Open Geospatial Consortium Meteorology and Oceanography Domain Working Group progress report

14th Workshop on Meteorological Operational Systems
ECMWF November 2013

Chris Little, Marie-Françoise Voidrot-Martinez
Co-chairs OGC Met Ocean DWG

Introduction

- OGC Overview
- Other Standards organisations
- OGC Standards
- OGC Strategies
- Met Ocean DWG
- OGC-WMO MoU
- WMO / Met Ocean DWG Interests & Progress
- Questions & Answers

OGC Overview

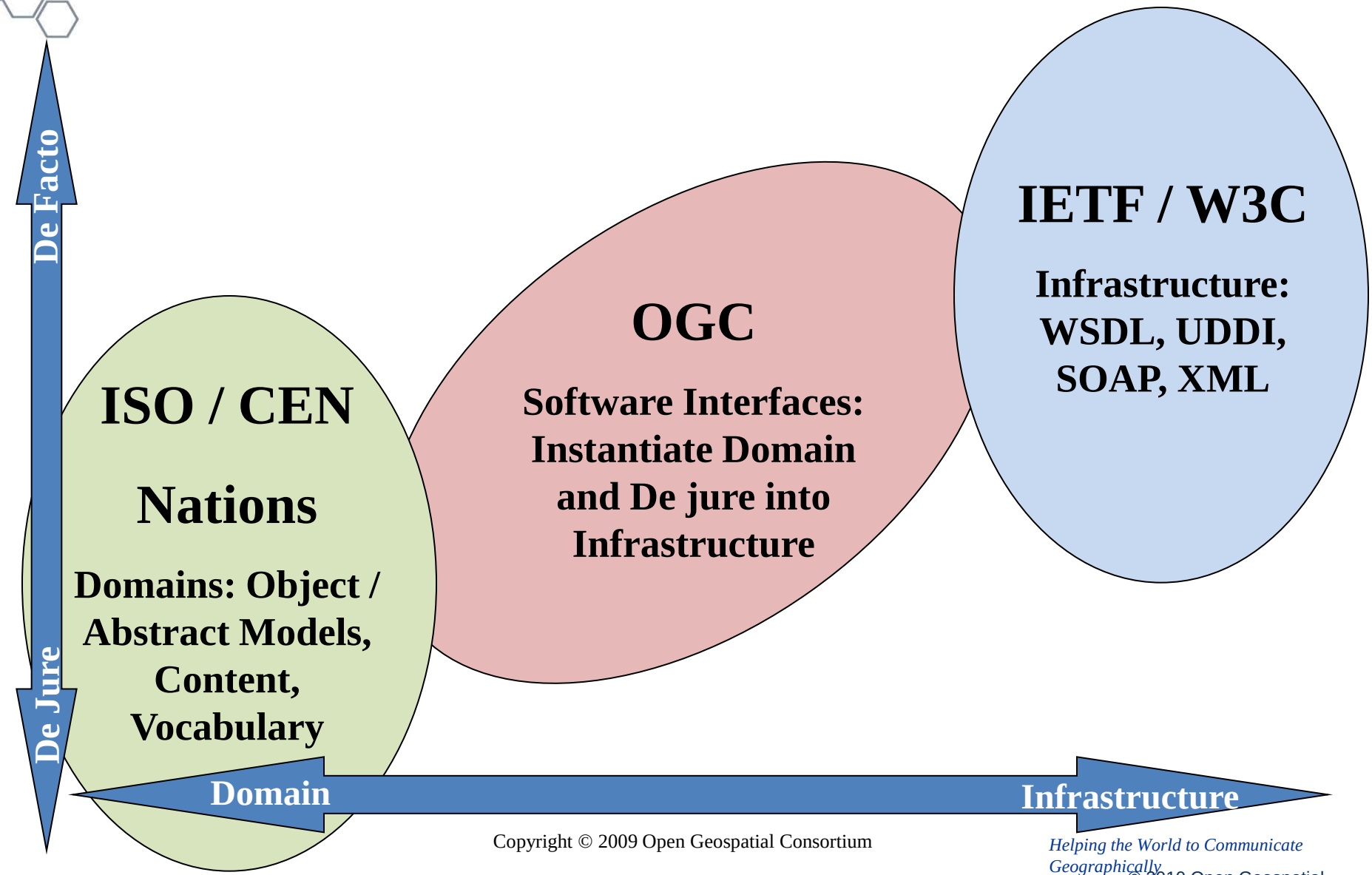
- Voluntary, Consensus, Standards Development Organisation
- International, non-profit, consortium, established 1994
- Develops publicly available interface standards for geospatial data and services
- **482** companies, govt. agencies, universities, individuals
- Voluntary consensus processes:
  - "Any objection to Unanimous Consent?"
  - 1 or 2 NO votes could stop things. Only 79 votes at Tech Committee
- "The only game in town" for geospatial standards
- Several standards adopted by ISO
- Standards specified by Governments (e.g. INSPIRE)
- Significant Open Source community support

OGC®

Other Standards Organisations

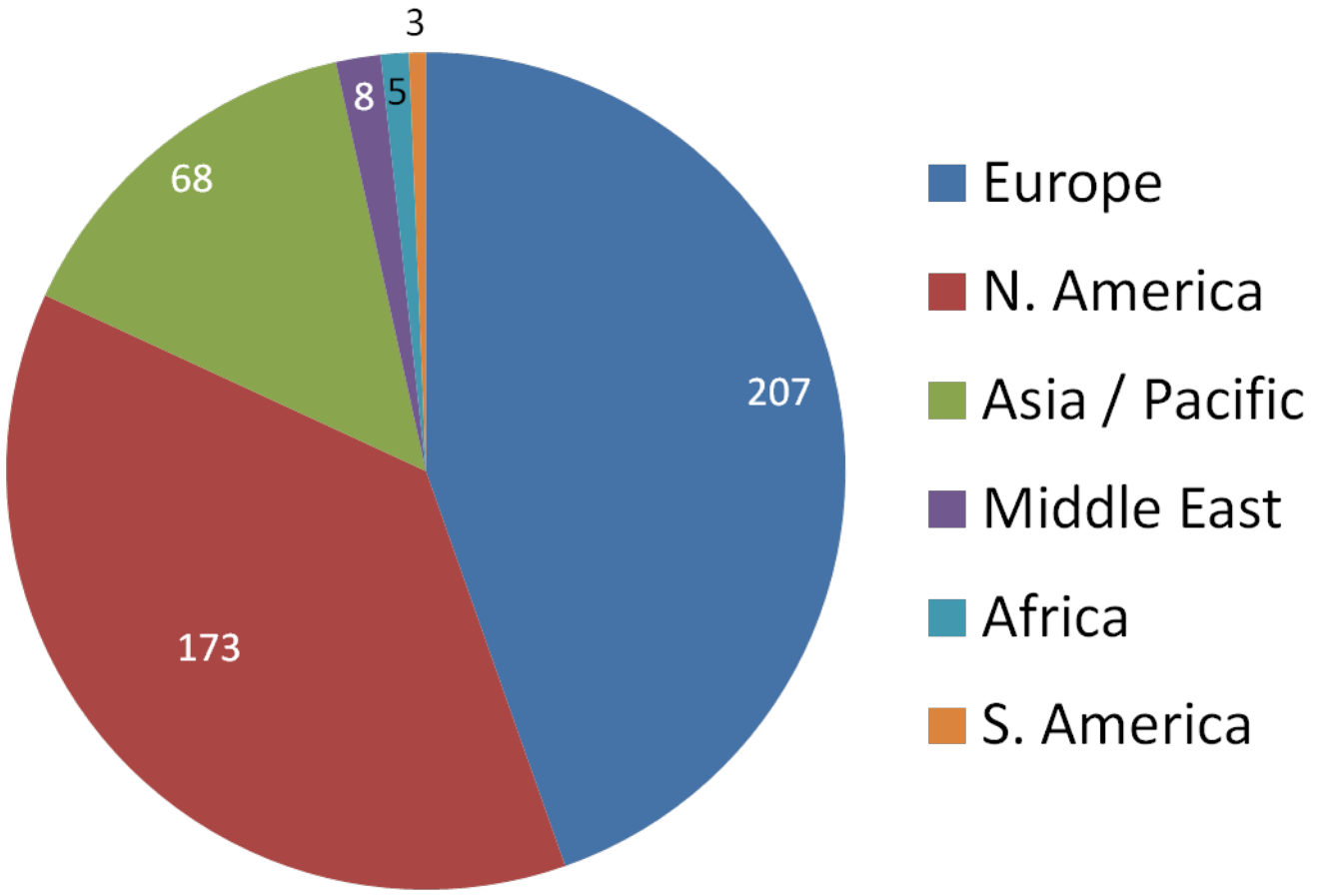
- WMO
- ICAO
- ISO
- ITU
- UNESCO/IOC
- IHO
- IMO
- …
- IETF (Internet Engineering Task Force)
- IANA (Internet Assigned Name Authority)
- IEEE (Institute of Electrical and Electronic Engineers)
- …
- W3C (World Wide Web Consortium)
- OASIS (Organization for the Advancement of Structured Information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

Where does OGC fit in the 'standards' world?



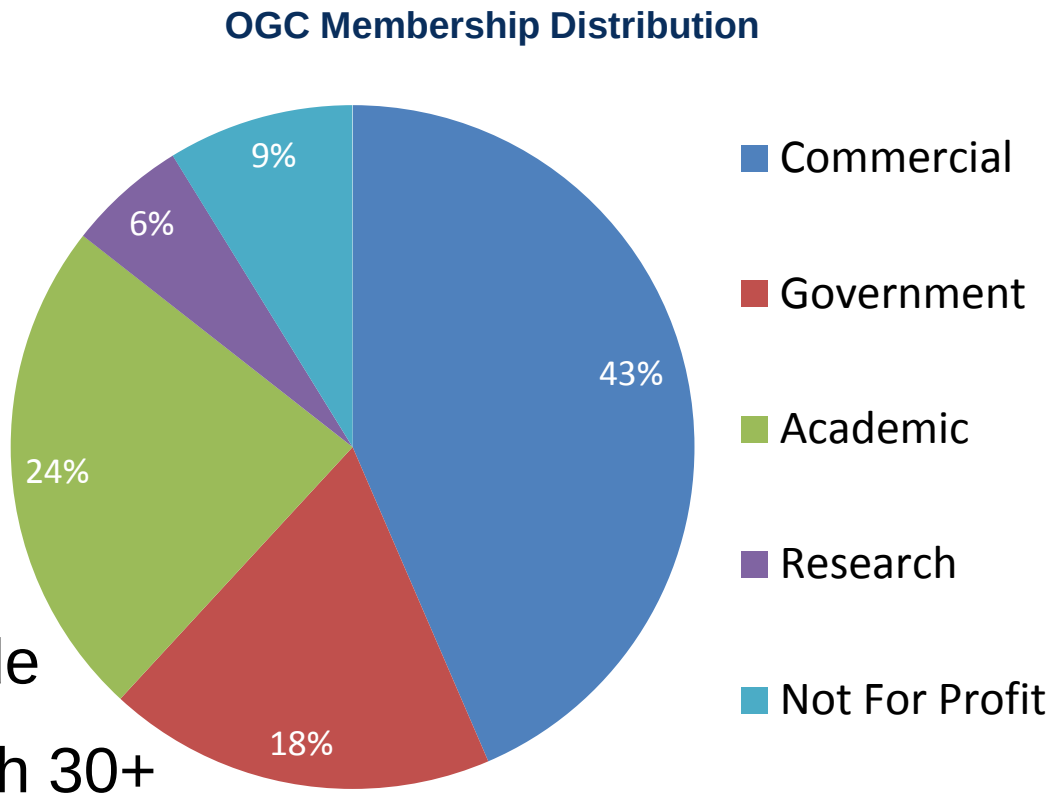
Helping the World to Communicate Geographically

OGC: Membership Distribution



OGC: Who and What?

- 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



OGC®

Helping the World to Communicate Geographically

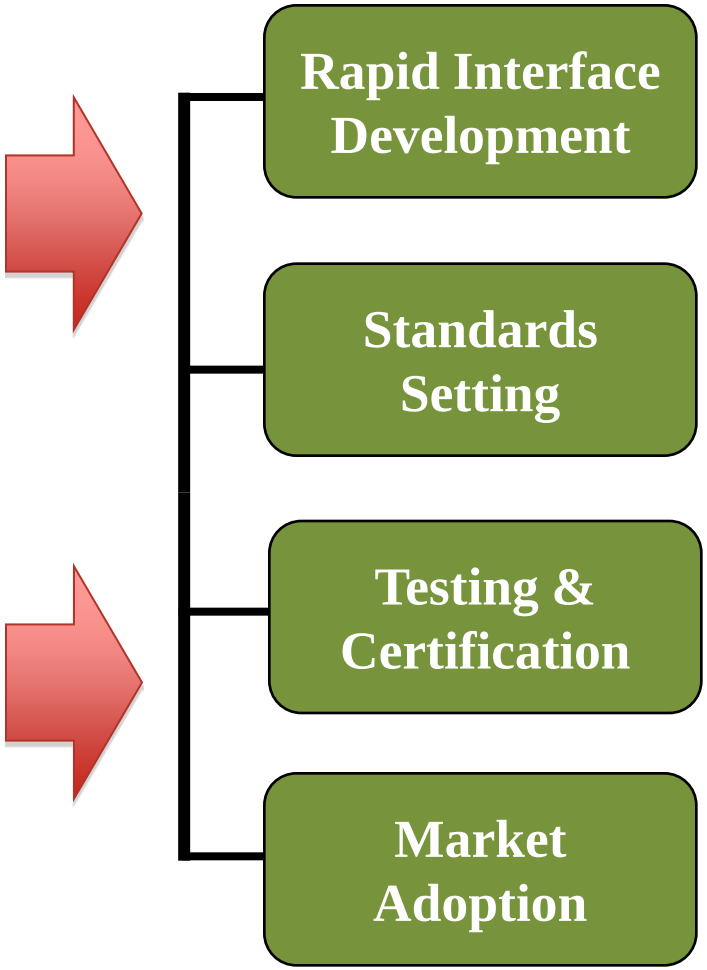
OGC: Where is the money?

	Annual cost	Voting	Conf Places	Other Benefits
Strategic (5)	"Significant resources"	Strategic Advisory Committee	20 free	6 memberships for contracts 40 hours training
Principal (17)	$55K	Planning Committee	4 free	3 memberships for contracts 24 hours training
Technical (74)	$11K	Technical Committee	2 free	
Associate	$4.4K	SWG & DWG	1 free	
Associate <$2m p.a.	$2.2K	SWG & DWG	1 free	
Non Gov Not for Profit	$1.1K	SWG & DWG	1 free	
University	$0.5K	SWG & DWG	1 free	
Provincial Government	$0.5K	SWG & DWG	1 free	
Individuals	$0.5K	SWG & DWG	1 free	
Local Government	$0.2K	SWG & DWG	1 free	

OGC: Approach to Advancing Interoperability

- **Interoperability Program (IP)** - a global, innovative, hands-on rapid prototyping and testing program designed to unite users and industry in accelerating interface development and validation, and the delivery of interoperability to the market
- **Specification Development Program** – Consensus standards process similar to other Industry consortia (World Wide Web Consortium, OMA etc.).
- **Compliance Testing and Certification Program** - allows organizations that implement an OGC standard to test their implementations with the mandatory elements of that standard

- **Marketing and Communications Program** – education and training, encourage take up of OGC specifications, business development, communications programs



OGC®

Helping the World to Communicate Geographically

OGC Public Documents

All at the OGC Portal

- Implementation Standards (50)
- Profiles of Standards (5)
- Abstract Specification and Reference Model (~20 topics)
- Formal Schemas (26)
- Best Practices (25)
- Public Discussion Papers & Engineering Reports (~200)
- Policy directives and documents (8)
- White Papers (36)
- Requests for Comment, Requests for Quotation
- Change Requests
- Deprecated and Retired Documents

OGC®

Making location count.

Home | Standards | Programs | Participate | OGC Blog | Events | About OGC | Member Login | Search

Geospatial and location standards for:

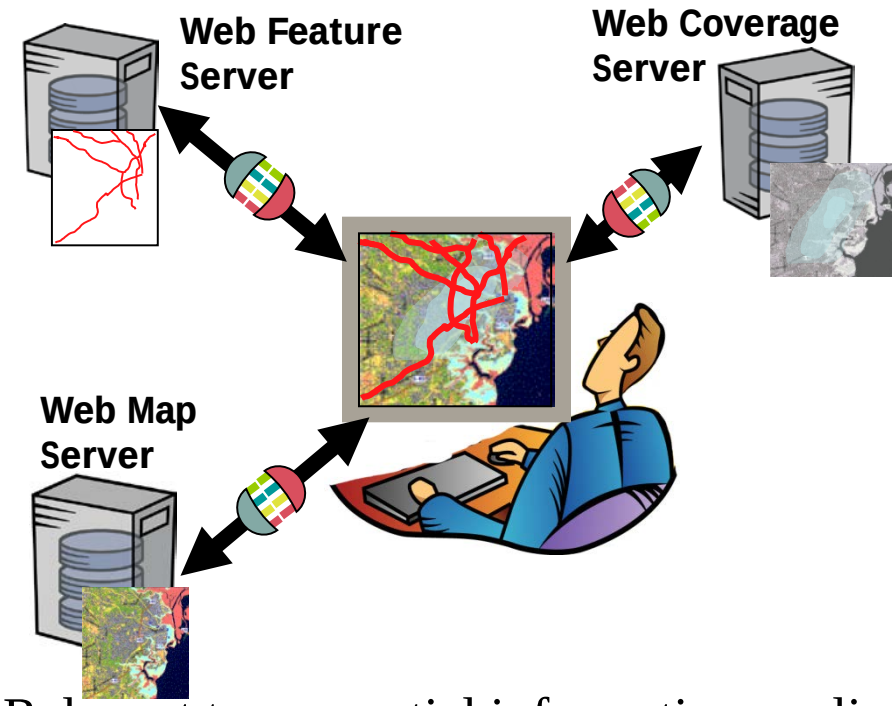
- Aviation
- Built Environment & 3D
- Business Intelligence
- Defense & Intelligence
- Emergency Response & Disaster Management
- Geosciences & Environment
- Government & Spatial Data Infrastructure
- Mobile Internet & Location Services
- Sensor Webs
- University & Research

OGC: Specification - How is it done?

- 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

OGC Web Services (OWS)

Just as http:// is the 'dial tone' of the World Wide Web, the geospatial web is enabled by OGC standards:

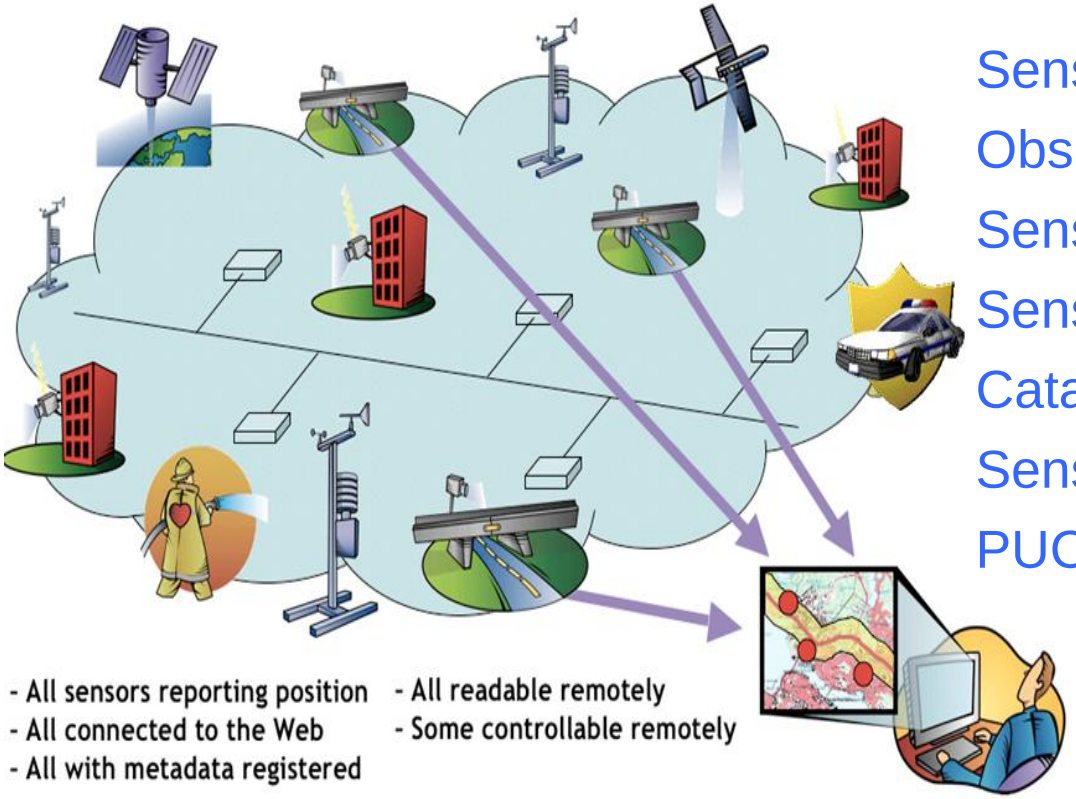


- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalogue (CSW)
- Geography Markup Language (GML)
- KML
- GeoSMS
- Others…

Relevant to geospatial information applications: Critical Infrastructure, Emergency Management, Weather, Climate, Homeland Security, Defense & Intelligence, Oceans Science, others

OGC Sensor Web Enablement Standards

Discovery and tasking of sensor assets, and the access and application of sensor observations for enhanced situational awareness



Sensor Model Language (SensorML)

Observations & Measurements (O&M)

Sensor Planning Service (SPS)

Sensor Observation Service (SOS)

Catalogue Service

Sensor Alert Service (SAS)

PUCK

GIS – Meteorology Workshops - 1

- Regular ECWMF Meteorological Operations Workshop 2007: recommended workshop/conference on GIS
- Workshop on the Use of GIS/OGC Standards in Meteorology:
  - ECMWF 2008-11-24/26, 120 attendees, presentations & recommendations
  - Reviewed use of OGC (Open Geospatial Consortium) standards in geo-sciences in Europe & worldwide
  - Recommended promotion of 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 National Met Services**

Met Ocean Domain Working Group

- Météo-France joined OGC 2007, UKMO 2008
- At OGC Tech Conf, Athens, 2009-03:
  - Meteorology DWG established
  - Hydrology DWG also established
- At OGC Tech Conf, Darmstadt, 2009-09:
  - Meteorology DWG converted itself to Meteorology & Oceanography DWG;
  - Stopped separate Climatology DWG;
  - Environmental System Science DWG well established
- OGC and WMO signed MoU 2009-11 (Met, Ocean, Hydro)

OGC-WMO Memorandum of Understanding

- Signed 23 November 2009
- Compromise between:
  - WMO-No. 60: Basic Documents No. 3 2002 edition

    ftp://ftp.wmo.int/Documents/MediaPublic/Publications/Policy_docs/060E.pdf
  - Standard OGC MoU terms
- 'Umbrella' MoU over organisations, encompassing:
  - OGC Met Oceans DWG and Hydrology DWG
  - all WMO Commissions:

    CBS, CHy, JCOMM, CCl, CIMO, CAeM, CAgM, CAS
- Short legal document, with flexible Annexe
- Lightweight – let experts get on with the work

GIS – Meteorology Workshops - 2

- 2nd Workshop on Use of GIS/OGC Standards in Meteorology
  - Toulouse, 23-25 November 2009
  - Established second major work theme: **Conceptual modelling**
  - Third workshop planned Exeter 2010, Observations theme
- 3rd Workshop on Use of GIS/OGC Standards in Meteorology
  - Exeter, 15-27 November 2010
  - Progressed previous work, re-established Interoperability Experiments, SLD/SE started
  - Obs theme didn't happen

4th Workshop did not happen according to plan

GIS – Meteorology Workshops - 3

- 4th Workshop on Use of GIS/OGC Standards in Meteorology
  - Reading, 4-6 April 2013

WMS further work:

- Implementation testing, extend to Profile or Standard
- Extend for climatological time
- Support WMS2.0 (now in abeyance)

Conceptual Modelling:

- Aviation more or less finished
- Another domain starting (climatology?)
- Time Model needed (Temporal DWG started: leap seconds, Gregorian calendar start, heliocentric coordinates, climatological periods)
- SLD/SE GitHub symbols need styling and linking to real WMO registry

WCS 2.0 Extension:

- Application Profile, 4D+, not 2D+Layers, ensembles, time, ‘corridors’, tiles
- Encoding formats GRIB2 TBD
- Data tiling TBD may be separate standard

Met Ocean DWG: Some Interesting Domain WGs

Active dialogues

- Aviation
- Catalogues
- Co-ordinate Reference Systems
- Coverages
- Defence & Intelligence
- Emergency & Disaster Management
- Hydrology
- Metadata (Discovery, not Interpretation)

Not currently Active

- Data Preservation
- Decision Support
- Earth Systems Science
- Location Services
- Mass Market
- Sensor Web Enablement

WMO / Met Ocean DWG currently NOT* Interested

- GeoXAMCL – security at detailed feature level
- CityGML – city and building modelling
- OpenLS - Location Services ??
- WPS - Web Processing Service ?
- 3D and Augmented Reality ?? But some activity
- GeoSMS ? Some interest
- Etc

* Or rather: no critical mass of interested volunteers

OGC Met Domain WG Achievements - 1

- Charter accepted
- Meteorology Domain Working Group created at the OGC Technical Conference in March 2009 in Athens
- Hydrology DWG created at the same meeting (Athens TC)
- Chris Little (UK Met Office) elected as chair MDWG (Athens TC)
- Marie-Françoise Voidrot elected as co-chair In June 2009 (Boston TC)
- Initiated a Memorandum of Understanding between OGC and WMO
- A public email list open to everyone (OGC member or not) set up : https://lists.opengeospatial.org/mailman/listinfo/meteo.dwg
- A twiki space set up : http://external.opengis.org/twiki_public/bin/view/MeteoDWG/WebHome

OGC Met Domain WG Achievements - 2

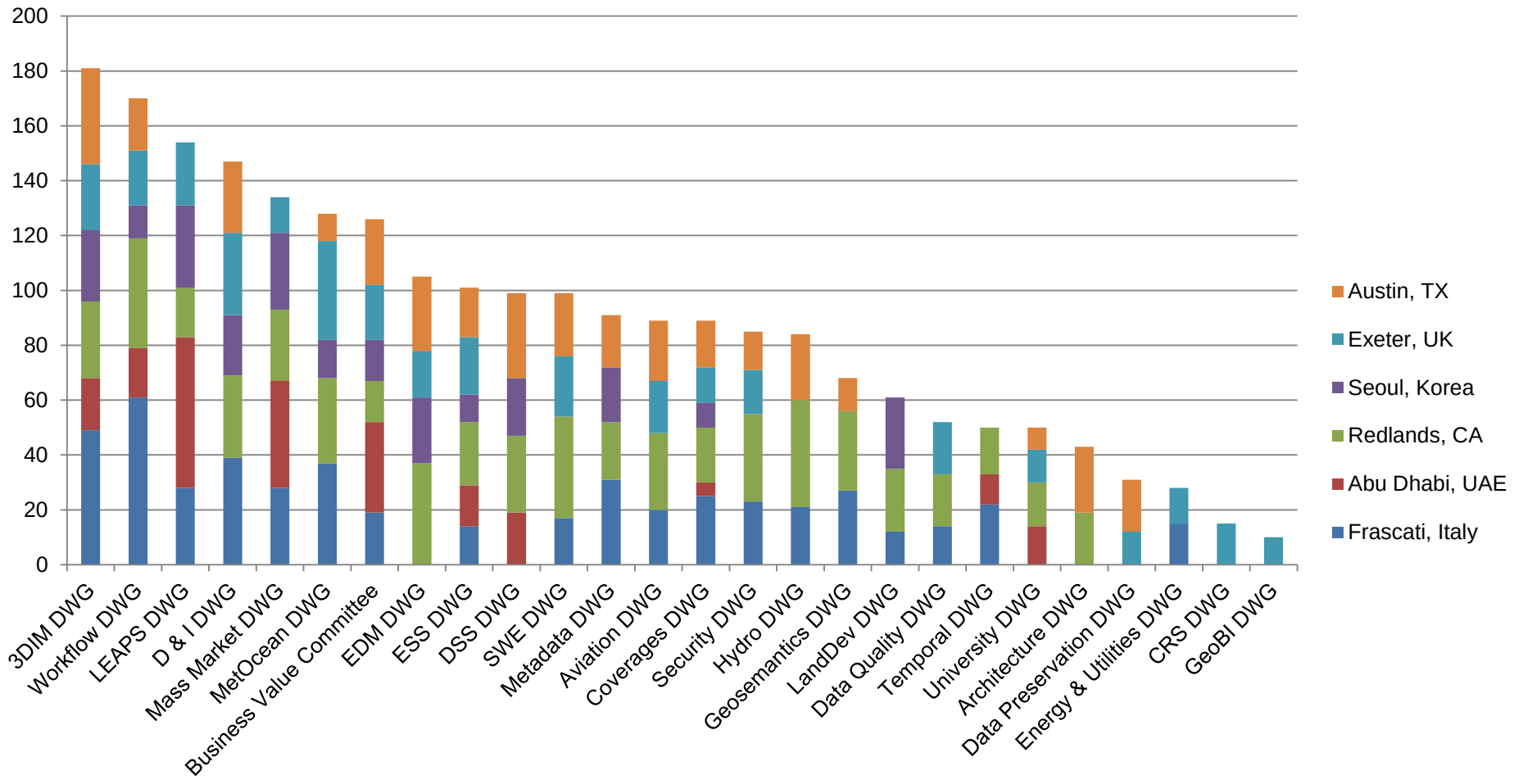
Teleconferences most / many Tuesdays, 15:00 - 16:00 UTC

- WMS Best Practice, retrofit WMS 1.3:
  - TIME
  - Vertical Coordinates, ELEVATION
  - Customer / User orientated, so no Met traditional terminology
  - Coordinate Reference Systems CRS (being tackled in other groups)
  - Climatological Periods & Time (TBD)
- SLD/SE wiki and GitHub https://github.com/chris-little/WorldWeatherSymbols
- Conceptual Modelling
  - Based on O&M
  - Jeremy Tandy leading, driven by Aviation, but long term, domain by domain
- WCS, new WCS 2.0 Met Ocean Extensions
  - led by Pete Trevelyan
- Temporal Domain WG being established
  - Climatological periods, historical calendars, leap seconds, 2038, etc

Met Ocean DWG Summary

- Members: UKMO, M-F, DWD, ECWMF, EUMETSAT, FMI, KNMI, met.no, met.ro, CMC, NOAA, BoM, (JMA, KMA, ??);
- WMS Best Practice recommendations made;
- Consistency between WMO, ICAO and OGC conceptual models achieved;
- Work started on WCS and data payloads;
- Work started on temporal aspects;
- Non-WMO observations are increasingly important, so **OGC observation standards** becoming important;
- Lots of work, increasing importance – join in!

Met Ocean DWG Attendance



Met Ocean DWG future work priorities

- Work on Met Ocean aspects of WCS2.0 extension proposals
- Follow GeoTIFF WCS shortcut process with WMO GRIB format
- Develop WCS Data Tile standard

- Extend WMS1.3 BP to other standards (WMTS… Other than WCS 2.0)
- Extend the BP towards a Profile (+ Chair WMS SWG?)
- Expand WMS1.3 BP with climatological periods, calendars, etc
- Express Requirements/Change Request to WMS2.0 (now back to 1.4)
- Carry on with weather symbols in SVG, & styles, for SLD/SE on Github

- Interact more with the on Aviation DWG for Met
- Influence or use other OGC standards e.g. O&M, PubSub, WPS, etc
- Work on WMO Registries, Vertical & Temporal CRSs, etc

OGC Summary

- OGC: is becoming global, rather than American
- Has opened up processes to community groups
  - Twiki, mailing lists
  - Responding to ‘big industry’ versus ‘open source communities’
- Is restructuring standards to a ‘Core & Extensions’ model
- Is updating standards from client/server to RESTful
- In middle of ‘2D+Layers’ versus ‘4D+slice & dice’ churn
- Interoperability Experiments and Test Beds are still heavyweight, to protect members’ IPR
  - Not an issue for Met Ocean community
  - Moving back towards implementation-led standards making*
- Has taken on Met Ocean requirements in key standards
  - Even when Met Ocean people not actively involved
  - We have a good reputation!

OGC Met Ocean Domain WG

Questions & Answers?

Spare Slides

OGC Overview 2

Vision:

- Realise societal, economic and scientific benefits of integrating electronic location resources into commercial and institutional processes worldwide

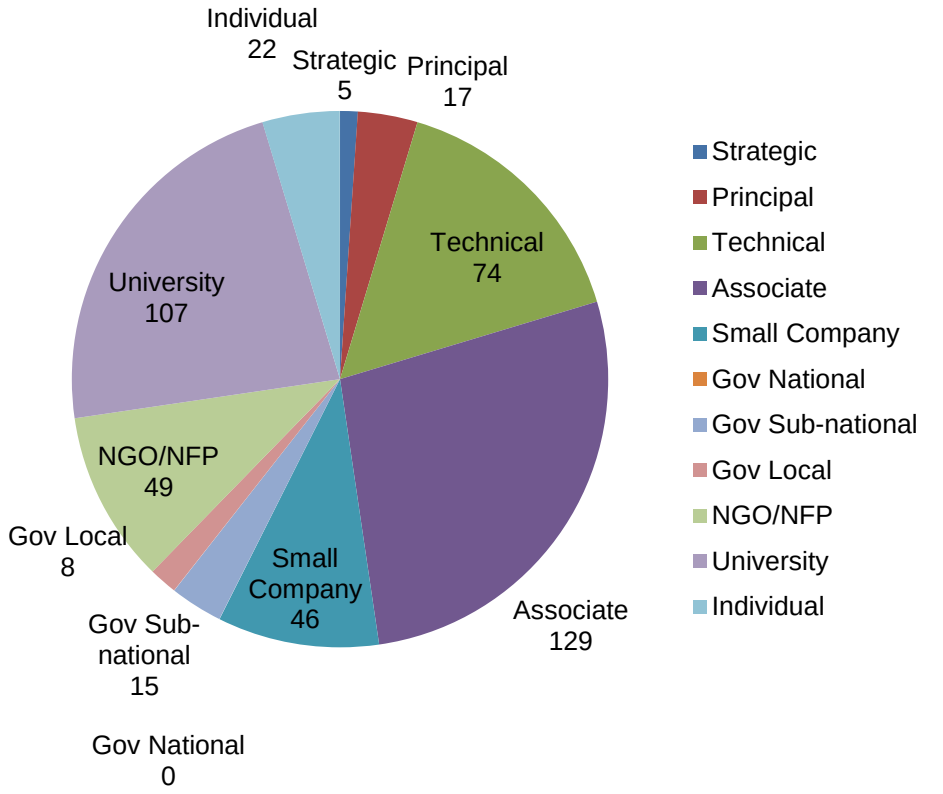
Mission:

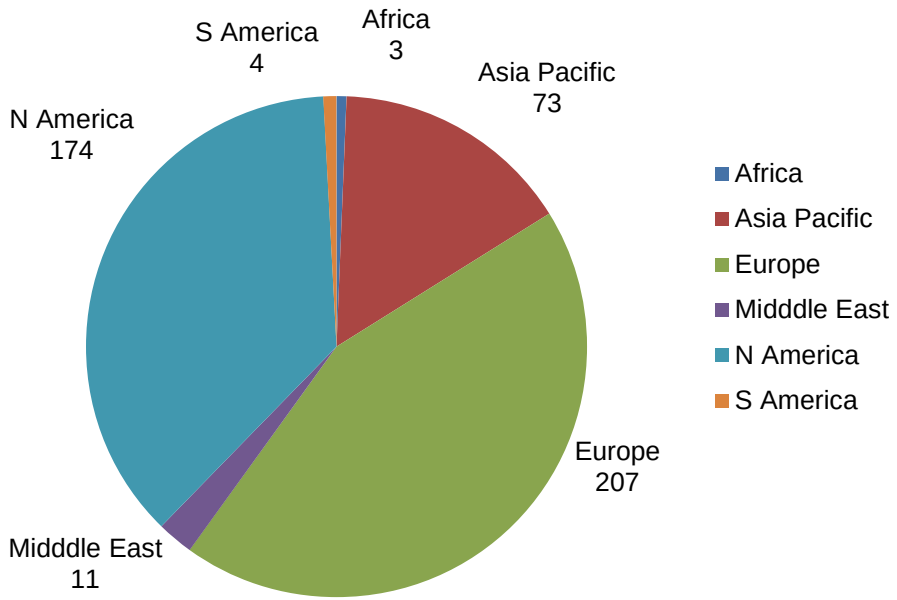
- global forum for collaboration of developers and users of spatial data products and services and to
- advance the development of international standards for geospatial interoperability

Strategic Goals:

- Goal 1 - Provide free and openly available standards to the market, tangible value to Members, and measurable benefits to users.
- Goal 2 - Lead worldwide in the creation and establishment of standards that allow geospatial content and services to be seamlessly integrated into business and civic processes, the spatial web and enterprise computing.
- Goal 3 - Facilitate the adoption of open, spatially enabled reference architectures in enterprise environments worldwide.
- Goal 4 - Advance standards in support of the formation of new and innovative markets and applications for geospatial technologies.
- Goal 5 - Accelerate market assimilation of interoperability research through collaborative consortium processes.

OGC Membership breakdown





Helping the World to Communicate Geographically

OGC Reference Model (ORM)

www.opengeospatial.org/standards/orm

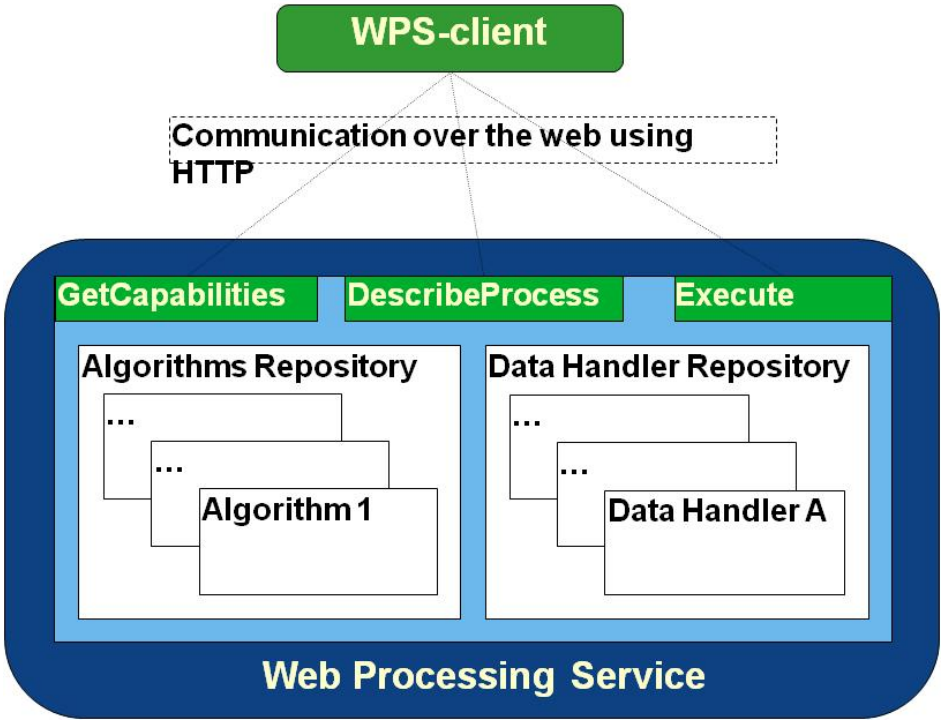
- What is the purpose of the ORM?
  - Overview of OGC Standards Baseline
  - Insight into the current state of the work of the OGC
  - Basis for coordination and understanding of the OGC documents
  - Resource for defining architectures for specific applications

- Why Read This Document?
  - Better understand the OGC Standards Baseline
  - Better understand the ongoing work of the OGC
  - Gain an understanding necessary to contribute to OGC process
  - Aid in implementing one or more of the OpenGIS Standards

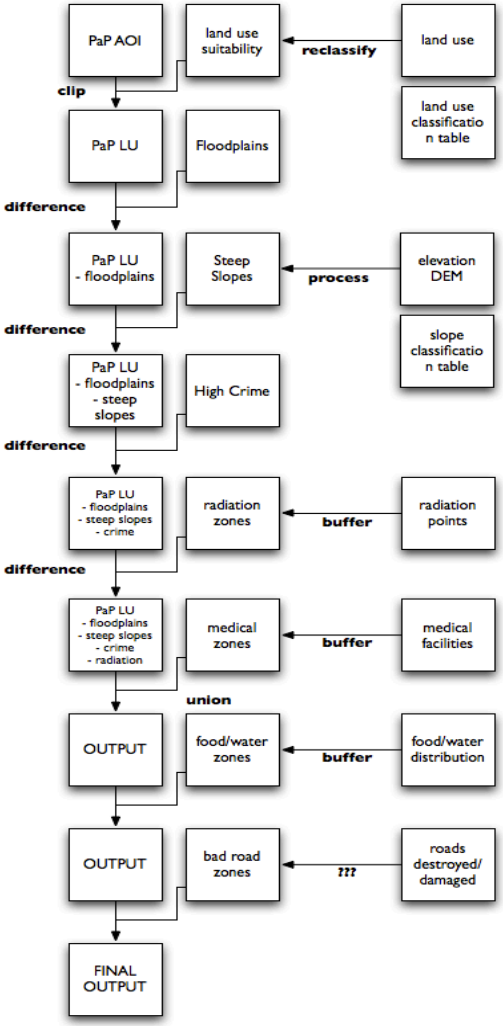
Geospatial Processing, Analysis, Workflow

Web Processing Service – WPS

- OGC Web Service access to algorithms
- Change detection, coordinate transformation, modeling and simulation…



Geoprocessing Workflow



OGC®

Geographically *nicate*

Challenges for OGC standards in Meteorology

- Long history of interoperability at human/paper level
- Spatial & Temporal, 2D, 3D, 4+D, constantly changing
- Not MBytes, but GB, TB and PetaBytes of data daily.
- Irregular time intervals
- Timescales: hours,.., seasons,.., centuries, + & -
- Multiple Time attributes
- 'Regular' grids are not always regular
- Continual change of coordinate systems & projecting
- Eulerian versus Lagrangian viewpoints
- Vertical coordinates
- Cross-sections, height-time diagrams, T/φs, etc
- Ensembles: probabilistic distributions
- Significant 'Objects', features of interest

WMO / Met Ocean DWG Interests

- WMS – Currently Proactive
  - Time – Several Proposals, consensus nearly achieived. Informal IE held
  - Elevation
  - Map Projections – changes to existing repositories in progress
  - SLD/SE – Aviation SigWx and standard WMO Plots Use Cases - slow
  - Tiling – WMTS now a separate standard – jigsaw edges – stationary!
- Conceptual Modelling - Currently Proactive
  - WXXM for Aviation
  - GML3.2.1, KML2.2
  - geoSMS for use with CAP
- WCS/WFS – lots of 'churn' - Currently Reactive, becoming proactive
  - 4D, CRS,
  - payload formats,
  - vector vs raster
- CSW – compatibility with ISO23950, OpenSearch - Currently Reactive
- O&M, SWE increasing in importance - Currently Passive