OGC Orientation Slides

Greg Buehler and Carl Reed

March 19, 2011

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Common impression about standards work

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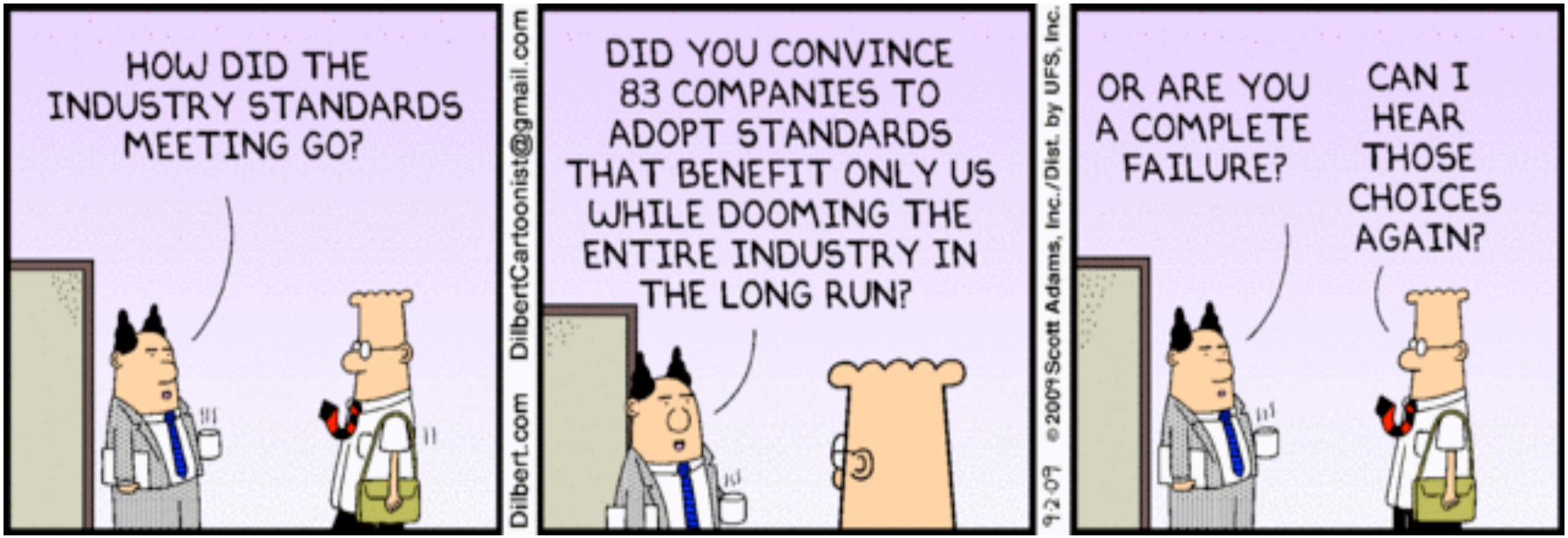
Or How Many Others View Standards



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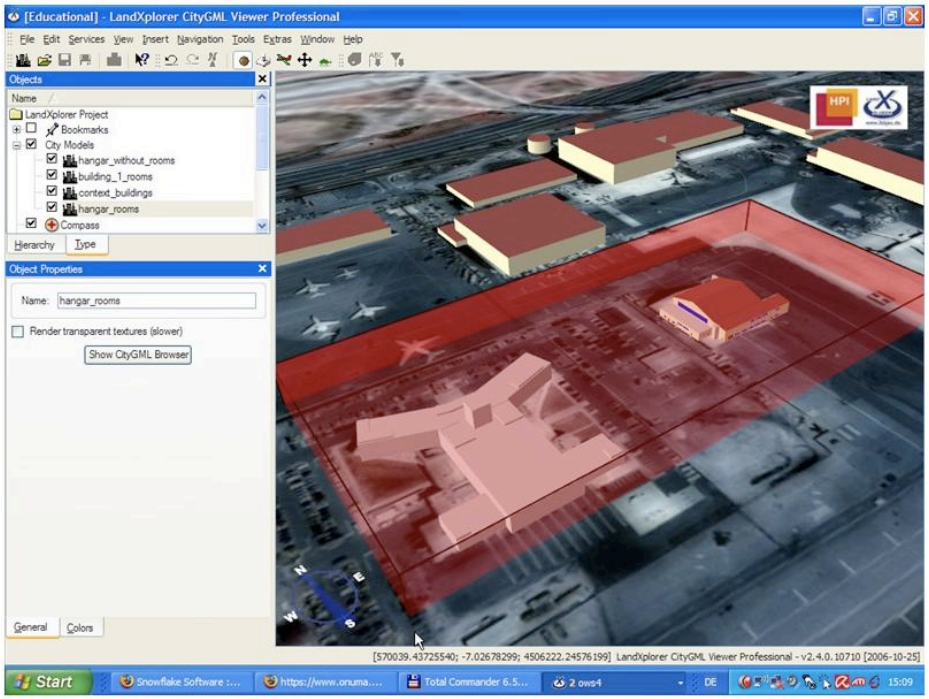
The reality

- . . . the annual cost of waste due to inadequate interoperability among computer-aided design, engineering, and software systems in the construction industry to be $15.8 billion <in the US alone>.

2004 NIST report titled "Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry,"



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What is the OGC and what is an OGC standard?

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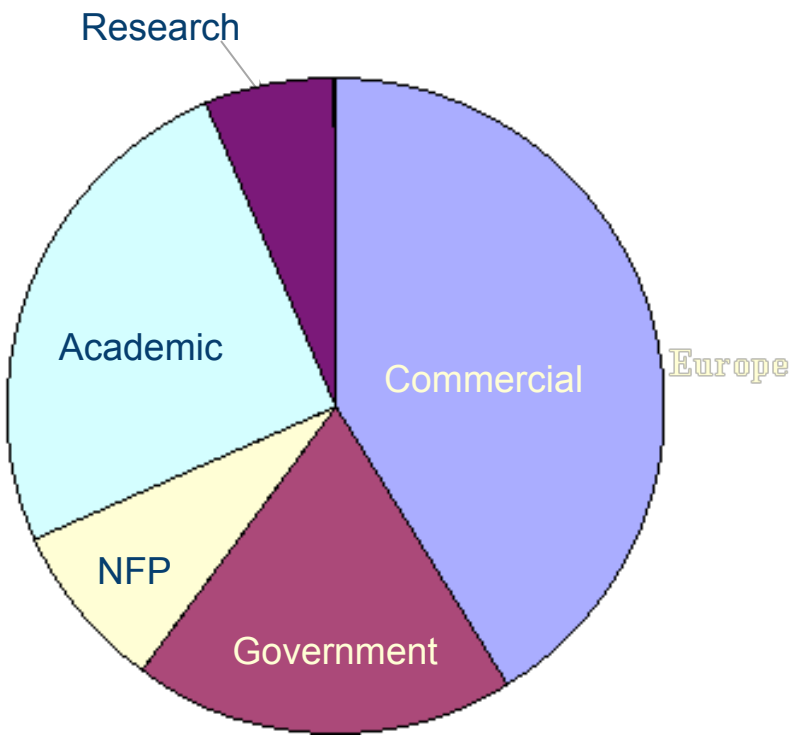
What is the OGC?

- A Voluntary Consensus Standards Organization, founded in 1994.
- Currently 440+ members
- 35 adopted standards
- Hundreds of product implementations
- Broad user community implementation worldwide
- Alliance partnerships with 30+ standards & professional orgs

OGC Membership Distribution



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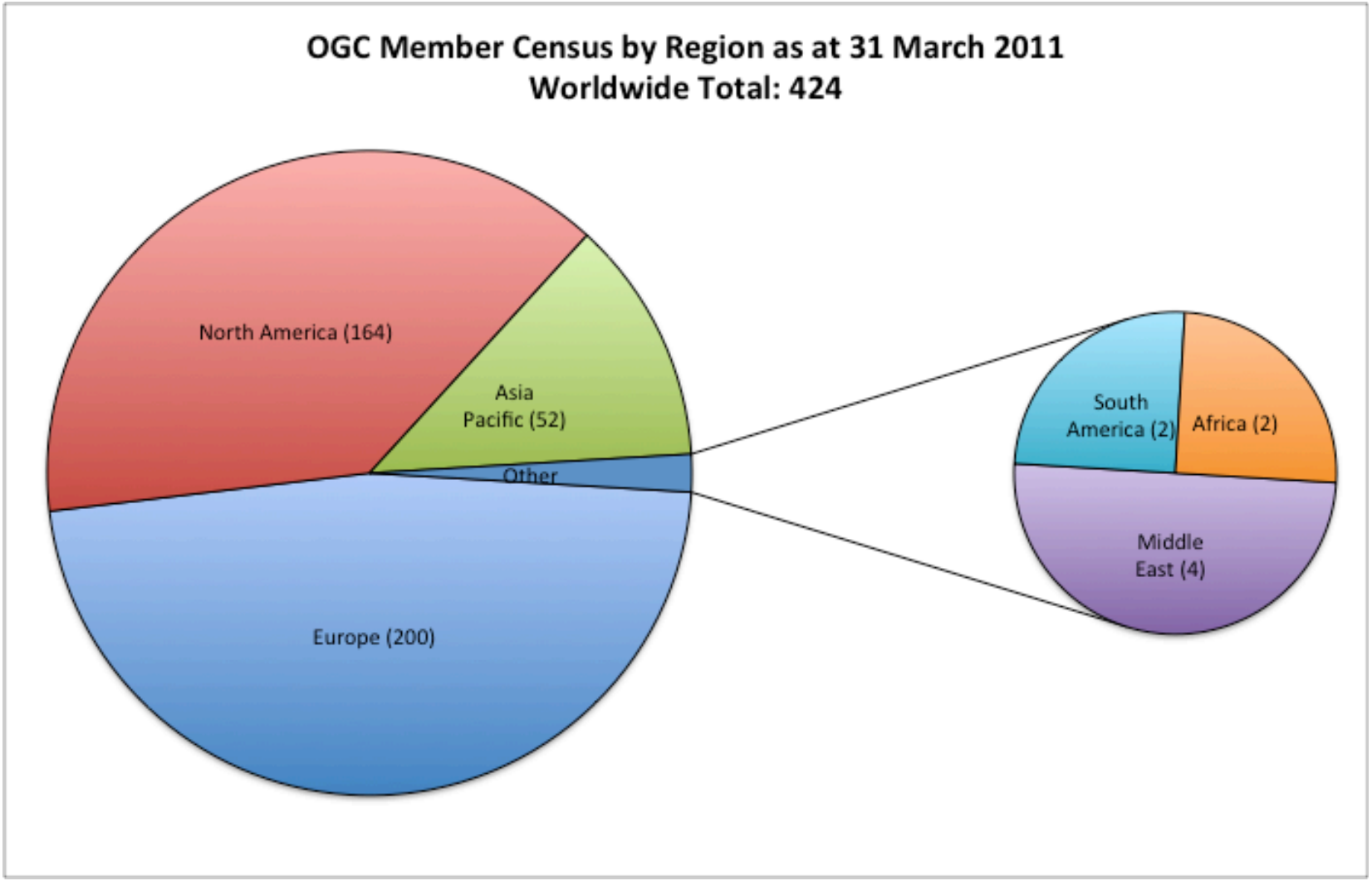
OGC 2011 Member Census thru 3/31



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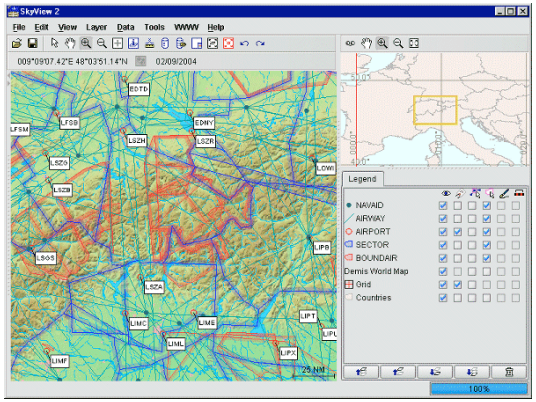
What is an OGC standard?

- *A **document**, established by **consensus** and **approved by the OGC Membership**, that provides rules and guidelines, aimed at the achievement of the optimum degree of order (interoperability) in a given context.*
  - OGC Technical Committee Policies and Procedures. Derived from ISO definition



EuroControl Aeronautical SkyView2 application

Consensus

- Consensus:
  - This is what the OGC standards process is all about!
  - Guided by the TC Policies and Procedures
  - Also documented in the TAO: A Guide for New Members, the OGC New Member Orientation, and numerous other documents.
  - Three or more Member organizations required to start any new OGC activity.
  - Also guided by the OGC Principals of Conduct

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Standards Development is not easy!

- Requires collaboration on a global basis
- Requires concensus by many organizations
- Requires give and take
- Requires certified, repeatable process

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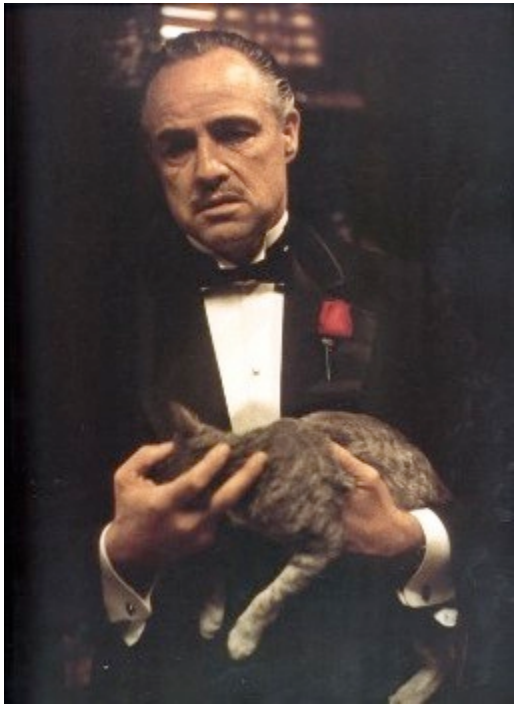
The core of the consensus philosophy

- "Never get angry. Never make a threat. Reason with people."
  - *Don Vito Corleone (The Godfather)*



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General Background Information on the OGC

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OGC Timeline

- 1994 – OGC Formed. 6 Members
- 1998 - First standard (Simple Features)
- 1999 – First test bed – Web Map
- 2000 - First Web Service Standard (Web Map Service)
- 2004 – Changed name to Open Geospatial Consortium
- 2010 – 30 standards and 400+ Members
- Today – 35 standards, 440+ Member organizations

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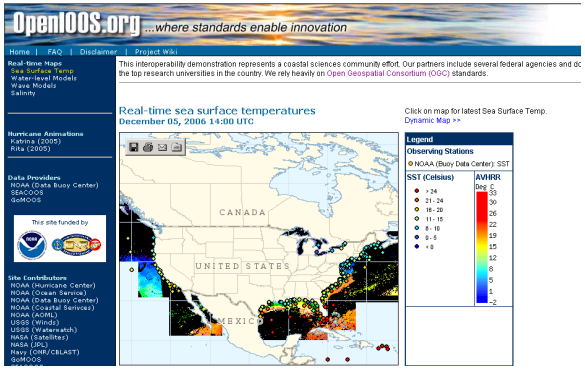
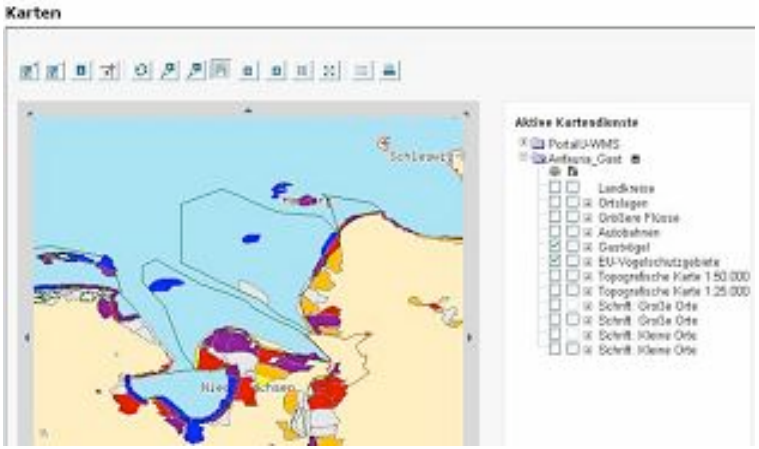
The OGC Vision

Achieve the full societal, economic and scientific benefits of integrating location resources into commercial and institutional processes worldwide



SURA Coastal Ocean Observing and Prediction (SCOOP) Program

PortalU
German Environmental Information Portal



The OGC Mission

- *To serve as a global forum for the collaboration of developers and users of spatial data products and services, and to advance the development of international standards for geospatial interoperability.*

Urban Model of Berlin based on OGC CityGML
Source: www.3d-stadtmodell-berlin.de

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What does the OGC provide?

- An ***agreed upon consensus process*** for defining, testing, documenting, and approving standards
- ***Staff knowledge, expertise and support*** to work with the members to facilitate the consensus process the culminates in approved and adopted standards.
- A ***process framework*** to encourage effectiveness and efficiency in advancing OGC member goals.
- A comprehensive ***Communications infrastructure***.
- A ***consensus-based forum*** for conflict resolution

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OGC's Approach for Advancing Interoperability

- ***Interoperability Program*** **(IP)** - a global, innovative, hands-on prototyping and testing program designed to accelerate interface development and validation, and bring interoperability to the market

Rapid Interface Development

Standards Setting

- ***Standards Development Program*** – Where the Standards Consensus development and revision process happens.

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

Market Adoption

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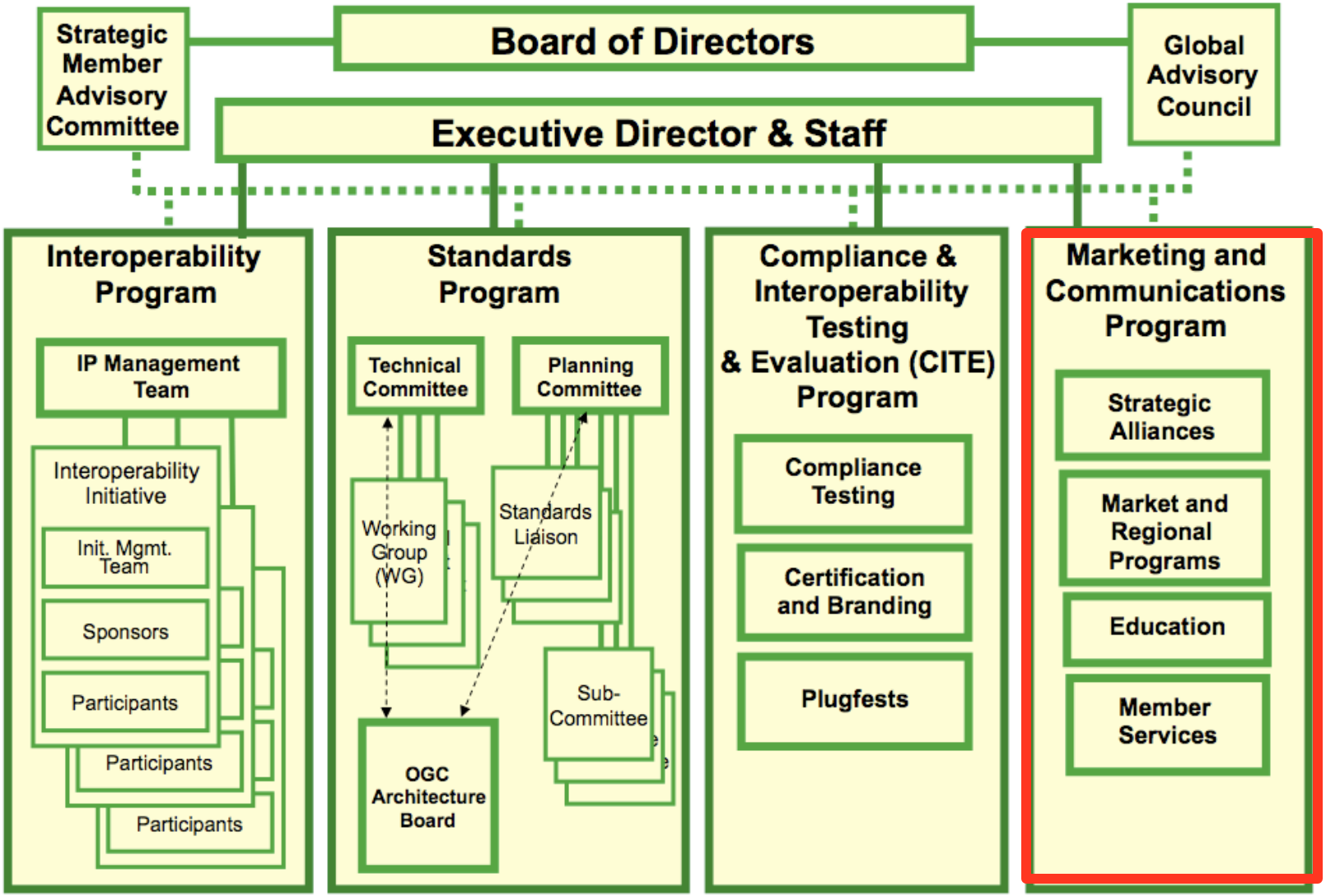
OGC Structure



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Marketing and Communication

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Marketing and Communication Goal

- Work with OGC members and user communities around the world to encourage "take up" or implementation of OGC standards, as well as to encourage new membership and engagement in OGC programs and initiatives.

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IT Infrastructure, OGC Web Maintenance, Member Portal, Email etc

- Bloomington Office
  - Greg Buehler, Mark Buehler, Kevin Stegemoller, Joe Brumley

Strategic Partnerships

- Developing and Maintaining Strategic Partnerships is a key function of the OGC staff:
  - World Meteorological Organization (WMO)
  - Global Spatial Data Infrastructure Association (GSDI)
  - OSGeo
  - OpenMI
  - Building Smart Institute
  - DGIWG
  - GEO
  - IJIS
  - USGIF
  - Environmental Modeling and Software (EMS)
- There is a slide later about standards collaboration

Regional Forums

- OGC forums provide for OGC Members to communicate on a country or regional level, recognizing local language, cultural, and policy requirements. Further, forums:
  - Promote and support OGC membership
  - Coordinate participation in the OGC
  - Promote policies, co-operative business development initiatives and public/private partnerships that support the use of OGC standards.
  - http://www.opengeospatial.org/ogc/regions
- Existing forums:
  - Asia Forum, Europe Forum, France Forum, ILAF (Iberian and Latin-American Forum), India Forum, Korea Forum, Nordic Forum

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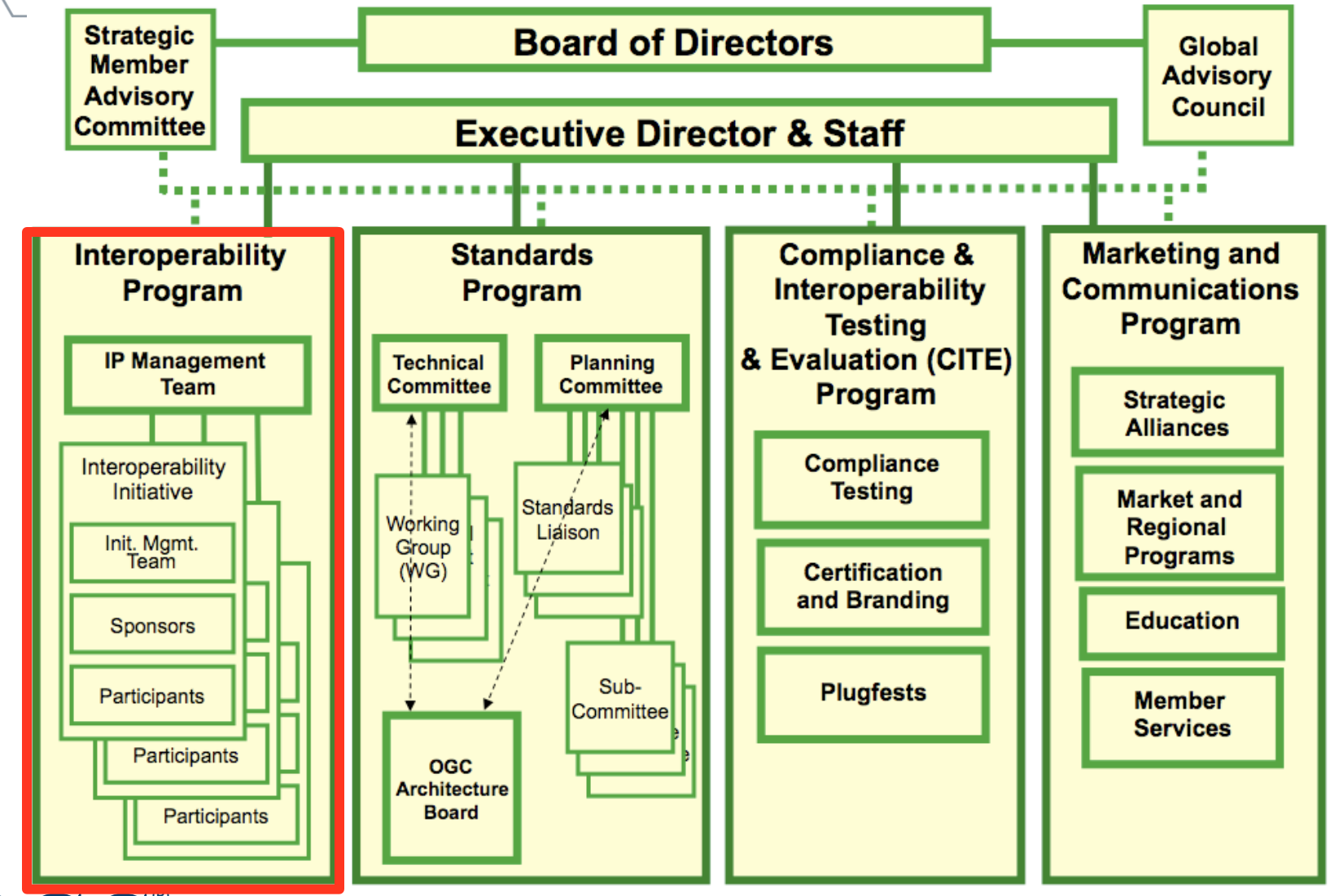
OGC Structure



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OGC Interoperability Program

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The OGC Interoperability Program (IP)

- A global, collaborative, hands-on engineering, prototyping and testing designed to rapidly deliver
  - Running code implementations
  - Engineering Reports
  - Change Requests
  - Demonstration in real world scenarios

- Sponsors and Participants work together.
  - Sponsors provide requirements, ***use / business cases*** and funding
  - Participants work with sponsors to define and/or refine standards to solve a given interoperability problem

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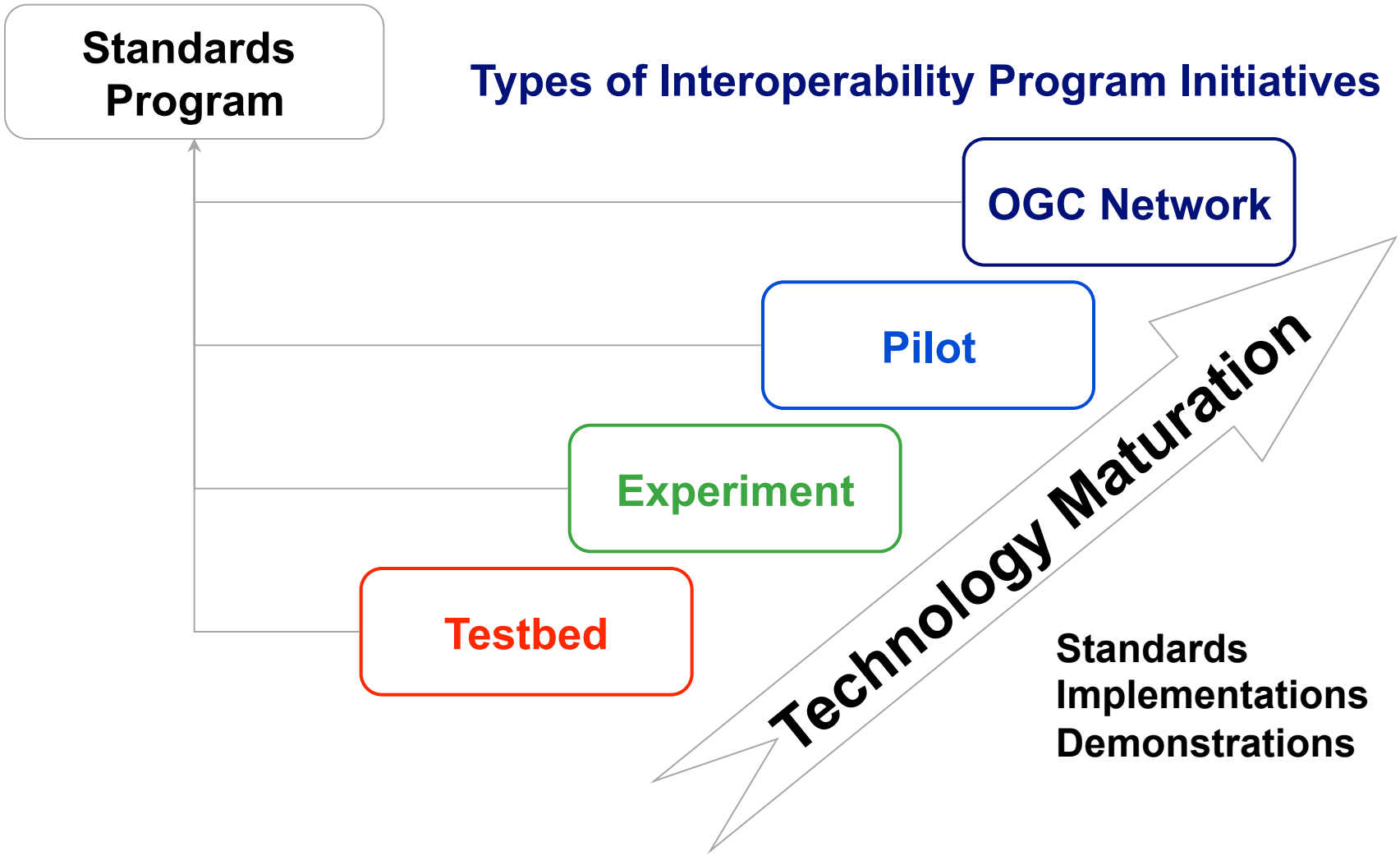
Types of OGC-IP Initiatives

	OGC Testbed	**OGC Interoperability Experiment**	**OGC Pilot**	**OGC Network**
Purpose	Develop new standards & refine existing specs	Refine & extend existing standards	Test existing standards in operational environment	Persistent, widespread infrastructure
Project Management	OGC IP Team	OGC Members	OGC IP Team	OGC Members and IP Team
Sponsorship	Yes	No	Yes	Both
Participation	OGC Members	OGC Members & approved non-Members	Members & operational partners	Members & public

Interoperability Program Development



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OWS Testbed Development Approach

- Vehicle for maturing various technologies
  - Incubator for new interoperability areas
  - 2-3 cycles needed to get mature specs for RFQ adoption
- Multiple thread approach advantages
  - Synergy: new specs built in the venue of existing specs
  - Efficiency: uniform management of 10's of participants
  - Integrated Demo: specs working together, publicity
- Evolutionary development approach
  - Incremental spirals: ~1 per year
  - Architecture basis: define spirals, updated by spirals
  - Schedule defines extent of content in a spiral

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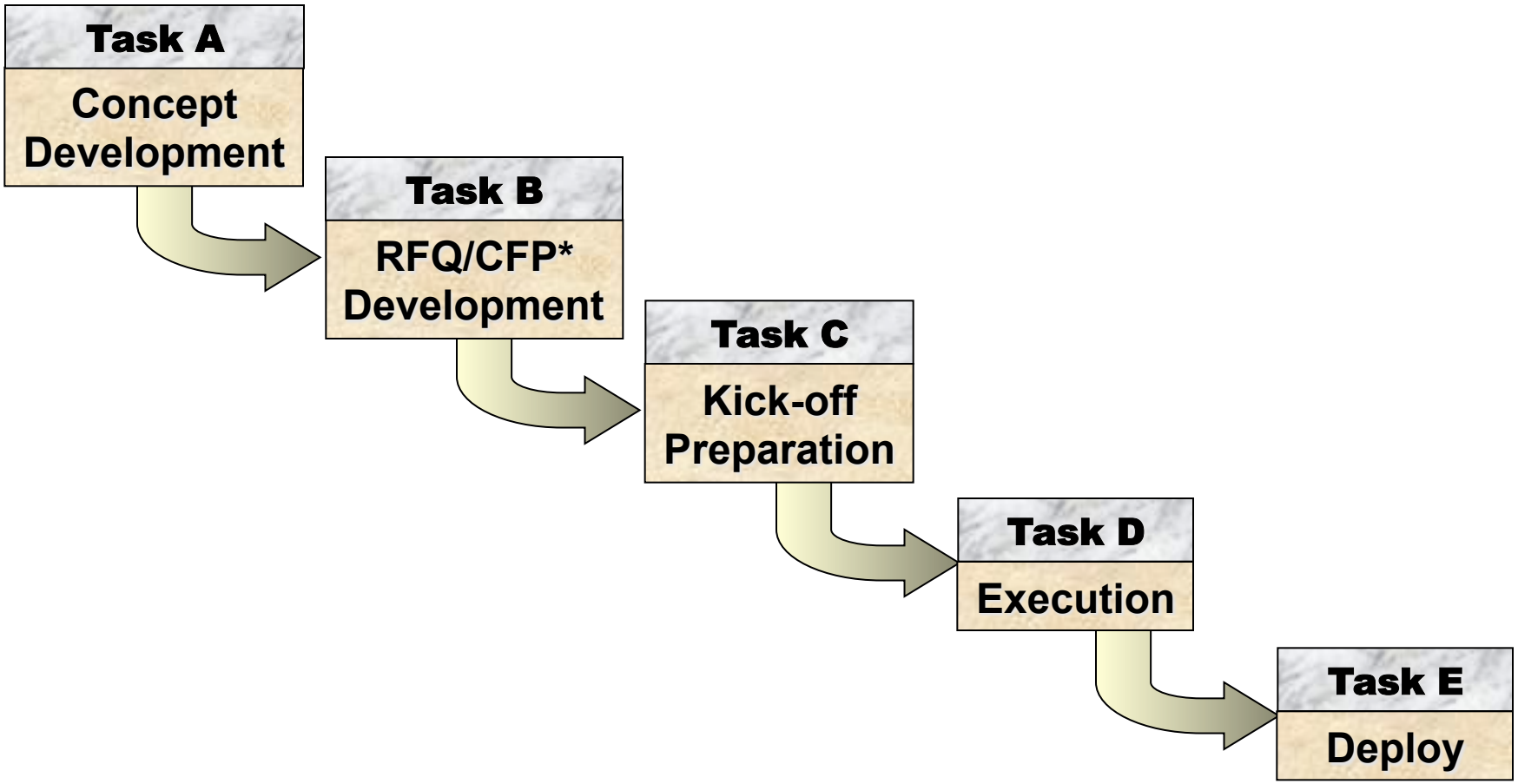
Testbed Approach



*RFQ/CFP = Request for Quotation/Call for Participation

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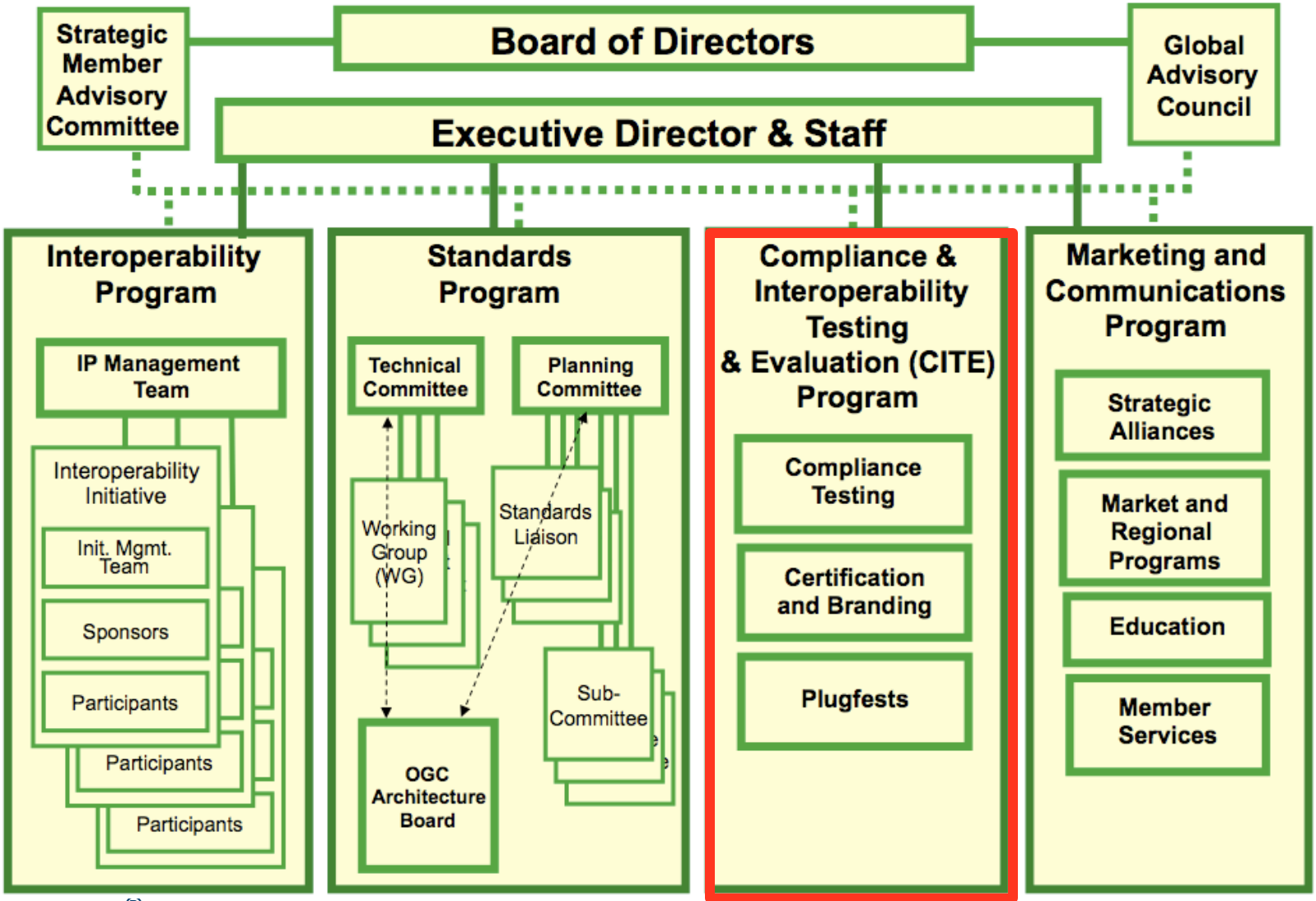

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Introduction to OGC Compliance Testing and TEAM Engine

Luis Bermudez
lbermudez@opengeospatial.org
March 2011

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Compliance Program Goals

- Provide robust standard compliance solutions for geospatial communities
- Provide a process whereby compliance for OGC specifications can be tested.
- Increase systems interoperability
- Reducing technology risks

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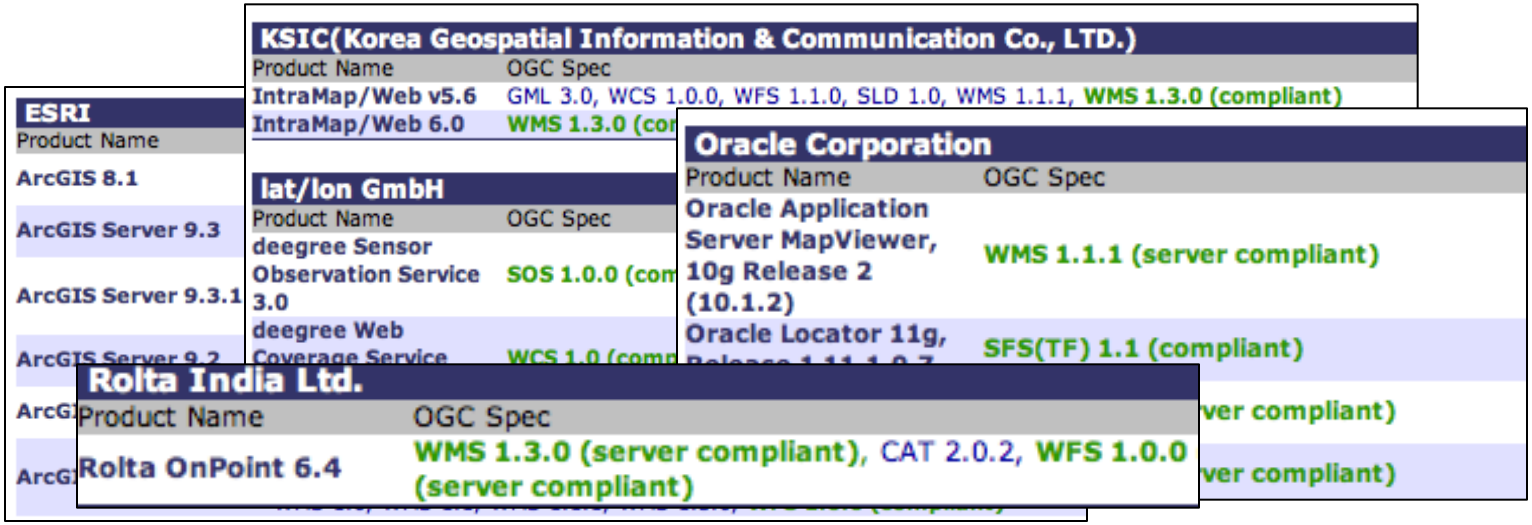
Compliance Numbers (Mar 2011)

- More than 10 years providing certification
- Web Testing Engine - open source - operational since 2007
- More than 260 compliant products in the market



KSIC(Korea Geospatial Information & Communication Co., LTD.)

Product Name	OGC Spec
IntraMap/Web v5.6	GML 3.0, WCS 1.0.0, WFS 1.1.0, SLD 1.0, WMS 1.1.1, WMS 1.3.0 (compliant)
IntraMap/Web 6.0	WMS 1.3.0 (cor

ESRI

Product Name
ArcGIS 8.1
ArcGIS Server 9.3
ArcGIS Server 9.3.1
ArcGIS Server 9.2
ArcGI
ArcGI

lat/lon GmbH

Product Name	OGC Spec
deegree Sensor Observation Service 3.0	SOS 1.0.0 (com
deegree Web Coverage Service	WCS 1.0 (comp

Oracle Corporation

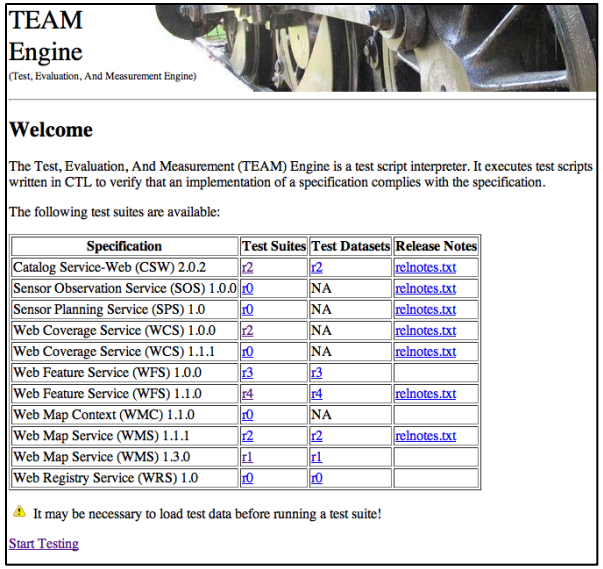
Product Name	OGC Spec
Oracle Application Server MapViewer, 10g Release 2 (10.1.2)	WMS 1.1.1 (server compliant)
Oracle Locator 11g,	SFS(TF) 1.1 (compliant)
	ver compliant)
	ver compliant)

Rolta India Ltd.

Product Name	OGC Spec
Rolta OnPoint 6.4	WMS 1.3.0 (server compliant), CAT 2.0.2, WFS 1.0.0 (server compliant)

Compliance Procedure

- 1) Developers go to online Test engine



TEAM Engine

(Test, Evaluation, And Measurement Engine)

Welcome

The Test, Evaluation, And Measurement (TEAM) Engine is a test script interpreter. It executes test scripts written in CTL to verify that an implementation of a specification complies with the specification.

The following test suites are available:

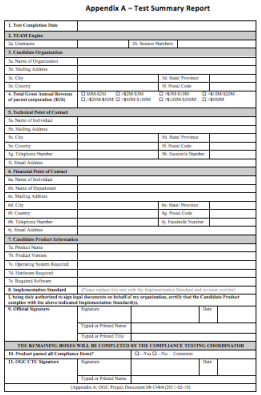
Specification	Test Suites	Test Datasets	Release Notes
Catalog Service-Web (CSW) 2.0.2	r2	r2	relnotes.txt
Sensor Observation Service (SOS) 1.0.0	r0	NA	relnotes.txt
Sensor Planning Service (SPS) 1.0	r0	NA	relnotes.txt
Web Coverage Service (WCS) 1.0.0	r2	NA	relnotes.txt
Web Coverage Service (WCS) 1.1.1	r0	NA	relnotes.txt
Web Feature Service (WFS) 1.0.0	r3	r3	
Web Feature Service (WFS) 1.1.0	r4	r4	relnotes.txt
Web Map Context (WMC) 1.1.0	r0	NA	
Web Map Service (WMS) 1.1.1	r2	r2	relnotes.txt
Web Map Service (WMS) 1.3.0	r1	r1	
Web Registry Service (WRS) 1.0	r0	r0	

⚠ It may be necessary to load test data before running a test suite!

Start Testing

http://cite.opengeospatial.org/teamengine/

2) Fill the Test Results (TSR) Form



Appendix A – Test Summary Report

3) Pay License Fee

Annual Fee per Product Version per Implemented Standard Version

Licensee Total Gross Annual Revenue	Non Member	Member
$0M - < $2M	$100	$80
$2M - < $3M	$250	$200
$3M - < $10M	$500	$400
$10M - < $20M	$750	$600
$20M - < $50M	$1,200	$960
$50M - < $100M	$2,000	$1,600
$100M - < $500M	$4,500	$3,600
$500M+	$7,000	$5,600

4) Get Compliance Certificate

Open Geospatial Consortium, Inc.
Compliance Certificate

This Compliance Certificate is awarded to

[Company Name]

In recognition that

[Product Name and Version]

Meets all Compliance Items and therefore complies with

[Full Specification Name and Version]

Awarded the [date] day of [Month Year]

Jeffrey S. Barnett, Vice President

5) Use Certification mark

CERTIFIED OGC COMPLIANT

More information:
http://bit.ly/gTmmSo

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CITE WIKI

http://cite.opengeospatial.org/

Resources

- Director of Interoperability Certification
  - Luis Bermudez <lbermudez@opengeospatial.org>
- Wiki
  - http://cite.opengeospatial.org
- Developers list and issue tracker
  - http://cite.opengeospatial.org/forum
- Team Engine at Sourceforge
  - http://sourceforge.net/projects/teamengine/
- General Questions about the program and submissions of test results
  - compliance@opengeospatial.org

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Key OGC Documents

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Tao of the OGC

- A Guide to the Consensus Process of the Open Geospatial Consortium (OGC)

- **Tao**
  - Path or Way (Buddhism)
  - The right manner of human activity and virtuous conduct seen as stemming from universal criteria and ideals governing right, wrong (Confucianism)

- http://portal.opengeospatial.org/files/?artifact_id=5259

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The OGC Reference Model (ORM) Version 2.1

- The OGC Reference Model (ORM) describes the OGC Standards Baseline focusing on relationships between the baseline documents. The OGC Standards Baseline (SB) consists of the approved OGC Abstract and Implementation Standards and Best Practice documents.

- http://www.opengeospatial.org/standards/orm

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Geospatial Service Architecture Viewpoints

Community Objectives

Enterprise Viewpoint

Business aspects: purpose, scope and policies
What for? Why? Who? When?

Abstract/Best Practices

Information sources and models
What is it about?

Information Viewpoint

Computational Viewpoint

Types of services and protocols
How does each bit work?

Implementation/Development

Engineering Viewpoint

Solution types: distribution infrastructure
How do the components work together?

Technology Viewpoint

Implementation system: hardware, software, distribution
With what?

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Viewpoints in "Reference Model - Open Distributed Processing (RM-ODP)" ISO/IEC 10746

The Technical Committee Policies and Procedures

- This document provides descriptions of roles, responsibilities, standards development and submission procedures, and procedures related to revisions of existing OGC standards.
  - The current version can be downloaded from:
    - http://portal.opengeospatial.org/files/?artifact_id=23325

- A variety of FAQ and supporting documents can be found in a folder here
  - http://portal.opengeospatial.org/index.php?m=projects&a=view&project_id=82&tab=2&artifact_id=22851

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Other key OGC documents

- OGC Bylaws –
  - http://portal.opengeospatial.org/files/?artifact_id=6947
- OGC Principals of Conduct
  - http://www.opengeospatial.org/ogc/policies/conduct
- OGC Intellectual Property Policies and Procedures
  - https://portal.opengeospatial.org/files/?artifact_id=23145

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Approved OGC Standards

- Catalogue Services
  - CS Core
  - CS-W ebRIM
  - CS-W 19115/19119
  - CS-W ebRIM for EO
- Processing Services
  - OpenLS Core Services
  - Sensor Planning Service (SPS)
  - Web Processing Service (WPS)
  - Coordinate Transformation Service (CTS)
  - WCS Processing (with WCS)
- Encodings
  - Geography Markup Language (GML)
    - CityGML
    - GML Simple Features
  - Filter Encoding (FE)
  - GML in JPEG 2000
  - KML
  - NetCDF
  - Observations & Measurements (O&M)
  - Open GeoSMS
  - Sensor Model Language (SensorML)
  - Symbology Encoding (SE)
  - Styled Layer Descriptor (SLD)
  - SWE Common
  - Web Map Context (WMC)

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Approved OGC Standards (Continued)

- Data Services
  - Simple Features (SQL)
  - Web Coverage Service (WCS)
    - WCS Transactional
  - Sensor Observation Service (SOS)
  - Table Join Service (TJS)
  - Web Feature Service (WFS)
- Portrayal Service
  - Web Map Service (WMS)
  - Web Map Tiling Service
- Others
  - GeoXACML
  - GeoAPI
  - OWS Common

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OGC's Commitment to Other Standards Organizations

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OGC Standards Alliance Partnerships

- Internet Engineering Task Force (IETF)
- Organization for the Advancement of Structured Information Standards (OASIS)
- National Emergency Number Association (NENA)
- International Organization for Standards (ISO)
- World Wide Web Consortium (W3C)
- World Meteorological Organization (WMO)
- IEEE Technical Committee 9 (Sensor Web)
- Open Grid Forum (OGF)
- buildingSMART Alliance
- Web3D Consortium

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Collaboration with Internet Engineering Task Force (IETF)

- Participated in the GeoPriv Working group since 2004
  - www.ietf.org
- A number of internet RFCs (standards) use a GML Application Schema
  - Presence Information Data Format – Location Object (RFC 4119 and revisions)
  - The location object references in ECRIT, SIP, RADIUS etc
- Now also specified as a mandatory internet standard for the Next Generation 9-1-1 system

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Use of GML by OASIS

- There is now a GML Schema for use in a variety of OASIS standards. This application schema was developed by OGC staff and members and submitted to OASIS.
  - Is now being used in HAVE (2d point)
  - Is now being used in EDXL-RM as a payload extension
  - Both CAP and EDXL (DE, RM, SA, etc) revisions will incorporate this work.

- Currently, a profile of the GML Simple Features profile is the approved OASIS location encoding standard.

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Relationship with ISO TC-211

- The OGC has a class A technical liaison agreement with TC 211. Governed by Terms of Reference (ToR)
- The coordination and communication is performed by the Joint Advisory Group (JAG)
- A number of OGC standards have been submitted into ISO and approved as ISO standards
  - Web Map Service
  - Simple Features
  - Web Feature Service
  - Filter Encoding
  - GML
  - Observations and Measurements
  - Coordinate Reference Systems (aka Spatial Referencing by Coordinates)

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Policies and Procedures of the Technical Committee

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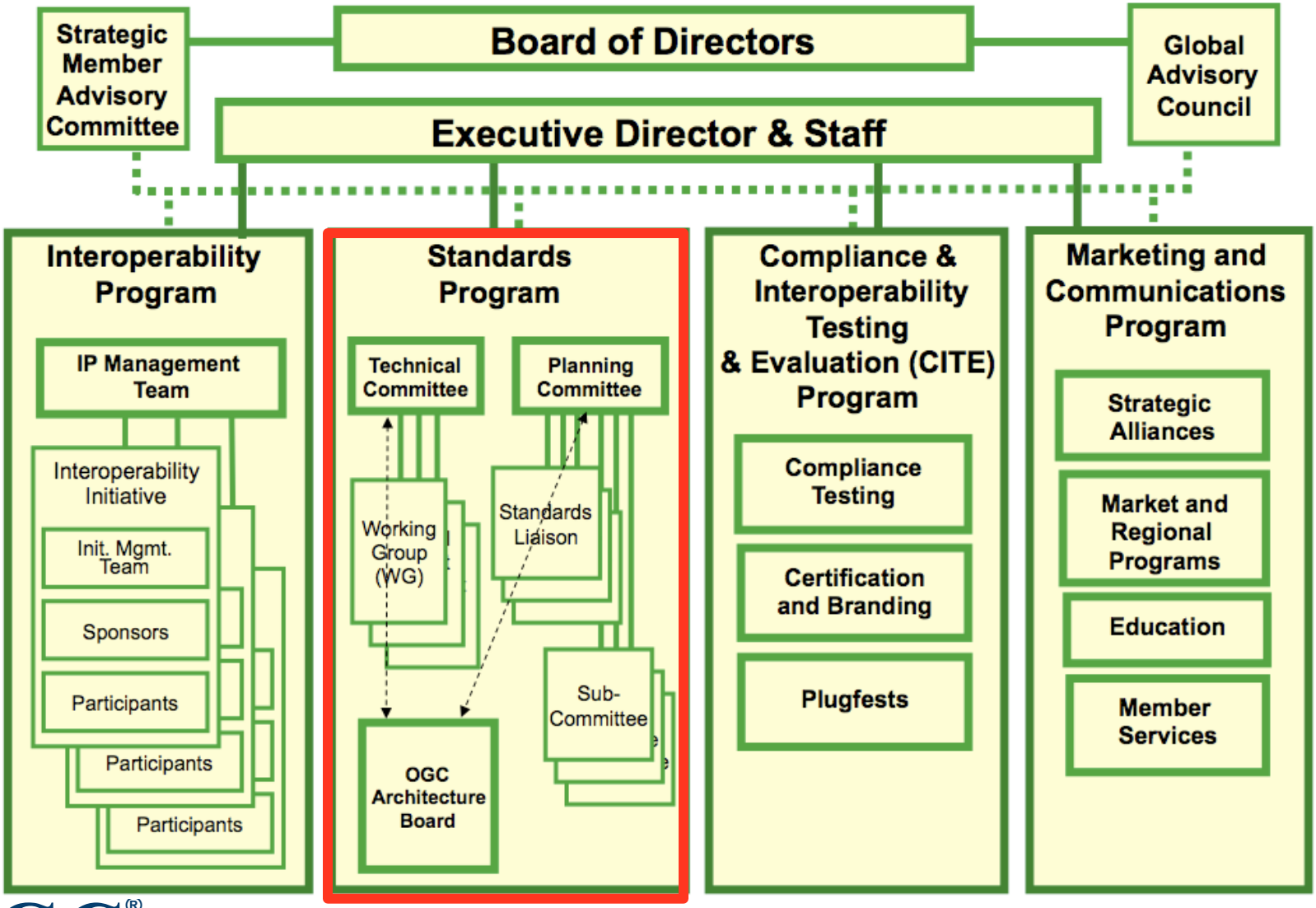
Technical and Planning Committees



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The Standards Process

- Standards development using a consensus process
- OGC Technical Committee, OGC Planning Committee and OGC Architecture Board
- Working Groups enable member focus on domains (e.g. Earth Observation), an aspect of architecture (e.g. Catalogue), or on a specific standard (e.g. WMS)

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The OGC Process – Consensus and Collaboration

Interoperability Requirements From members And Market

Requirements Documented as Part of OGC Interoperability Activity

Requirements used to Define new interface or Enhance existing Interface

Interface Implemented By Members, Tested And Documented

Members submit Interface for discussion And possible adoption Using OGC RFC/SWG processes

New or enhanced Interface provided to Community for Implementation

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Flexible Standards Process

Interoperability Program

Community Interaction

New Rqmts

Concept Development

Feasibility Studies

Draft Spec Concepts

Design & Proof-of-concept

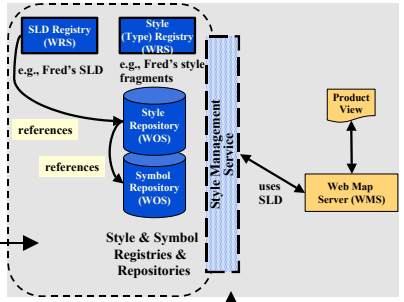
Testbeds

Draft Specs

Implementation & Test

Pilot Project

Reference Implementations



Specification Program

Draft Specs

Candidate Standards& Recommendations

Draft Specs Submitted By Members

OGC Working Group (WG)

Recommended Standards Actions

Technical Committee (TC)

Recommended Standards

Planning Committee (TC)

Approved Standards

ISO

OASIS

Other Standards Org

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The Standards Development Program

- Where and how the OGC standards are processed and adopted.

- The primary operating units of the Standards Program are the OGC Technical Committee, the Architecture Board, the OGC Naming Authority, and the OGC Planning Committee

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What is the Technical Committee?

- Where the formal standards development consensus discussion and approval process occurs.
  - Comprised of a number of Domain Working Groups (DWGs or WGs for short) and Standards Working Groups (SWGs).
    - Domain WGs provide a forum for discussion of key interoperability issue areas, discussion and review of standards, and presentations on key technology areas relevant to solving geospatial interoperability issues.
    - Standards WGs (SWGs) perform revision and maintenance of adopted standards.

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Domain Working Groups (November 2011)

Name	Lead **
3DIM DWG (3DIM DWG)	Scott Simmons, CACI International Inc.
Architecture DWG (Arch DWG)	Doug Nebert, US Geological Survey (USGS)
Aviation DWG (Aviation DWG)	Navin Vembar, FAA System Operations Airspace and AIM Office
Catalog DWG (Cat DWG)	Doug Nebert, US Geological Survey (USGS)
Coordinate Reference System DWG (CRS DWG)	Victor Minor, Blue Marble Geographics
Coverages DWG (Cover DWG)	Peter Baumann, FORWISS (Bavarian Research Centre for Knowledge-Based Systems)
Data Preservation DWG (PreservDWG)	Steve Morris, North Carolina State University
Data Quality DWG (DQ DWG)	Matt Beare, 1Spatial Group Ltd.
Decision Support DWG (DS DWG)	Stan Tillman, Intergraph Corporation
Defense and Intelligence DWG (D and I DWG)	Lucio Colaiacomo, European Union Satellite Centre
Earth Systems Science DWG (ESS WG)	Phillip Dibner, Ecosystem Research
Emergency & Disaster Management DWG (EDM DWG)	Lewis Leinenweber, SE Solutions, Inc.
Geo Rights Management (GeoRM) DWG (GeoRM DWG)	Roland Wagner, BHT-Berlin (Beuth Hochschule für Technik Berlin)
Geography Markup Language (GML) DWG (GML DWG)	Ron Lake, Galdos Systems Inc.
Geometry DWG (GeometryDWG)	John Herring, Oracle USA
Geosemantics DWG (Semantics)	Joshua Lieberman, Deloitte Financial Advisory Services, LLP
Hydrology DWG (Hydrology DWG)	David Lemon, CSIRO
Location Services DWG (LS DWG)	Marwa Mabrouk, Esri
Mass Market DWG (MassMarket DWG)	Ed Parsons, Google
Metadata DWG (Metadata DWG)	David Danko, Esri
Meteorology & Oceanography DWG (Met Ocean DWG)	Chris Little, UK Met Office
Oblique Imagery DWG (ObliqueImageryD)	Shayne Urbanowski, Lockheed Martin
Security DWG (SecurityDWG)	Andreas Matheus, University of the Bundeswehr - ITIS
Sensor Web Enablement DWG (SensorWeb DWG)	Mike Botts, Botts Innovative Research
University DWG (Univ DWG)	Chris Higgins, Open Grid Forum
Web Feature Service DWG (WFS DWG)	Martin Daly, cadcorp (Computer Aided Development Corp.) Ltd.
Workflow DWG (Workflow DWG)	Stan Tillman, Intergraph Corporation

** - There may be Co-Chairs or Vice-Chairs that are not listed in this table

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Standards Working Groups (November 2011)

ARML 2.0 SWG (ARML 2.0 SWG)	Martin Lechner, Wikitude GmbH.
Catalogue Services 3.0 SWG (Cat 3.0 SWG)	Doug Nebert, US Geological Survey (USGS)
CF-NetCDF 1.0 SWG (CF-NetCDF1.0SWG)	Ben Domenico, University Corporation for Atmospheric Research (UCAR)
CityGML SWG (CityGML SWG)	Carsten Roensdorf, Ordnance Survey
ebRIM AP of CSW SWG (ebRIM AP of CSW)	Frédéric Houbie, Intergraph Corporation
ebXML RegRep SWG (ebXMLRegRepSWG)	Frédéric Houbie, Intergraph Corporation
GeoAPI 3.0 SWG (GeoAPI 3.0 SWG)	Martin Desruisseaux, GEOMATYS
Geographic Linkage Service 1.0 SWG (GLS 1.0 SWG)	Peter Schut, GeoConnections - Natural Resources Canada
GeoServices Rest SWG (GServRestSWG)	Satish Sankaran, Esri
GeoSPARQL SWG (GeoSPARQL SWG)	Carl Reed III, Open Geospatial Consortium, Inc.
GeoSynchronization 1.0 SWG (Geosync SWG)	Panagiotis (Peter) A. Vretanos, CubeWerx
GeoXACML SWG (GeoXACML SWG)	Jan Herrmann, Technische Universität München, Dept. of Informatics
GML 3.3 SWG (GML 3.3 SWG)	Clemens Portele, interactive instruments GmbH
GMLJP2 1.1 SWG (GMLJP2-1.1SWG)	David Burggraf, Galdos Systems Inc.
O&M 2.0 SWG (OM 2.0 SWG)	Simon Cox, CSIRO
OLS 1.3 SWG (OLS 1.3 SWG)	Carl Stephen Smyth, MAGIC Services Forum
Open GeoSMS SWG (Open GeoSMS SWG)	Kuo-Yu Chuang, Industrial Technology Research Institute
Ordering Services for Earth Observation Products SWG (order-eo1.0.swg)	Daniele Marchionni, European Space Agency (ESA)
OWS Common 1.2 SWG (OWSCommon1.2SWG)	James Greenwood, SeiCorp, Inc.
OWS Context SWG (OWScontextSWG)	David Wesloh, US National Geospatial-Intelligence Agency (NGA)
PubSub SWG (PubSub SWG)	Johannes Echterhoff, International Geospatial Services Institute (iGSI) GmbH
PUCK 1.0 SWG (PUCK 1.0 SWG)	Thomas OReilly, Monterey Bay Aquarium Research Institute
RESTful Services Policy SWG (RESTful SWG)	John Herring, Oracle USA
Sensor Model Language (SensorML) 2.0 SWG (SensorML2.0SWG)	Mike Botts, Botts Innovative Research
Sensor Observation Service (SOS) 2.0 SWG (SOS SWG)	Arne Broering, 52° North Initiative for Geospatial Open Source Software GmbH
Simple Features SWG (SF SWG)	John Herring, Oracle USA
Styled Layer Descriptor and Symbology Encoding 1.2 SWG (SLDSE 1.2 SWG)	Olivier Ertz, School of Business & Engineering Vaud (HEIG-VD)
SWE Common SWG (SWECommonSWG)	Alexandre Robin, EADS ASTRIUM
WaterML 2.0 SWG (WaterML2.0SWG)	OGC Portal Admin, Open Geospatial Consortium, Inc.
Web Coverage Service (WCS) SWG (WCS SWG)	Peter Baumann, Jacobs University Bremen GmbH
Web Mapping Service 1.4 SWG (WMS 1.4 SWG)	Satish Sankaran, Esri
Web Processing Service 2.0 SWG (WPS 2.0 SWG)	Bastian Schäffer, University of Muenster - Institute for Geoinformatics
WFS Gazetteer Profile 1.0 SWG (WFSgaz1.0 SWG)	Doug Nebert, US Geological Survey (USGS)
WFS/FES SWG (WFS/FES SWG)	Panagiotis (Peter) A. Vretanos, CubeWerx

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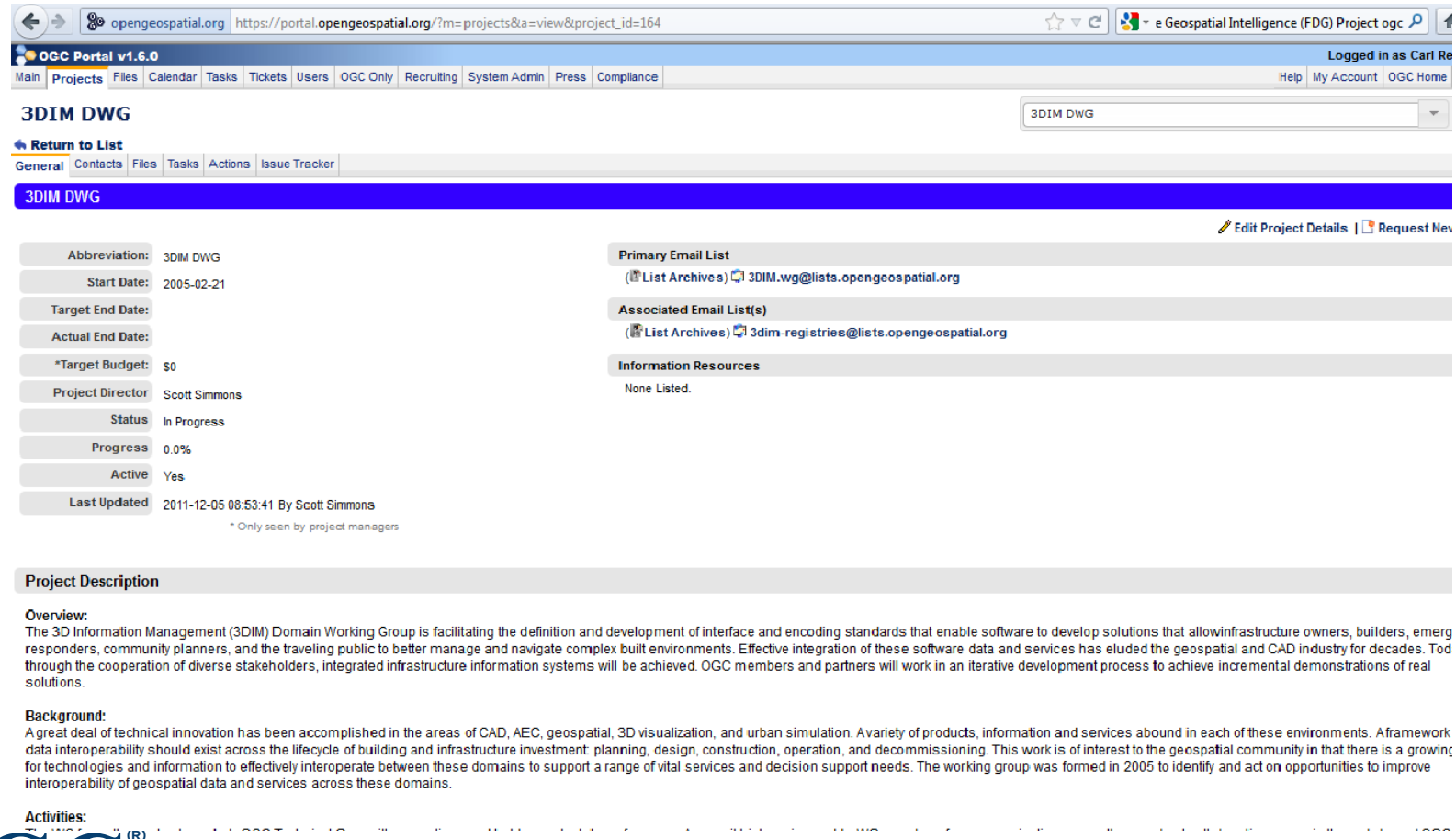
Every DWG and SWG has a portal page

- Go to https://portal.opengeospatial.org/?m=projects&tab=3 and select the WG of interest



What is the OGC Planning Committee?

- The Planning Committee provides guidance and the management structure for the Technical Committee and the Interoperability Program.
  - Members participate in OGC business planning and market focus activities
  - Manages the consortium's technology release process
  - Approves special negotiated memberships and committee participation.
  - Must be a Principal or Strategic Member or a TC representative to the PC to participate in PC activities.

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What is the OGC Architecture Board?

- Work with the TC and the PC to insure architecture consistency of the Baseline and provide guidance to the OGC membership to insure strong life cycle management of the OGC standards baseline
  - Reviews all OGC standards and revisions to standards prior to public comment.
  - General technology discussions and guidance
  - Evaluate candidate standards for fast track process
  - Issue resolution
- Nominated and Elected by the OGC Membership

OGC®

What is the OGC Naming Authority?

- The OGC-NA controls the assignment of OGC Names to resources of interest in geographic information infrastructures.
- Series of policy documents here
  - http://www.opengeospatial.org/ogc/policies/directives#urn
- Current policy is to use http uri's and not urn's.
- Part of any OGC standards development process is to submit list of proposed URIs to OGC-NA for review.
- There is an OGC registry and a resolver for assigned names.

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OGC Collaboration and Communication Assets

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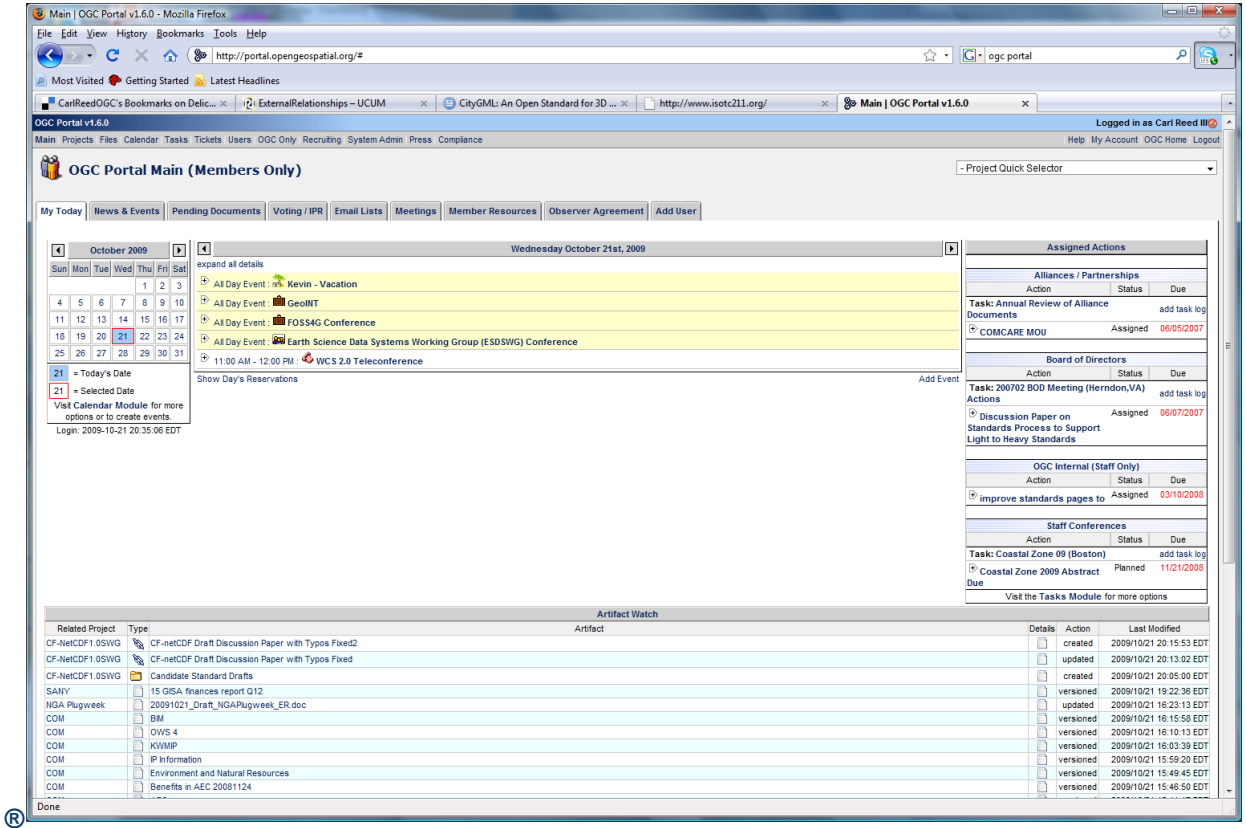
The Members only Portal

- The Portal is designed to assist OGC Staff and Members in the management and conduct of all aspects of OGC related activities. http://portal.opengeospatial.org



E-mail

- The life-blood of the OGC
- Every Working Group has an email list.
- An email list can be Members only or public. Public lists require Member approval.
- Any OGC Member in good standing can subscribe to any OGC TC email list.
- Use the portal to subscribe as desired.

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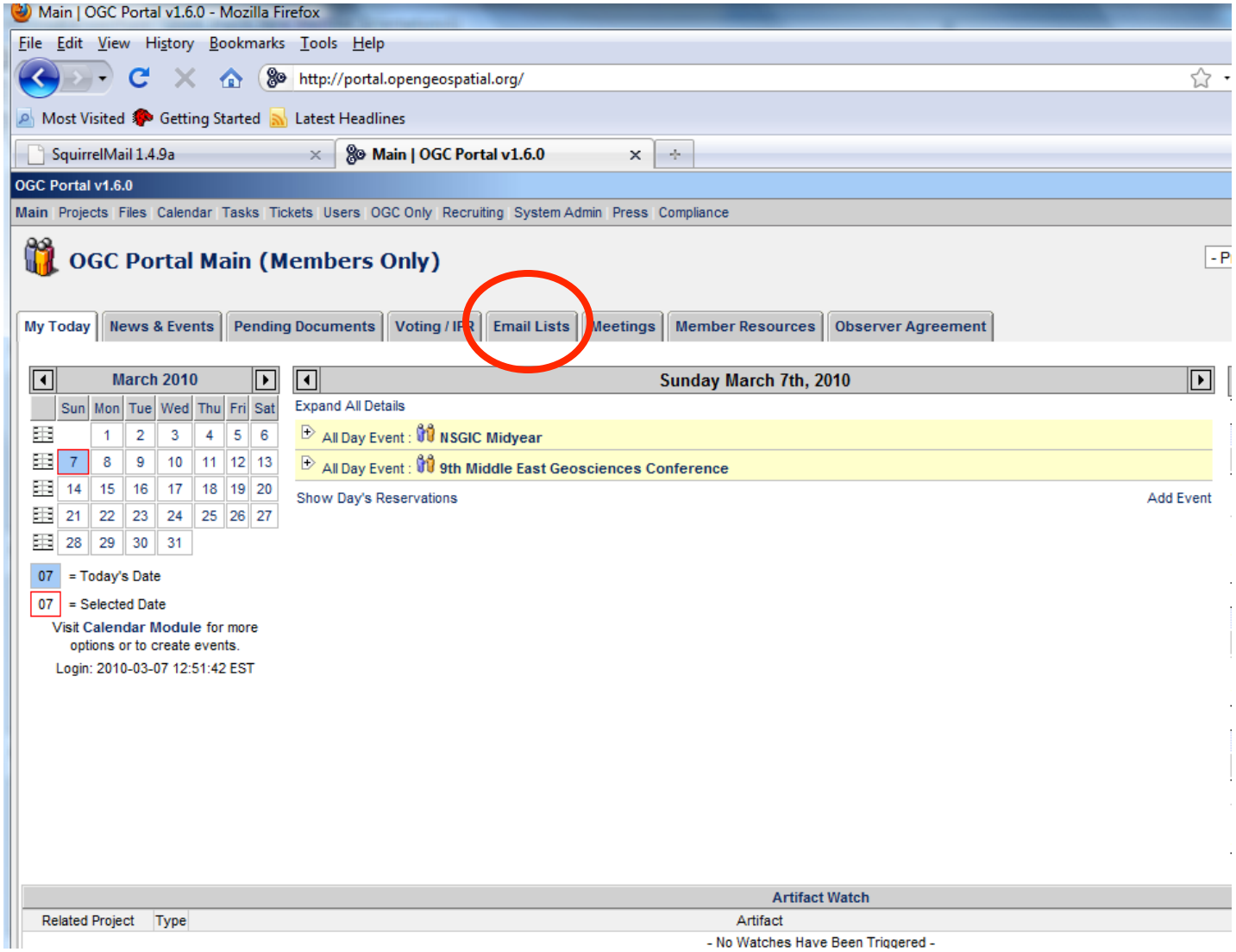
Portal email subscription application



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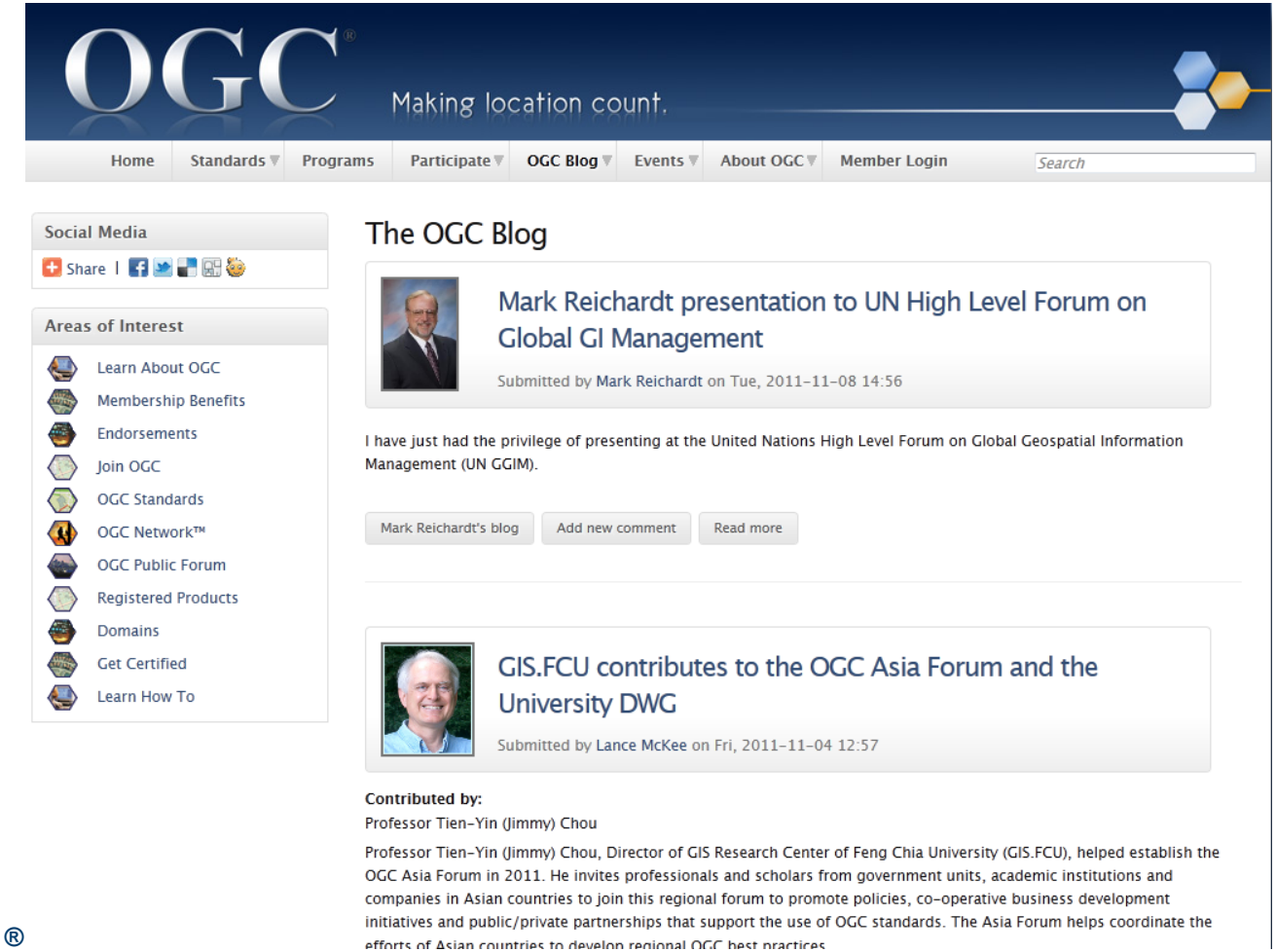
OGC Blog

- http://www.opengeospatial.org/blog



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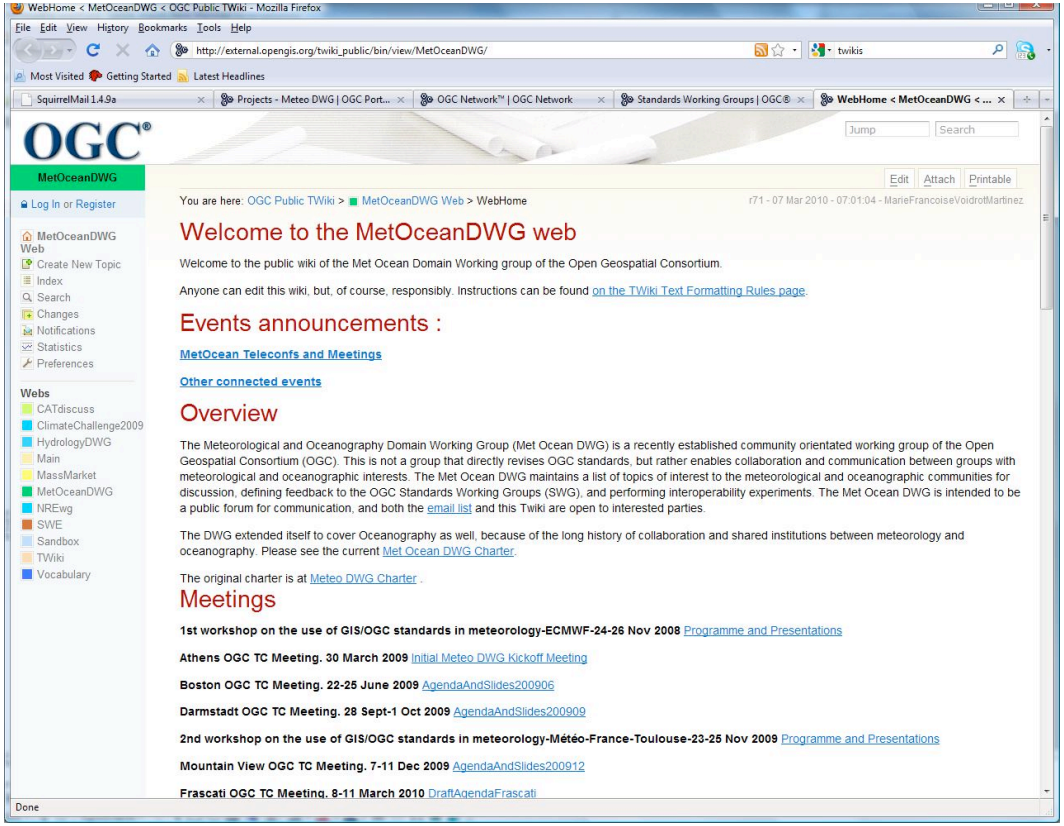
OGC Wikis/twikis

- Any OGC Working Group can request a wiki. Just need to let OGC staff know!
- Wikis can be Members only or also publicly accessible. Need Member approval to have a wiki public.



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OGCNetwork.net

- Network™ is a window onto the dynamic, constantly changing geospatial web as described by the OpenGIS® Reference Model (ORM). Multiple communities of interest for research in geospatial interoperability are supported, and persistent demonstration capability is provided.

- www.ogcnetwork.net

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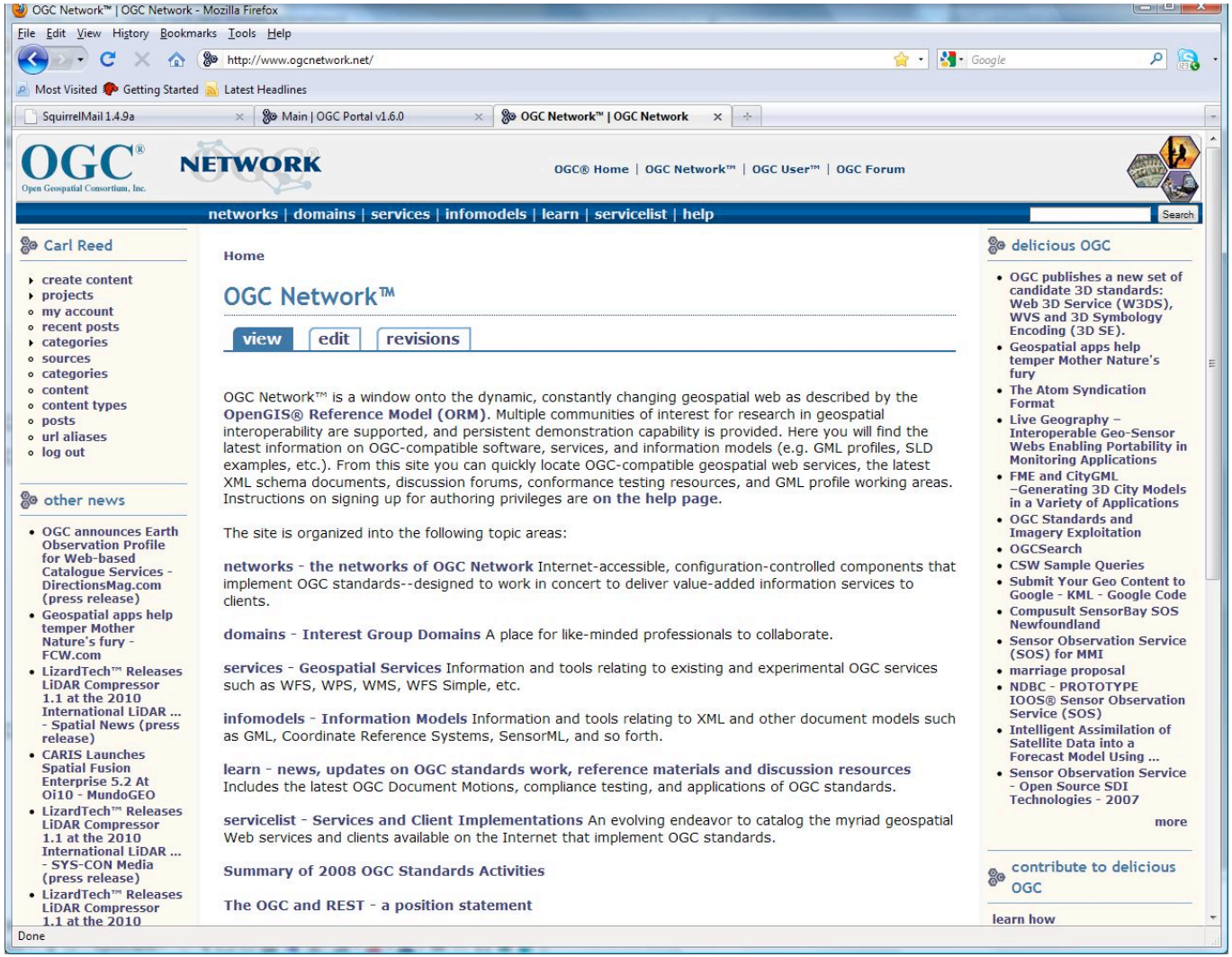
Home page for OGCNetwork



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OGC Document Catalogue using delicious

- **Summary:** *navigate OGC documents using Delicious, starting with http://delicious.com/tag/ogcdoc. Contribute by tagging your own important OGC documents with **ogcdoc**, plus other keywords such as {filter georss gml owc ows sas sdi sensorml sld sos styling swe wcs wfs wmc wms wps}*

- More information at http://www.ogcnetwork.net/ogcdoc

- Currently 400+ documents catelogued

- Please add content!

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OGC Meetings: Guidance

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General Information about OGC TC-PC Meetings

- There are four meetings per year
- One or more Members agree to sponsor/host OGC TC-PC meetings
- We try to plan meetings at least 18 months out.
- In different regions.
- If your organization is interested in sponsoring or hosting an OGC meeting, please contact Greg Buehler.

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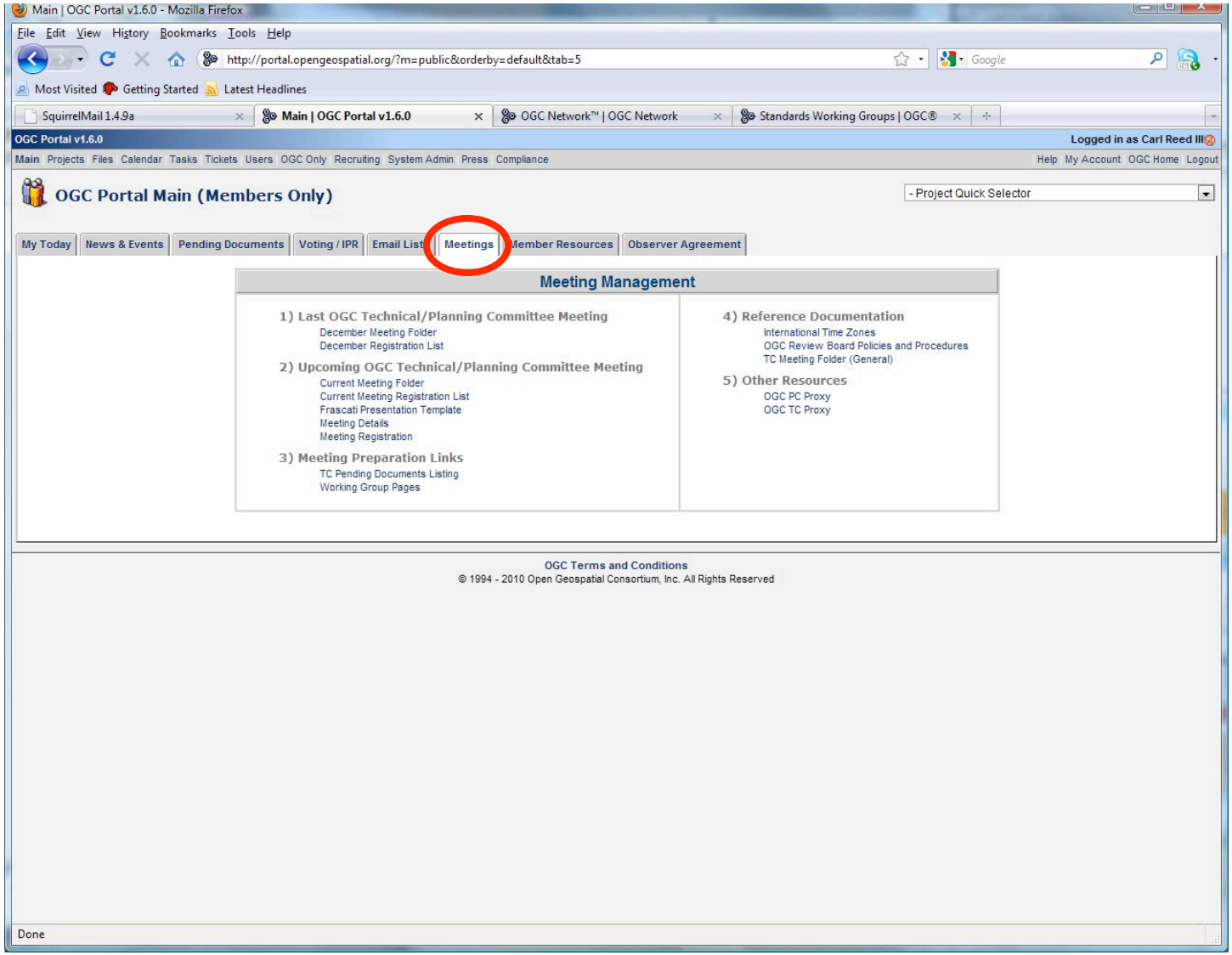
How to navigate to meeting information



The Three Week Rule

- Under the TC policies and procedures, any document that is to be discussed and voted on by the members must be submitted at least three weeks prior to a given meeting.

- The TC can vote to suspend this policy for a specific document vote.
  - This requires a 2/3 majority of the voting Members present in order to override the P&P

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Where are documents submitted?

- On the portal in the Pending Documents project.
  - Members attending a TC meeting are strongly encouraged to review the documents in the Pending Documents catalog and read those of interest. These documents form the foundation for many of the discussions and votes that occur at an OGC TC meeting.

- To obtain the current list of pending documents, go to http://portal.opengeospatial.org/index.php?m=public&orderby=default&tab=2 .

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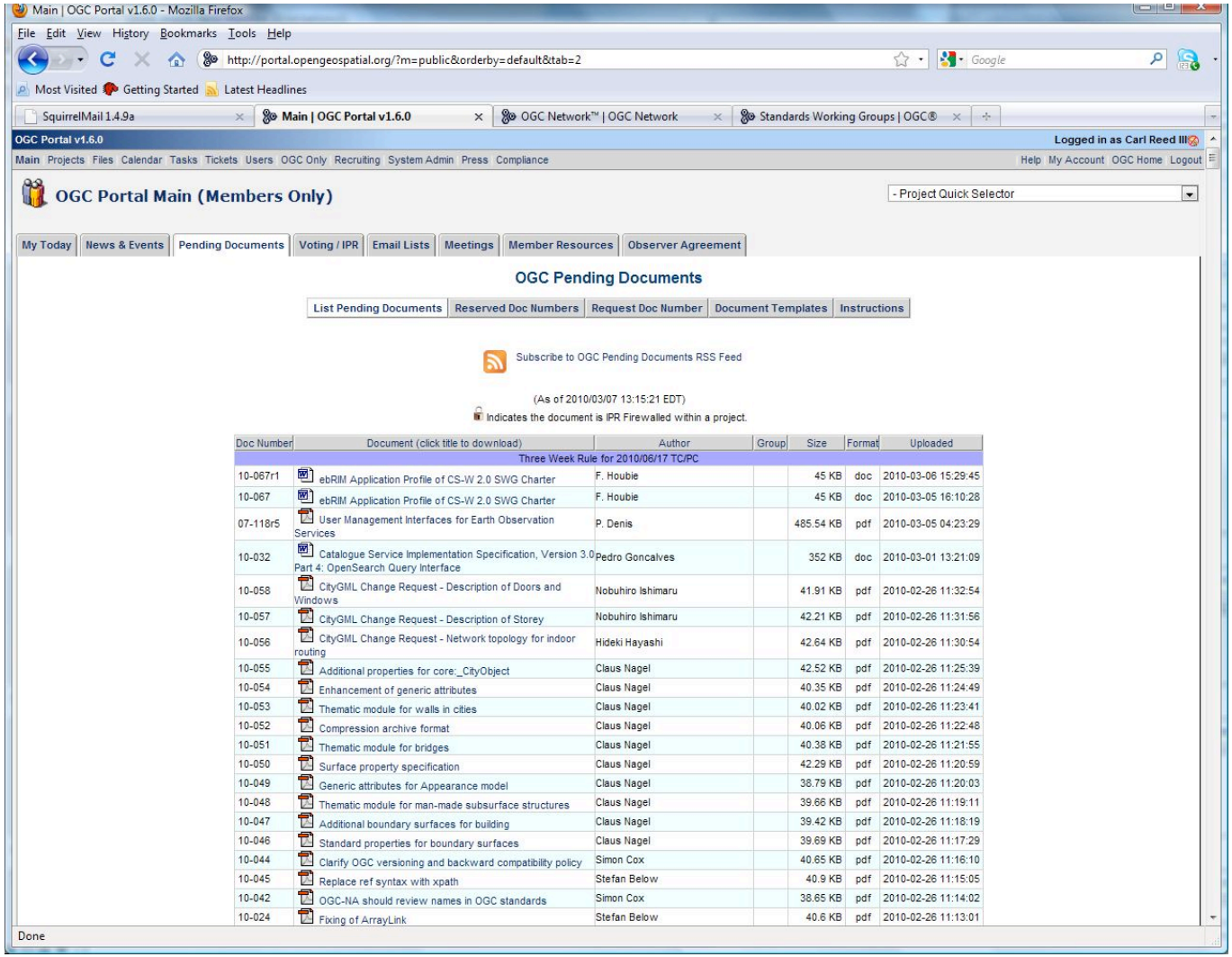
The Portal Pending Documents Page



Doc Number	Document (click title to download)	Author	Group	Size	Format	Uploaded
Three Week Rule for 2010/06/17 TC/PC						
10-067r1	ebRIM Application Profile of CS-W 2.0 SWG Charter	F. Houbie		45 KB	doc	2010-03-06 15:29:45
10-067	ebRIM Application Profile of CS-W 2.0 SWG Charter	F. Houbie		45 KB	doc	2010-03-05 16:10:28
07-118r5	User Management Interfaces for Earth Observation Services	P. Denis		485.54 KB	pdf	2010-03-05 04:23:29
10-032	Catalogue Service Implementation Specification, Version 3.0 Part 4: OpenSearch Query Interface	Pedro Goncalves		352 KB	doc	2010-03-01 13:21:09
10-058	CityGML Change Request - Description of Doors and Windows	Nobuhiro Ishimaru		41.91 KB	pdf	2010-02-26 11:32:54
10-057	CityGML Change Request - Description of Storey	Nobuhiro Ishimaru		42.21 KB	pdf	2010-02-26 11:31:56
10-056	CityGML Change Request - Network topology for indoor routing	Hideki Hayashi		42.64 KB	pdf	2010-02-26 11:30:54
10-055	Additional properties for core:_CityObject	Claus Nagel		42.52 KB	pdf	2010-02-26 11:25:39
10-054	Enhancement of generic attributes	Claus Nagel		40.35 KB	pdf	2010-02-26 11:24:49
10-053	Thematic module for walls in cities	Claus Nagel		40.02 KB	pdf	2010-02-26 11:23:41
10-052	Compression archive format	Claus Nagel		40.06 KB	pdf	2010-02-26 11:22:48
10-051	Thematic module for bridges	Claus Nagel		40.38 KB	pdf	2010-02-26 11:21:55
10-050	Surface property specification	Claus Nagel		42.29 KB	pdf	2010-02-26 11:20:59
10-049	Generic attributes for Appearance model	Claus Nagel		38.79 KB	pdf	2010-02-26 11:20:03
10-048	Thematic module for man-made subsurface structures	Claus Nagel		39.66 KB	pdf	2010-02-26 11:19:11
10-047	Additional boundary surfaces for building	Claus Nagel		39.42 KB	pdf	2010-02-26 11:18:19
10-046	Standard properties for boundary surfaces	Claus Nagel		39.69 KB	pdf	2010-02-26 11:17:29
10-044	Clarify OGC versioning and backward compatibility policy	Simon Cox		40.65 KB	pdf	2010-02-26 11:16:10
10-045	Replace ref syntax with xpath	Stefan Below		40.9 KB	pdf	2010-02-26 11:15:05
10-042	OGC-NA should review names in OGC standards	Simon Cox		38.65 KB	pdf	2010-02-26 11:14:02
10-024	Fixing of ArrayLink	Stefan Below		40.6 KB	pdf	2010-02-26 11:13:01

http://portal.opengeospatial.org/?m=public&orderby=default&tab=2

Schedule and Agendas

- Defining the master schedule is a very fluid process.
- Group chairs begin making meeting time requests 3 to 4 weeks prior to the meeting.
- Master schedule shown on the OGC Web site under “Next Meeting”.
- According to OGC procedures, the master schedule is supposed to be “firm” 3 weeks prior to the meeting; the agenda is known to change up to the morning of the opening plenary.
- Final meeting schedule is provided when you register for the meeting. Changes occurring during the meeting are posted on the bulletin board near the OGC meeting registration desk

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Key piece of advice . . .

- Never be afraid to approach someone and introduce yourself. Also, don't be afraid to ask questions, especially when it comes to jargon and acronyms!

- Every Member has an equal voice!

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OGC Documents

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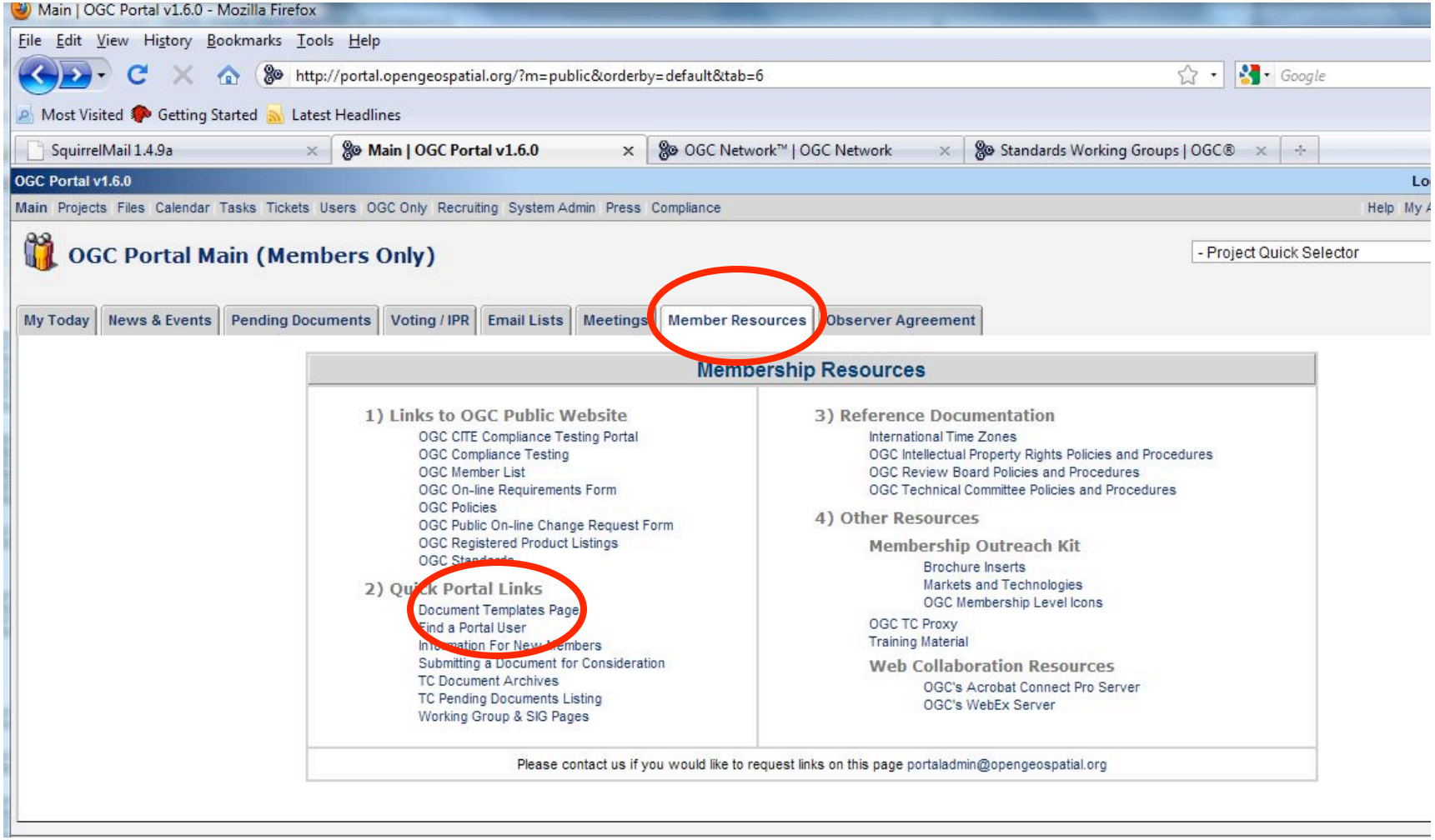
OGC Document Templates



http://portal.opengeospatial.org/?m=public&orderby=default&tab=6

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OGC Document Numbers

OGC document numbers as shown in pending. These are assigned when a document is first uploaded to pending documents.

Doc Number	Document (click title to download)	Author	Group	Size	Format	Uploaded
Three Week Rule for 2010/06/17 TC/PC						
10-124	OGC Identifiers – the case for http URIs	Simon Cox		142 KB	doc	2010-05-20 16:05:07
10-123	Align with Catalogue/CSW 3.0	Leif Stainsby		100.99 KB	pdf	2010-05-20 15:49:26
10-122	Define Life-cycle Update transaction method	Leif Stainsby		106.69 KB	pdf	2010-05-20 15:47:39
10-121	Define Extensible Life-Cycle model	Leif Stainsby		103.8 KB	pdf	2010-05-20 15:46:42
10-120	Repository Item validation	Leif Stainsby		105.18 KB	pdf	2010-05-20 15:45:09
10-119	Revise definition of VersionInfo/@versionName property	Leif Stainsby		111.5 KB	pdf	2010-05-20 15:43:50
10-118	Define a Registry Extension Package model	Leif Stainsby		107.59 KB	pdf	2010-05-20 15:41:33
10-117	Define a packaging format for CSW-ebRIM Extension Packages	Leif Stainsby		105.39 KB	pdf	2010-05-20 15:33:17
10-116	Add support for multiple file input such as shp files	Bastian Schäffer		99.35 KB	pdf	2010-05-20 15:32:03
10-115	Make clear the distinction between a Process Description, a WPS Application Profile, a profile of the WPS Specification	Edward Nash		103.12 KB	pdf	2010-05-20 15:30:56
10-114	Version number in Normative References to OGC documents	Steven Keens		104.79 KB	pdf	2010-05-20 15:29:45
10-113	LockFeature description does not correlate with schema fragments.	Panagiotis (Peter) A. Vretanos		104.09 KB	pdf	2010-05-20 15:28:29
10-112	Refine Granularity of Timestamps	Thomas Lane		103 KB	pdf	2010-05-20 15:27:13
10-111	Public comments on GeoAPI 3.0 specification draft	Martin Desruisseaux		167.54 KB	pdf	2010-05-20 12:56:54
09-142r3	Open GeoSMS Specification	Kuo-Yu slayer Chuang		359.66 KB	pdf	2010-05-20 11:26:18
10-110	Catalogue (CSW) 2.0.2 CR: introducing a new attribute to enrich the semantics of numberOfRecordsMatched	Yuqi Bai		104.88 KB	pdf	2010-05-19 14:55:49
10-066	Semantics of requirements class extension	Lorenzo Bigagli		103.67 KB	pdf	2010-05-19 14:53:14
10-065	Include MIME type specifications in XML encoding standards	Simon Cox		107.62 KB	pdf	2010-05-19 14:50:52
10-109	Make get Domain more general	Panagiotis (Peter) A. Vretanos		104.07 KB	pdf	2010-05-17 12:31:50
10-108	KML Change Request: Correct latitude & longitude bounds & defaults	Tyler Erickson		103.16 KB	pdf	2010-05-16 01:57:07
10-107r1	KVP parameter ordering and unrecognized KVP parameters	Keith Pomakis		105 KB	pdf	2010-05-16 01:51:26
10-106	BNF for WKT syntax does not specify whitespace between coordinates	Kevin Martin		104.01 KB	pdf	2010-05-16 01:43:58
10-105	Create new feature type capability for WFS	Panagiotis (Peter) Vretanos		101.55 KB	pdf	2010-05-16 01:41:46

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OGC Doc Types – from Standards to informational documents

- Implementation Specifications - Standards
  - Basis for working software; detail the interface structure between software components
- Abstract Specifications
  - Conceptual foundation / reference model for spec development
- Best Practices
  - Describe use of specifications
- Engineering Reports
  - Results from OGC Interoperability Program
- Discussion Papers
  - Forum for public review of concepts

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OGC Change Requests

- Can be submitted by anyone – Member or non-Members
- Use the public Change Request Submission application
  - http://portal.opengeospatial.org/public_ogc/change_request.php

OGC On-line Change/Requirement Request

Instructions

The below Request form is for submitting official change requests for current publicly available OGC documents and Standards, and for official new requirments not related to current docu documents or Standards would include, but are not limited to: Implementation Standards, Abstract Specifications and Best Practices Papers. All request submissions will be vetted for ap blatant errors or omissions, the OGC Staff and/or responsible Standards Working Group have the right to reject the proposed request. Rejected submissions will be returned to the subn submission and the comments will be archived. Bogus submissions will be discarded without notice.

Once a submission is deemed appropriate, the Technical Committee Chair (TCC) has the responsibility of assigning the Request (CR or Requirement) to the appropriate OGC Committee, Working Group. All Change Requests are public and available on the OGC Website. Requirements will be made available shortly.

Should you have any questions about the process for new requirements, please contact **creed@opengeospatial.org**.

Should you have any questions about this form, or the process for change requests, please contact **change-requests@opengeospatial.org**.

1. **Submitter Contact Information**
2. Confirmation of Submitter Information
3. Input of Request Details
4. Request Review (off-line by OGC Staff/SWG)

Step 1

Given Name:	
Last Name:	
Organization:	
Email:	
Type of Submission:	Change Request New Requirement

CONTINUE

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Engineering Report (ER)

- **Definition:**
  - A document that reports on some technical activity in an Interoperability Program Initiative. An ER is not a publicly available document. An ER does not represent the official position of the OGC nor of the OGC Technical Committee.

- **Clarification**
  - Ers will not be referred to as a “candidate standard” “candidate standard”.
  - Developed by members potentially with help from OGC Consultants and staff
  - An ER can become a Public Engineering Report, a Best Practices Paper, or submitted via the OGC RFC process for consideration as an adopted standard.
  - Usually first released as a Public Engineering Report if members deem document is mature enough.

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Public Engineering Report (ER)

- **Definition:**
  - An ER is a document that reports on some technical activity in an Interoperability Program Initiative. A public ER is an ER that the OGC Members have approved for public release.

- **Clarification**
  - ERs will not be referred to as a "candidate standard".
  - Developed by members potentially with help from OGC Consultants and staff
  - An ER can eventually become a Best Practices Paper, or submitted via the OGC RFC process for consideration as an adopted standard.
  - An ER is not an official position of the OGC nor of the OGC Technical Committee

Discussion Paper

- **Definition:**
  - A document containing discussion of some technology or standards work for release to the public. Discussion Papers are not the official position of the OGC and contain a statement to that effect.

- **Clarification**
  - A Discussion Paper can eventually become a Best Practices document or an adopted standard via the RFC process or the Profile adoption process.
  - Not a white paper. A Discussion paper is related to one or more approved or candidate standards.
  - Members deem document is mature enough for public release.

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OGC White Paper

- **Definition**:
  - A publication released by the OGC to the Public that states a position on a social, political, technical or other subject, often including a high-level explanation of an architecture or framework of a solution. A White Paper often explains the results or conclusions of research.

- **Clarification**
  - A WP is written by OGC staff, OGC consultants, or OGC member(s) on a particular technology or domain topic of interest to the community and related to the ongoing standards development work of the Consortium.
  - A WP will not be considered for adoption as an OGC Implementation Standard
  - Release must be approved by the members (vote).
  - Not an official position of the OGC

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Best Practices Document

- **Definition**:
  - A document containing discussion of best practices related to the use and/or implementation of an adopted OGC standard or related technology and for release to the public. Best Practices Papers are the official position of the OGC and thus represent an endorsement of the content of the paper.

- Clarification
  - A best practice is a technique or methodology that, through experience and research, has proven to reliably lead to a desired result when using one or more OGC standards
  - Must be approved by the membership via an electronic vote for public release.
  - Must have evidence of implementation.

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OGC Standards Documents

- OGC Standards Documents have 2 subtypes:
  - Abstract Specifications (AS)
  - Implementation Standards (IS)
- Standards are the primary “product” of the work of the Consortium.
- Guided by the Technical Committee Policies and Procedures.
  - http://portal.opengeospatial.org/files/?artifact_id=23325

OGC®

Abstract Specification (AS)

- A document (or set of documents) containing an OGC (and in numerous cases ISO) consensus on a *technology independent* model that describes an application environment for interoperable geoprocessing and geospatial data and services products.
  - Formal review and vote by Members.

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OGC Implementation Standard (IS)

- A document containing an OGC consensus approved technology *dependent (e.g, http) specification* for interfaces, encodings, and related specifications based on the Abstract Specification
  - Formal review via the RFC process.
  - Includes member approved profiles and application schemas.
  - May also become an ISO standard

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Guiding Policies/Procedures by Document Type

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Key policy points by Document Type **

Document Type	Member Review	WG Actions	IPR Review	Vote Required
White Paper	Yes	No	No	Yes
Best Practices	Yes	Yes	No	Yes
Discussion Paper and Engineering Report	Yes	Yes	No	Yes
RFC/Candidate Standard	Yes	Yes	Yes	Yes

Key process actions for Implementation Standards on next slide

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IS Sub-type Processing Requirements

IS Sub-type	RFC Required?	Public Review?	IPR Review?
Interface	Yes	Yes	Yes
Encoding	Yes	Yes	Yes
Profile	Yes	Yes	Yes
Application Schema	Yes	Yes	Yes

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OGC Policies and Procedures You need to be aware of

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What you need to know about submitting documents for consideration by the members

- Must follow the correct template:
  - Templates can be found at http://portal.opengeospatial.org/index.php?m=projects&a=view&project_id=82&tab=2&artifact_id=3238
- Must be posted to pending documents
  - http://portal.opengeospatial.org/index.php?m=public&orderby=default&tab=2
  - Follow directions available on that page
- 3 Week rule
  - Any document that is to be considered by the membership at a Face to Face technical committee meeting must be posted at least three weeks prior to the date of the meeting.

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Key Specification Processes

- The following slides cover key specification processes used by the OGC Technical Committee to consider, approve, and maintain an OGC standard
  - The Request for Comment (RFC)
  - Voting
  - The Standards Working Group

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RFC Submission Process & Guidelines

Feb 6, 2012

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The OGC Request for Comment (RFC) Process

- The primary mechanism for introducing a candidate standard or a revision to an existing standard into the OGC consensus approval process
- Has a number of steps to insure an open and transparent approval process.
- There is a document that describes all of the steps
  - https://portal.opengeospatial.org/files/?artifact_id=42012
- There is an alternative submission process known as the OGC Fast Track process

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Request For Comment (RFC) - Candidate

- Definition:
  - A candidate standard in the form of an existing, operational specification that one or more OGC Voting TC Members wish to sponsor as an RFC submission under the Bylaws of the OGC.

- Clarification
  - Follows current OGC TC P&P for RFC process as to how a Candidate Standard moves through the adoption process.
  - Can only be submitted by OGC members.
  - One submitter must be TC Voting member
  - Submission team shall have a minimum of 3 OGC Member organizations

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Summary of RFC Start-up

- Candidate standard submission team notifies the OGC (Technical Committee Chair) that there is going to be an RFC submission.
  - Endorsers notify the TCC of support for the submission.
  - Document is in proper template format.
- Cover letter with commitment to implement is provided.
- If required, a Submission of Technology Form is signed and submitted (must be done prior to public comment period)
- Candidate standard submitted to the OGC
- SWG charter developed and announced
- Broad Industry announcement.

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The Voting Process

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Votes happen all the time in the OGC

- Votes can occur in any of the following venues:
  - At the opening or closing Technical Committee plenary
  - In any of the Working Groups
  - In any of the TC sub-committees

- Votes can happen at face to face meetings or by electronic vote.

- There are rules regarding who can vote, when, and it what forum. These cases are now defined

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Types of votes

- Approval of a new OGC standard
- Approval of a revision of an existing OGC Standard
- For approval of release of an OGC document as a Discussion, White, or Best Practices Paper
- Approval of a new or revised policies and procedures document
- Vote for the TC representatives to the Planning Committee
- An override of the 3 week rule
- An election of the members of the OGC Architecture Board.
- Formation of a new Domain WG or Subcommittee

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Votes in a Working Group

- Can happen in F2F meetings or by e-vote
- Anyone can vote in a WG vote
- Simple majority of those present carries the vote
- No notice is required for votes in F2F meetings.
- A notice is required for any WG e-votes
- However, only one vote per member organization!

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Votes in a Standards Working Group

- Can happen in F2F meetings or by e-vote
- Only voting members of the SWG can vote
- Simple majority of the official members carries the vote
- No notice is required for votes in F2F meetings.
- A notice is required for any SWG e-votes

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Votes in a TC Plenary

- A number of votes will occur in a TC Plenary. There will also be a variety of votes, including all the voting types identified in the previous slide.
- Therefore, it is important to know who can vote and when
- The next slide has a table of voting types and who can vote.

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Table of votes that can occur in a Plenary

Vote Type	Who can Vote
White Paper, Discussion Paper, or Engineering Report	Any member except Individual
Approval of Domain WG Charter	Any member except Individual
Election of TC reps to the PC	Any member except Individual
Best Practices Paper	TC Voting Member Only

Vote Type	Who can Vote
Approval of new standard	TC Voting member only
Approval of a revision to standard	TC Voting member only
Changes to TC P&P	TC Voting member only
Architecture Board Election	TC Voting member only

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Standards Working Group Formation and Process

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Mission of a SWG

- Work on a standards document
  - Write a new standard based on requirements
  - Process a candidate standard from an RFC submissions
  - Revise an existing adopted OGC standard

- Open to all OGC members to participate

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SWG Formation

- Three or more members agree to form a new SWG.
- The group writes a charter. Must use template.
- Staff reviews the charter and works with charter members to finalize charter
- Charter is posted to pending documents
- TCC announces intent to form new SWG and asks members to review charter.

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Clarification of Process related to joining a SWG

- Charter Members:
  - Are the individuals who elect to join a new SWG during the charter development period.
  - When a new SWG is being formed, the convener needs to make a broad announcement to the Membership asking if anyone would like to join as a Charter Member.
  - Are immediately opted into the SWG once the TCC formally announces the new SWG and makes a call for participation.
  - Charter members do not need to join the SWG by going through the Observer opt-in process. By being a Charter member, you have elected to participate in the SWG and therefore are agreeing to the IPR terms of the SWG.
  - Charter members can vote at the first meeting of the SWG.

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Opting to participate: Observers

- Once a new SGW charter has been posted to pending, the TCC will make a general announcement. Please review the charter, ask any questions, and perhaps determine that your organization would like to participate.
  - During this week, OGC staff will work with the SWG Charter members to create the necessary portal presence for the new SWG
- After one week – unless there are objections from the TC – the TCC will make a call to participate. The email from the TCC will contain information about where and how to join the new SWG.
- The following OGC portal page has all current OGC activities that you may participate in, including a list of active SWGs
  - http://portal.opengeospatial.org/?m=public&orderby=default&tab=7

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Who can vote in a SWG?

- Charter Members can vote at the first meeting of the SWG
- Individuals who opt to participate (and are not charter members) have a 30 day waiting period before they can vote on any items or issues. Opting in means that the member agrees to the intellectual property terms of the SWG
  - But they can participate in any discussions
  - They may opt out during the 30 day waiting period with no IPR requirements
- The Chair will (via the portal) have the current list of allowed voters in a SWG

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Example Domains of Interest

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OGC Activities Driven by Community Needs

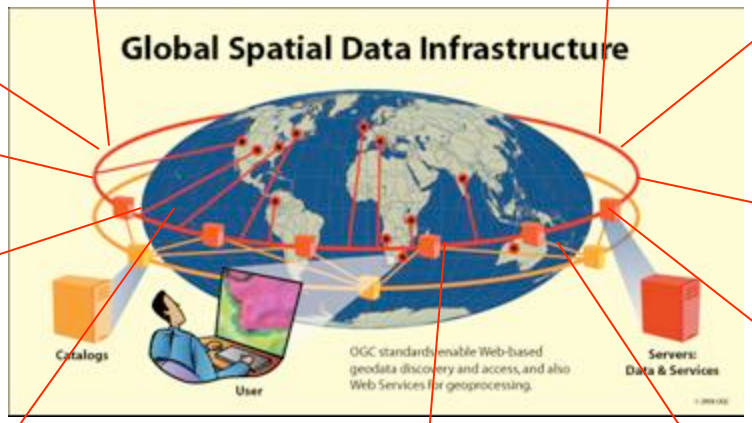
Other Standards Organizations

Education & Research

Sustainable Development

Infrastructure - Transportation

Health



E -Government

Emergency Services, Disaster Management

Aviation

Energy

Geosciences

Consumer Services, Real Time Information

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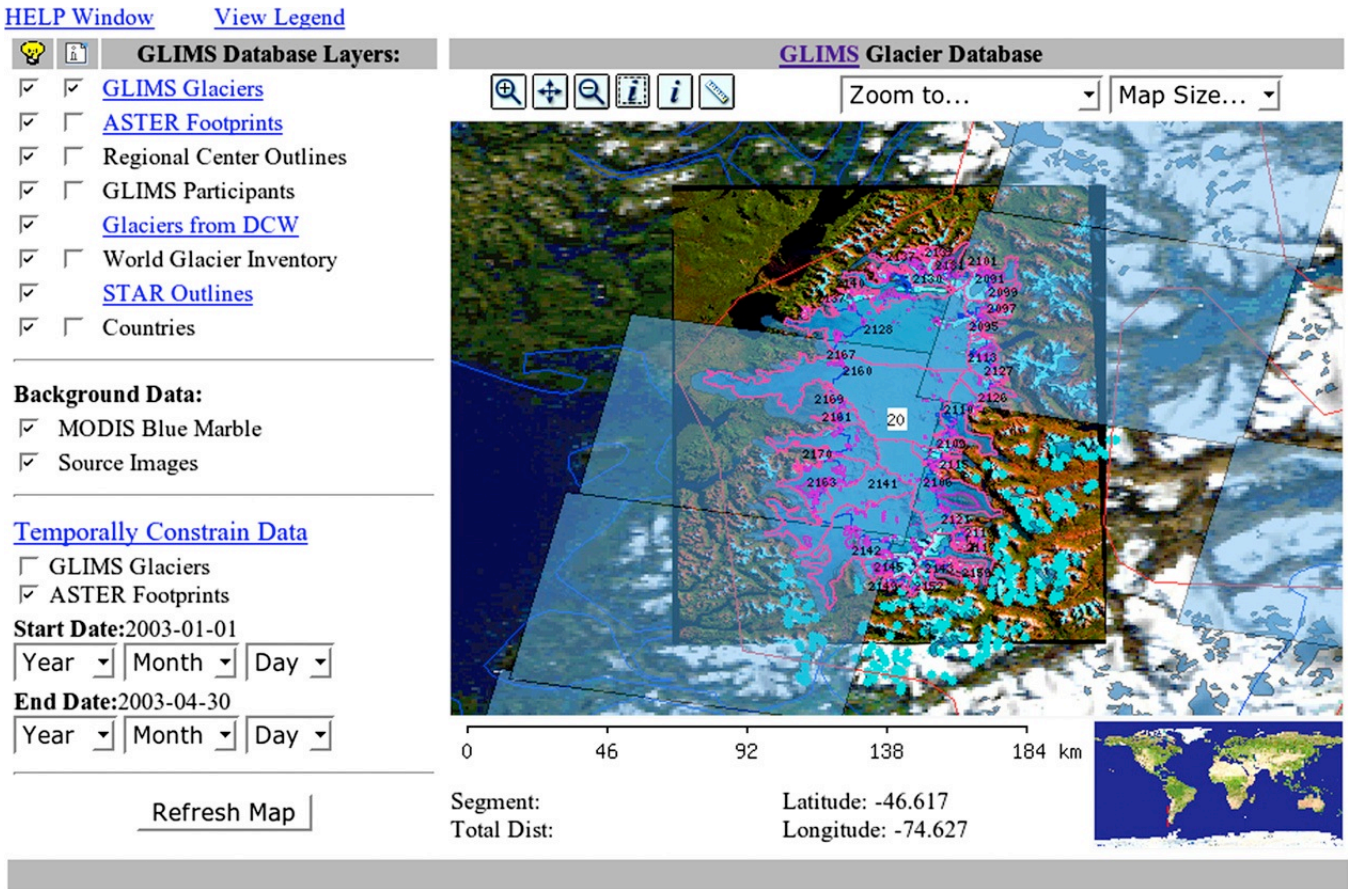
Domains of interest: Cryosphere



- GLIMSView
  - http://astrogeology.usgs.gov/Projects/GLIMSView/

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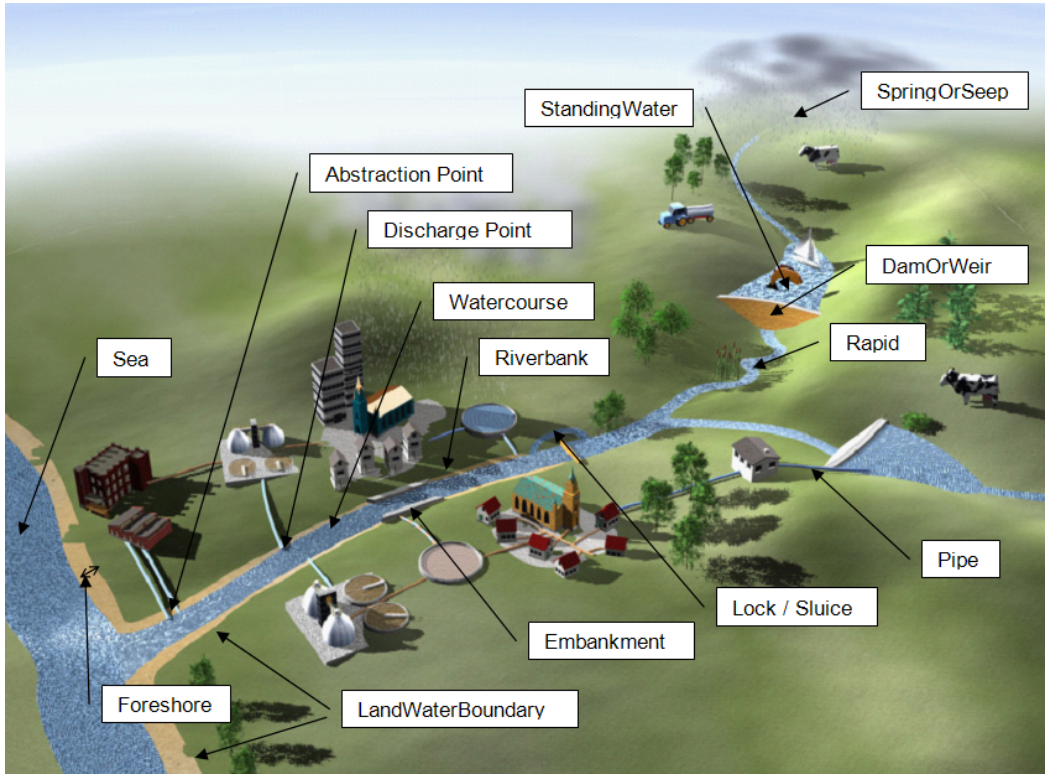
Domains of interest: Hydrology

- Define an information model that enables sharing of water data on a global basis and then encode as an XML/GML application schema.



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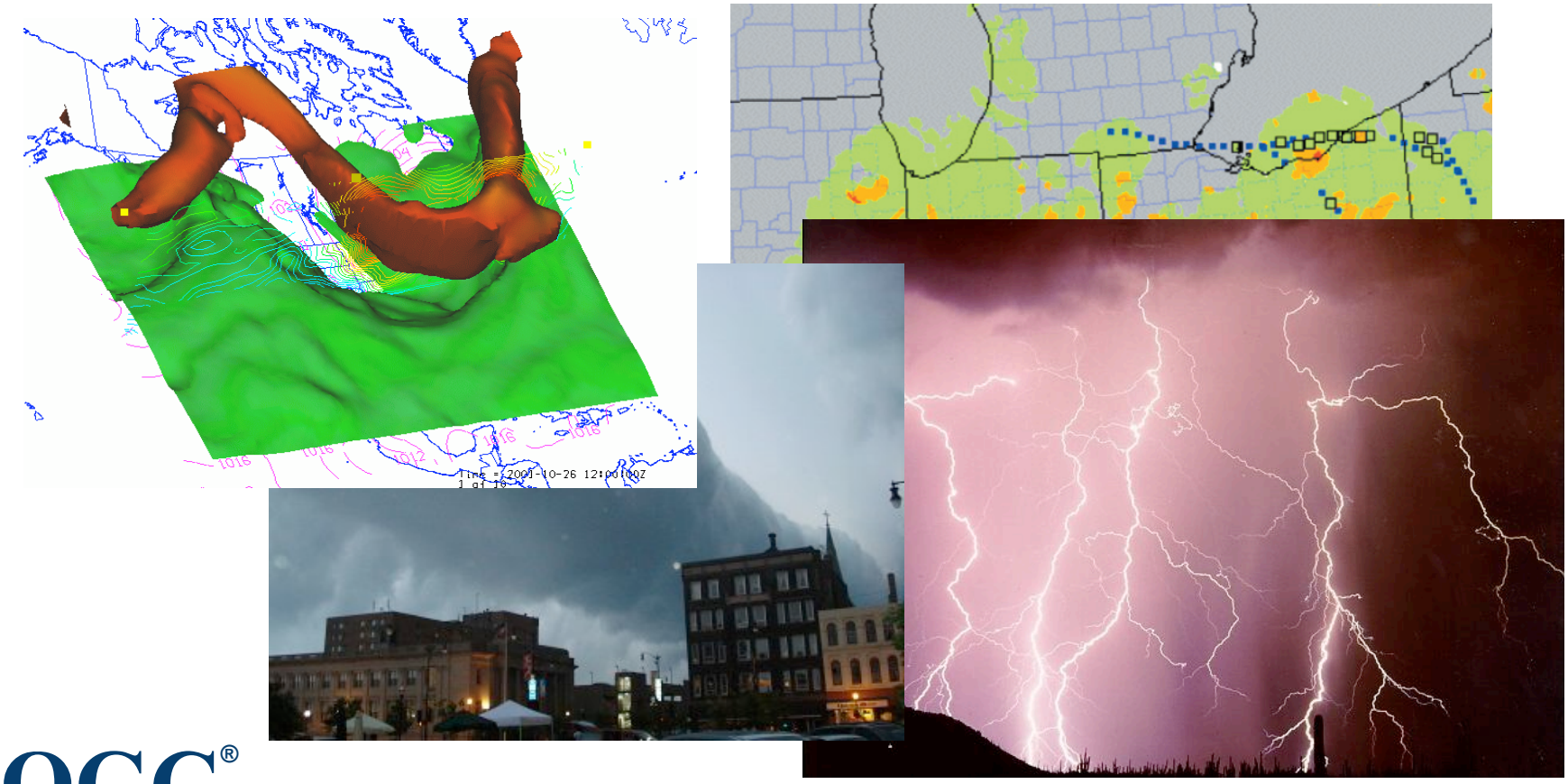
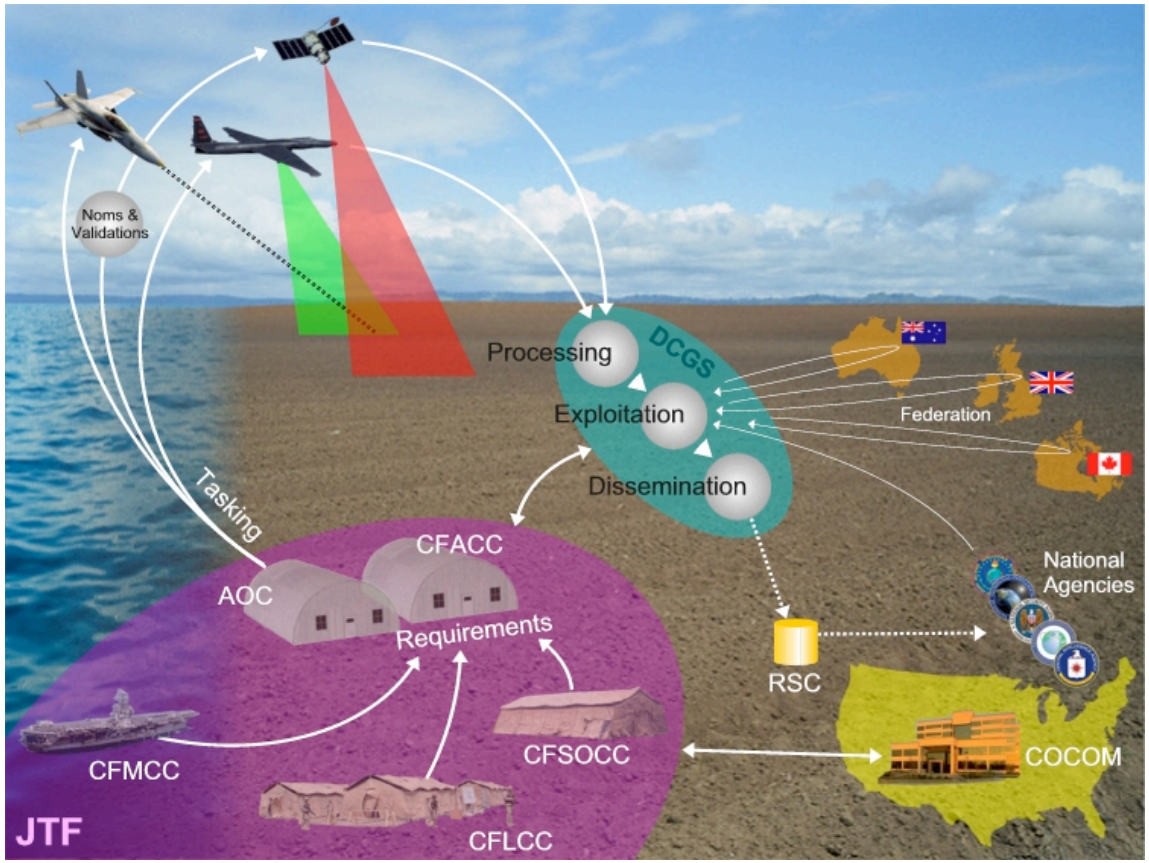
Domains of interest: Meteorology/Oceans

- The OGC Meteorology and Oceanography DWG provides an open forum for work on meteorological and oceanographic data interoperabilitand a process to publish and revise OGC Best Practices and Standards thence giving a route for submission to WMO CBS for adoption.



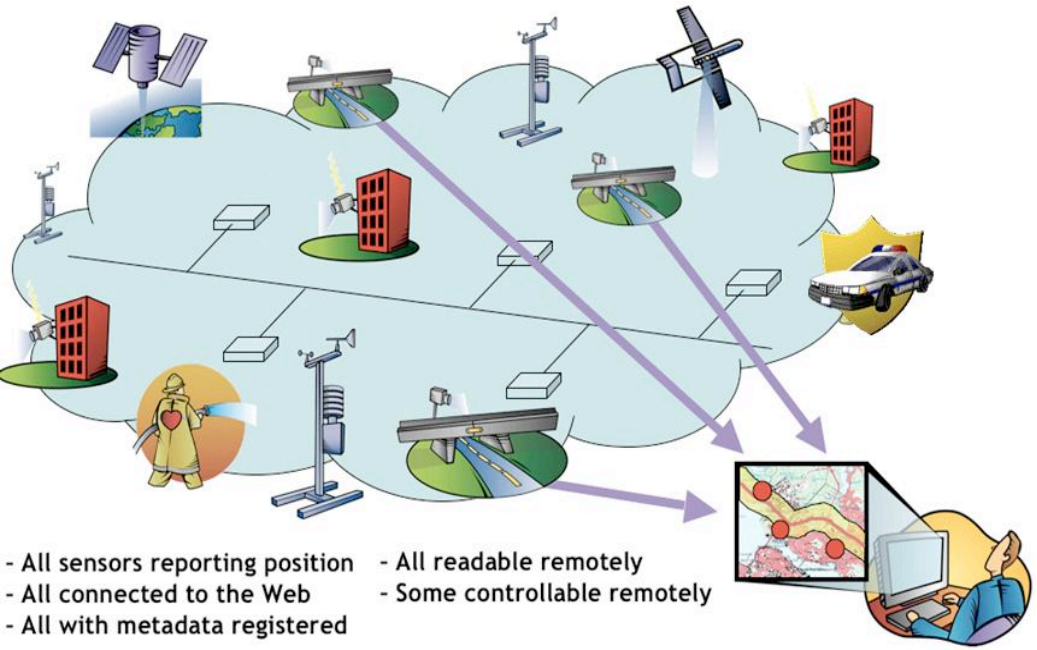
Domains of interest: Defence and Intelligence

- Real time access, integration, and fusion of static and real time assets for counter-terrorism, in support of the Warfighter, and other command and control operations



Domain of Interest: OGC Sensor Web Enablement Standards (SWE)

Enable 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)

--Complementary Standards--

- ✓IEEE 1451 smart sensor standard
- ✓OASIS (alert) standards

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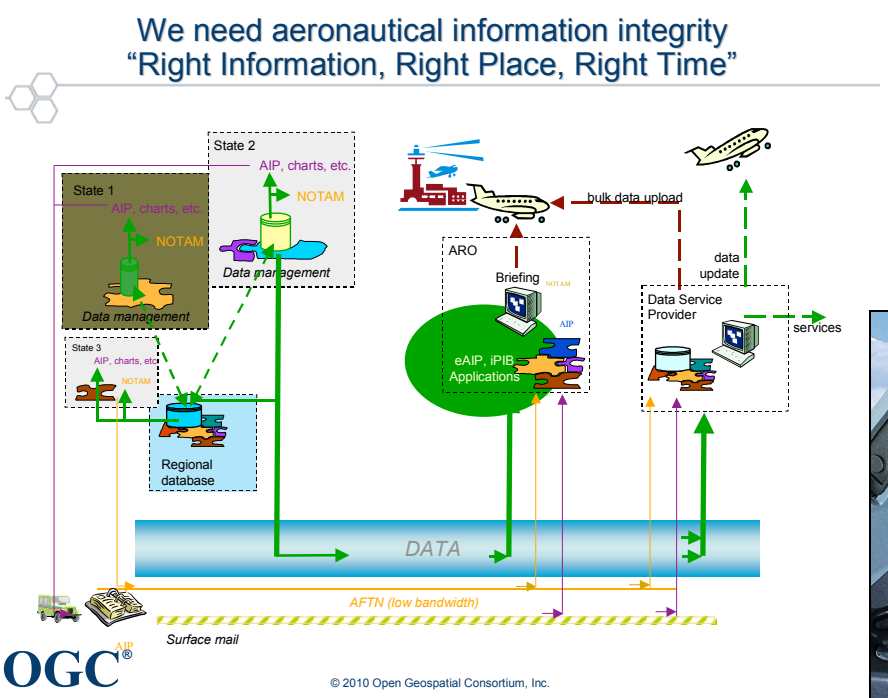
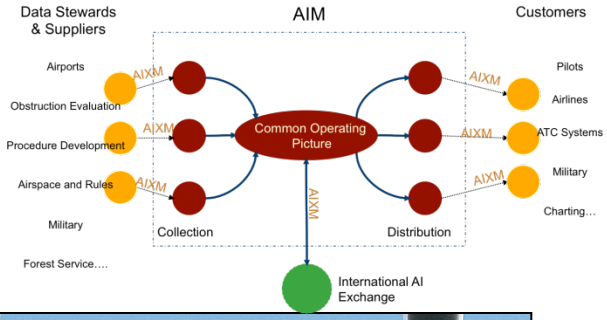
Domains of interest: Aviation

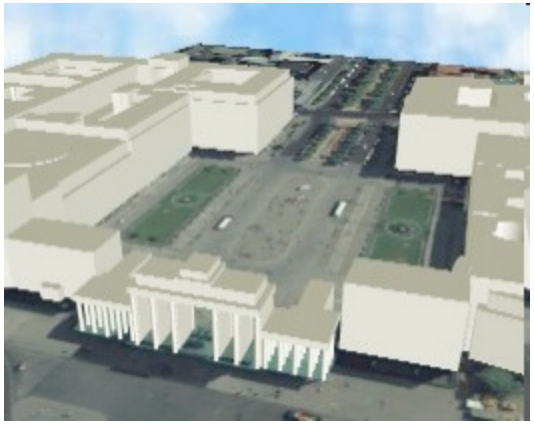
- Develop and test standards-based service-oriented architecture to support the provision of valuable aeronautical information directly to flight decks and Electronic Flight Bags (EFB)





3d modeling and visualization

- CityGML



Buildings (in LOD2) and true orthophoto of a small area around the 'Pariser Platz'

Street setting in Frankfurt with 5 textured buildings in LOD 3.

Buildings in LOD 2 with photorealistic textures near Max-Joseph-Platz in Munich, Germany.

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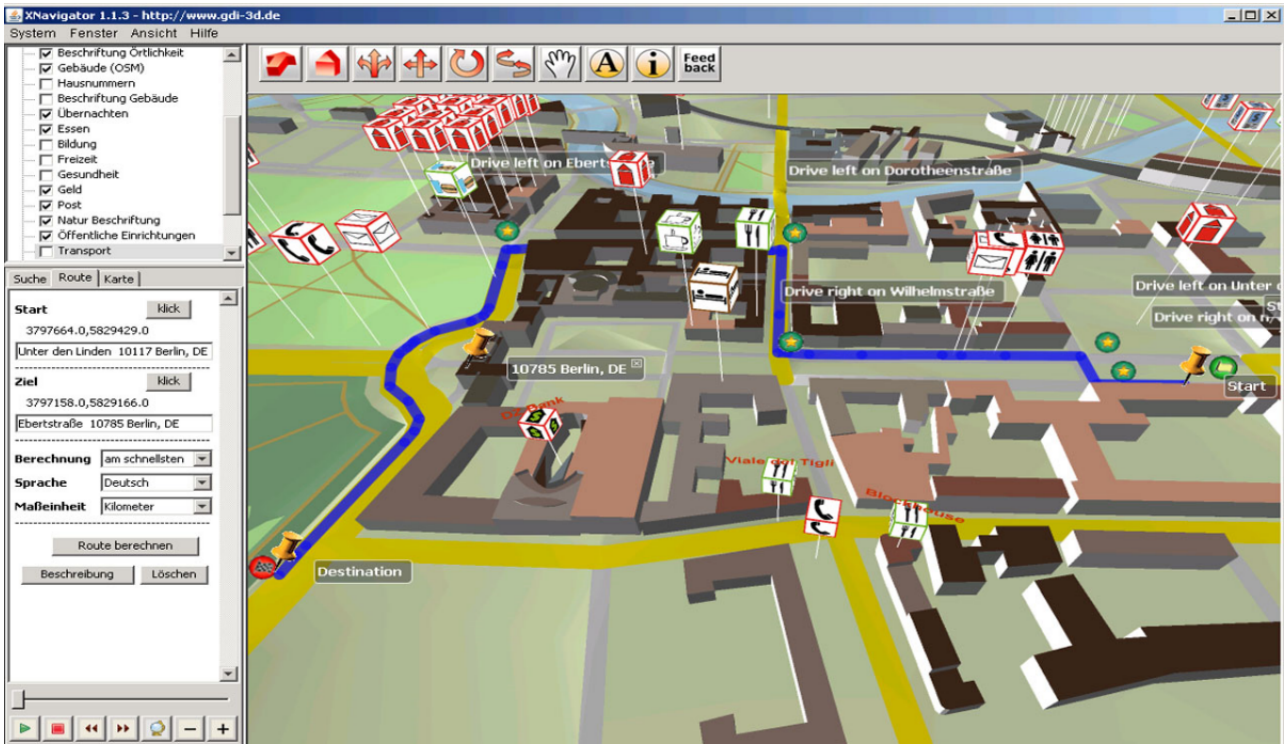
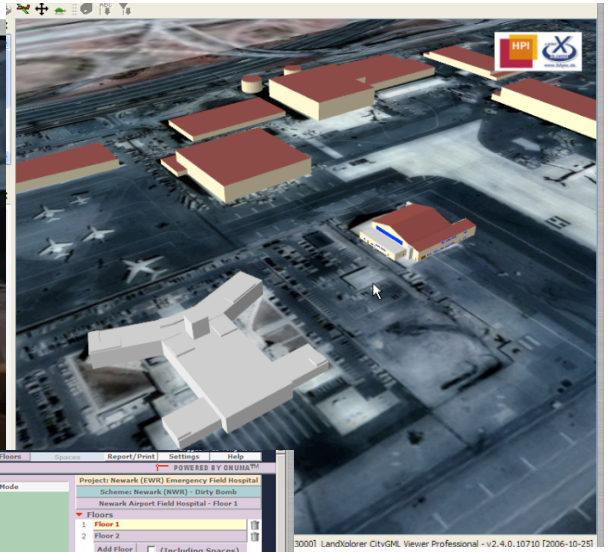
Application fusion: 3d, location services, mass market

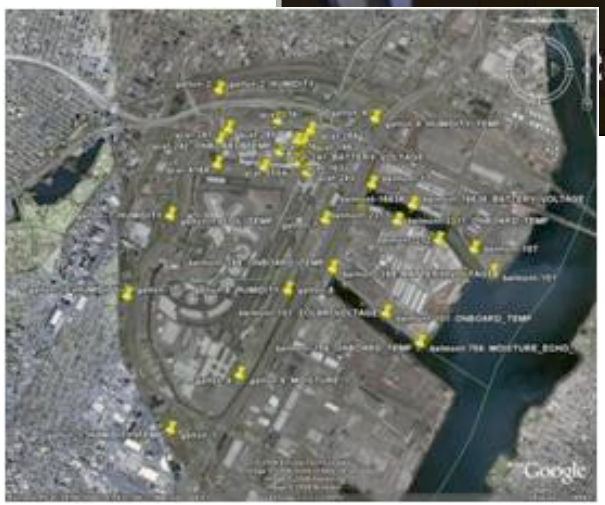
- CityGML, OpenStreetMap, Digital Terrain models, and OGC OpenLS, SOS, and candidate W3DS standards

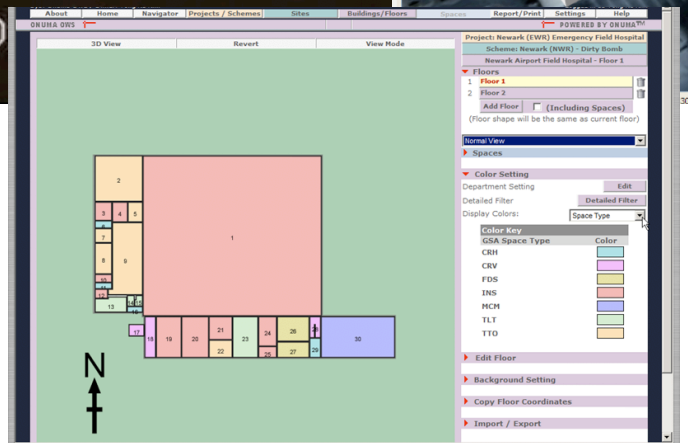


Emergency and Disaster Management

In response to a radiation event,
Identify and deploy a temporary hospital.







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Questions & Comments

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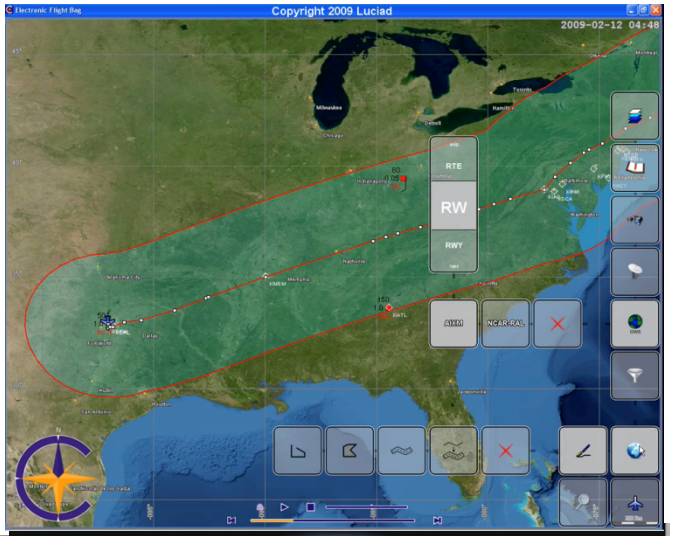

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