes:
  - Specify
  - Implement
  - Interoperability Experiments
  - Change standards/implementations
  - Repeat
- Technical & Planning committees every 3 months
- Standard Working Groups
  - Project orientated, 'vertical'
  - Create one standard
  - Change one standard
- Domain Working Groups
  - Programme orientated 'horizontal'
  - Communities of interest
  - Raise requirements for SWGs

# Met Ocean Domain WG

- Regular ECWMF Operations Workshop 2007: recommended workshop/conference on GIS

- 2008: Workshop on Use of GIS/OGC Standards in Met:
  - Review use of OGC (Open Geospatial Consortium) standards in geo-sciences in Europe & worldwide
  - Promote collaboration between meteorological services in order to define a set of common standards that will enhance interoperability
  - Recommended OGC involvement and establish Met DWG
  - Established major theme: **Web Map Services interoperability for NHMSs**

# Met Ocean Domain WG

**Met Office**

- 2007-2008 Météo-France, Met Office join OGC

- 2009 Meteorology & Hydrology DWGs established

-   Meteo DWG converts to Met & Ocean DWG

-   OGC and WMO signed MoU (Met, Ocean, Hydro)

    Short legal doc, flexible Annex, lightweight – let experts get on with work

-   2nd Workshop on Use of GIS/OGC Standards in Meteorology

    Established second major work theme: **Conceptual modelling**

- 2010 3rd Workshop on Use of GIS/OGC Standards in Meteorology

    Re-established Interoperability Experiments, **SLD/SE styling** work started

- 2013 4th Workshop on Use of GIS/OGC Standards in Meteorology

    Continued WMS, Conceptual Modelling, SLD/SE work

    **Temporal DWG started**: leap seconds, Gregorian calendar

    **WCS Extensions:** Met profile, 4D+ not 2D+layers, ensembles, corridors, GRIB2

- WMSv1.3 Best Practice for Time and Elevation
- WMSv1.3 Best Practice for Ensembles of Forecasts
- O&M Conceptual Model IWXXM (ICAO & WMO)
- WMO and ICAO weather symbols in SVG on GitHub
- WCS2.1 Extensions:
  - Met Ocean Profile
  - Corridors
  - Polygons
  - NetCDF and GRIB2 payload encodings
- TimeseriesML1.0 (derived from Hydrology Timeseries)

# W3C/OGC work done

Joint Spatial Data on the Web WG established/disbanded

- SDW Best Practice – candidate Recommendation
- (SDW Use Cases and Requirements – Tech Note)
- (Data on the Web BP – Recommendation)
- OWL-Time ontology – Recommendation
- Semantic Sensor Network ontology – Recommendation
- Publishing & using EO Data with RDF DataCube & DGGS (Discrete Global Grid System) – Tech Note
- QB4ST: RDF Data Cube extensions for spatio-temporal components – Tech Note
- Overview of the CoverageJSON format –Tech Note

# Changed OGC world

≋ Met Office

2D vs 4D
- WMS Best Practices built on 'Layers Model'
- Traditional cartographic model of layers broken
- 100 parameters  x  100 times  x  100 levels  x  100 ensembles  x 10 different models = 1billion layers to select from.

Lots of 3+D activity:
- Multi-player Gaming, military & aviation simulation
- Drones & autonomous vehicles: above / on / below surface
- Indoor navigation
- Smart Cities
- Below ground
- Marine, Space, Met Ocean, etc
- None is built on traditional 2D cartography

# Changed W3C world

Big Data (in the Cloud) hard to move, "Move apps to data"

- Cross domain science is where the action is
- Improve Discovery metadata
- But metadata open ended, does not describe how to use data
- Metadata not granular enough (ICSU RDA Research Data Alliance, formed Task Force this month)
- Metadata also in knowledge graphs on the Semantic Web
- Data stays in domain specific binary formats

- Use APIs, REST architecture, OpenAPI framework, registers and registries
- Latest OGC standard WFSv3 uses this pattern
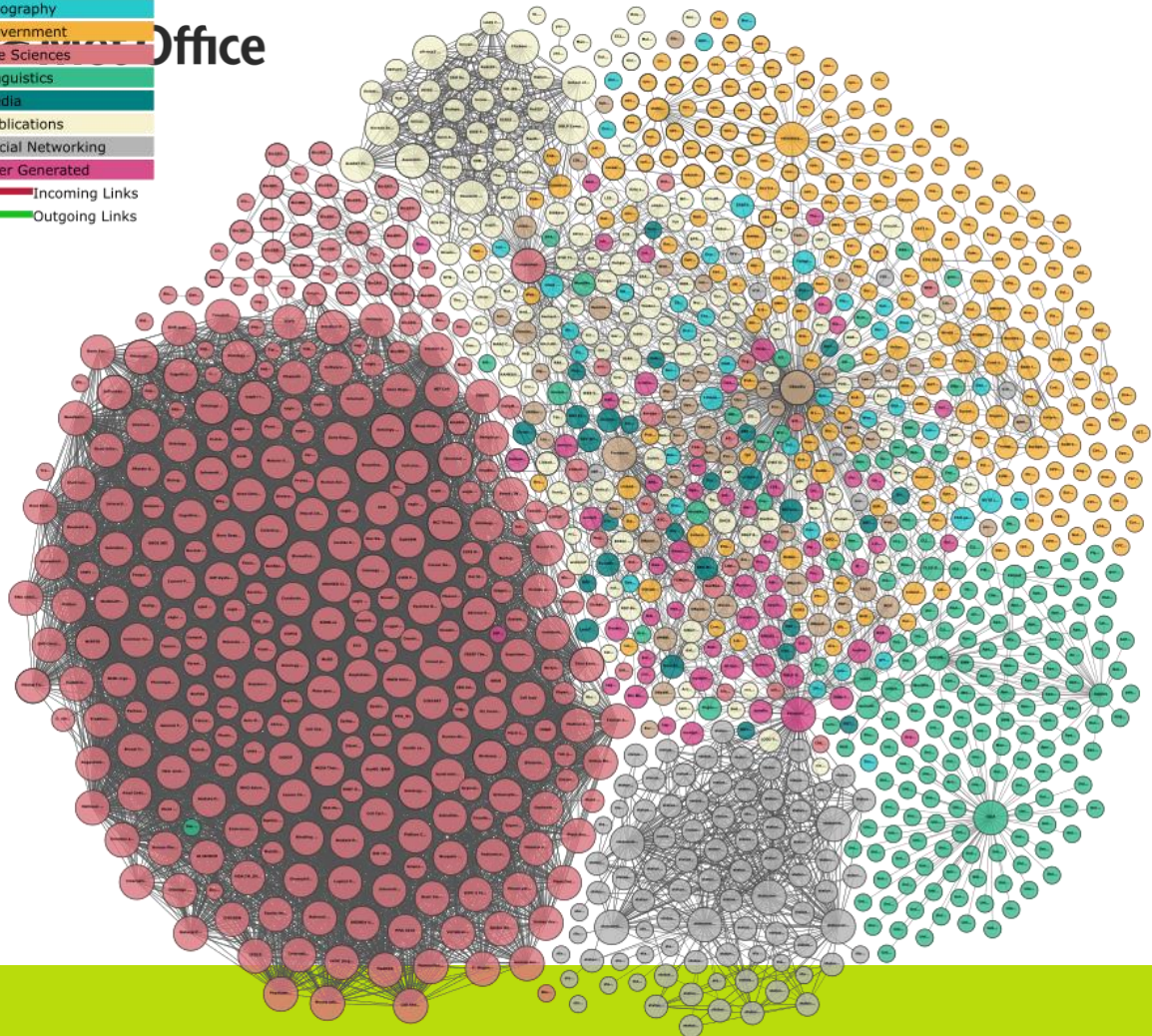
- WCSv2.1 Extensions
  - Met Ocean Profile
  - Corridors
  - Polygons
  - (Tiles)
- TimeseriesMLv1.2: multiple parameters, non-regular time intervals
- Joint OGC / ISO 19111 CRS revision
- How to use Cesium/3D Tiles standard?
- Liaise with W3C/OGC SDW Interest Group (like a Domain WG, raise requirements for standards WGs
- Visualisation Whitepaper: Portrayal should start from 3/4D not 2D
- API Weather on the Web
  - Using OpenAPI
  - Based on WFS3 patterns

# W3C work now

- Spatial Data on the Web WG now formally closed
- Spatial Data on the Web IG now active:
  - Maintain existing DWBP, SDWBP, ontologies
- Incubate and nurture new standardisation activities:
  - GeoWeb roadmap
  - MapML, WebVideoMapTracks, CityJSON, CoverageJSON,
  - Statistical Data on the Web BP
  - Stats language metadata to qualify data
  - Time language metadata – climatological periods, stats
- Using GitHub, projects and process 'Funnel'
- RDA Granularity Task Force

# ≋Met Office Met Ocean DWG Summary

- OGC is more global, rather than American
- has opened up processes to external community groups
  - Twiki, mailing lists
- is updating standards from client/server to RESTful
- Is restructuring standards to a 'Core & Extensions' model
- In middle of '2D+Layers' versus '4D+slice & dice' churn
- Interoperability Experiments & Test Beds still heavyweight, to protect members' IPR - Not an issue for Met Ocean
- Has taken on Met Ocean requirements in key standards, even when Met Ocean people not actively involved

- W3C for scalable, REST pattern, browser-based, cross-domain issues
- More volunteers and experts needed – it's FUN!

# ⣿ Met Office

# Questions? Answers??

'you said there would be biscuits !?'

liz Teele 2011