



OGC Standards

AIXM Seminar
Washington DC Jan 14-15 2010

Nadine Alameh, Ph.D.
MobiLaps LLC

Agenda



- OGC Introduction
 - OGC Reference Model (ORM)
- OGC's Approach for Advancing Interoperability
 - Aviation Threads in OGC Testbeds
 - OGC Web Services Initiative Phase 6 OWS-6
 - OGC Web Services initiative Phase 7 OWS-7
- OGC Working Groups of interest
 - Aviation Ad-hoc
 - Meteorology

What is the OGC?



- Open Geospatial Consortium, Inc. (OGC)
 - Not-for-profit, international voluntary consensus standards organization
 - Founded in 1994, Incorporated in US, UK, Australia
 - 385 industry, government, research and university members

OGC Mission

To lead in the development, promotion and harmonization of open geospatial standards ...

OGC Works Closely With Standards Organizations and Consortia in the Technology Community



– Primary Alliances for standards coordination

- Internet Engineering Task Force (IETF)
- OASIS
- International Organization for Standards (ISO)
- National Emergency Number Association (NENA)
- COMCARE
- Digital Geospatial Information Working Group (DGIWG)
- Open Mobile Alliance (OMA)
- National Institute of Building Sciences (NIBS)
- IEEE Technical Committee 9 (Sensor Web)



– Secondary alliances

- Global Spatial Data Infrastructure Association (GSDI)
- Web3D
- World Wide Web Consortium (W3C)
- Simulation Interoperability Standards Organization
- International Alliance for Interoperability (IAI)
- IEEE GRSS and ICEO
- Taxonomic Data Working Group (TDWG)



– Others



Market Availability

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



HOME » RESOURCE » PRODUCTS

Implementations by Specification

1) Select a specification
Web Map Service v.1.1.1

Web Map Service 1.1.1

2) Jump to Organization -

ABACO srl					Top
Product Name	OGC Spec	Type	Contact	Date	
DbMAP ASJ 2.5	WMS 1.1.1 (compliant)	Server	Orsi, Roberto	2005-08-09	

ABB					Top
Product Name	OGC Spec	Type	Contact	Date	
Facilplus Spatial 2.4	WMS 1.1.1, WMS 1.3.0	Proxy (Client/Server)	Jacobsson, Jonas	2005-11-15	

AED-SICAD AG					Top
Product Name	OGC Spec	Type	Contact	Date	
SICAD-IS Java Client 6.0	WMS 1.0, WMS 1.1, WMS 1.1.1	Client	Msbauer, Monika	2003-07-17	
SICAD/open - IMS 6.0	WMS 1.1.1, WMS 1.1, WMS 1.0	Server	Msbauer, Monika	2003-07-17	
SICAD/Raster - IMS 6.0	WMS 1.1.1, WMS 1.1, WMS 1.0	Server	Msbauer, Monika	2003-07-17	

Autodesk, Inc.					Top
Product Name	OGC Spec	Type	Contact	Date	
Autodesk MapGuide Enterprise 2007	WFS 1.0, WMS 1.1.1 (compliant)	Server	Rieks, Peter	2006-08-28	
Autodesk MapGuide WMS Extension 6.5	WMS 1.1.1	Server	Rieks, Peter	2004-04-19	
Autodesk MapGuide WMS Extension 6.5	WMS 1.1.1	Client	Rieks, Peter	2004-04-19	

Bentley Systems Inc.					Top
Product Name	OGC Spec	Type	Contact	Date	
Geo Web Publisher 8.9.2	WMS 1.1.1	Server and Client	Lapierre, Alain	2006-06-12	
MicroStation 8.11	WMS 1.1.1	Client	Lapierre, Alain	2008-04-01	

BILGI GIS					Top
Product Name	OGC Spec	Type	Contact	Date	
GeoKIT WMS 2.0	WMS 1.1.1 (compliant), SLD 1.0, WMS 1.3.0	Server	UCUZAL, Levent	2005-10-27	

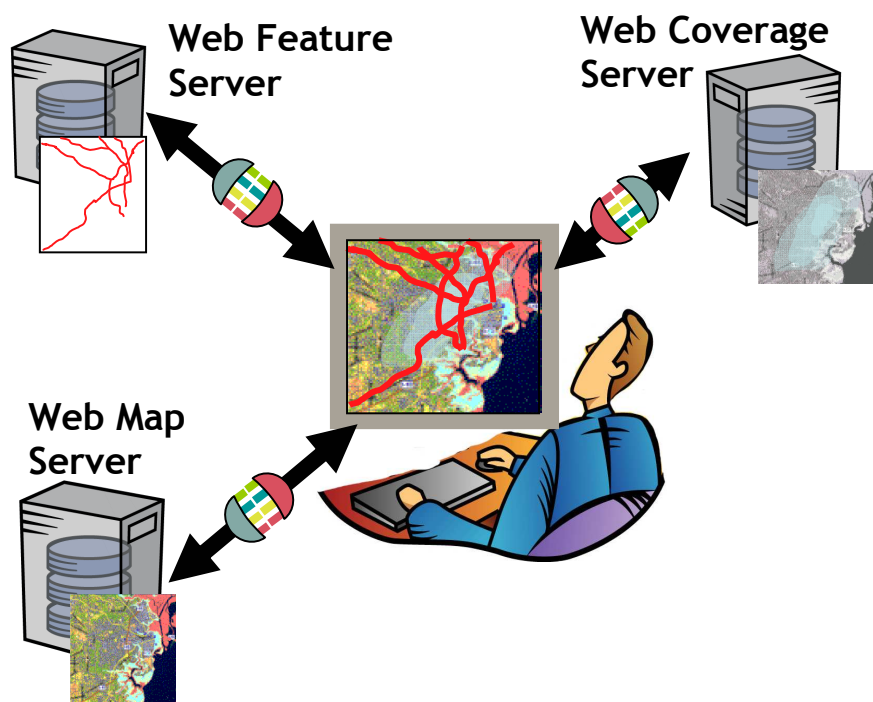
Blue Marble Geographics

- Free availability of standards stimulates market
- Hundreds of Products Implementing OGC Standards
- Compliance Test & Certification Program



OGC Web Services (OWS)

Just as http:// is the dial tone of the World Wide Web, and html / xml are the standard encodings, the geospatial web is enabled by OGC standards:



Web Map Service (WMS)
Web Feature Service (WFS)
Web Coverage Service (WCS)
Catalogue (CSW)
Geography Markup Language (GML)
Web Map Context (WMC)
OGC KML
Others...

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

OGC Reference Model (ORM)



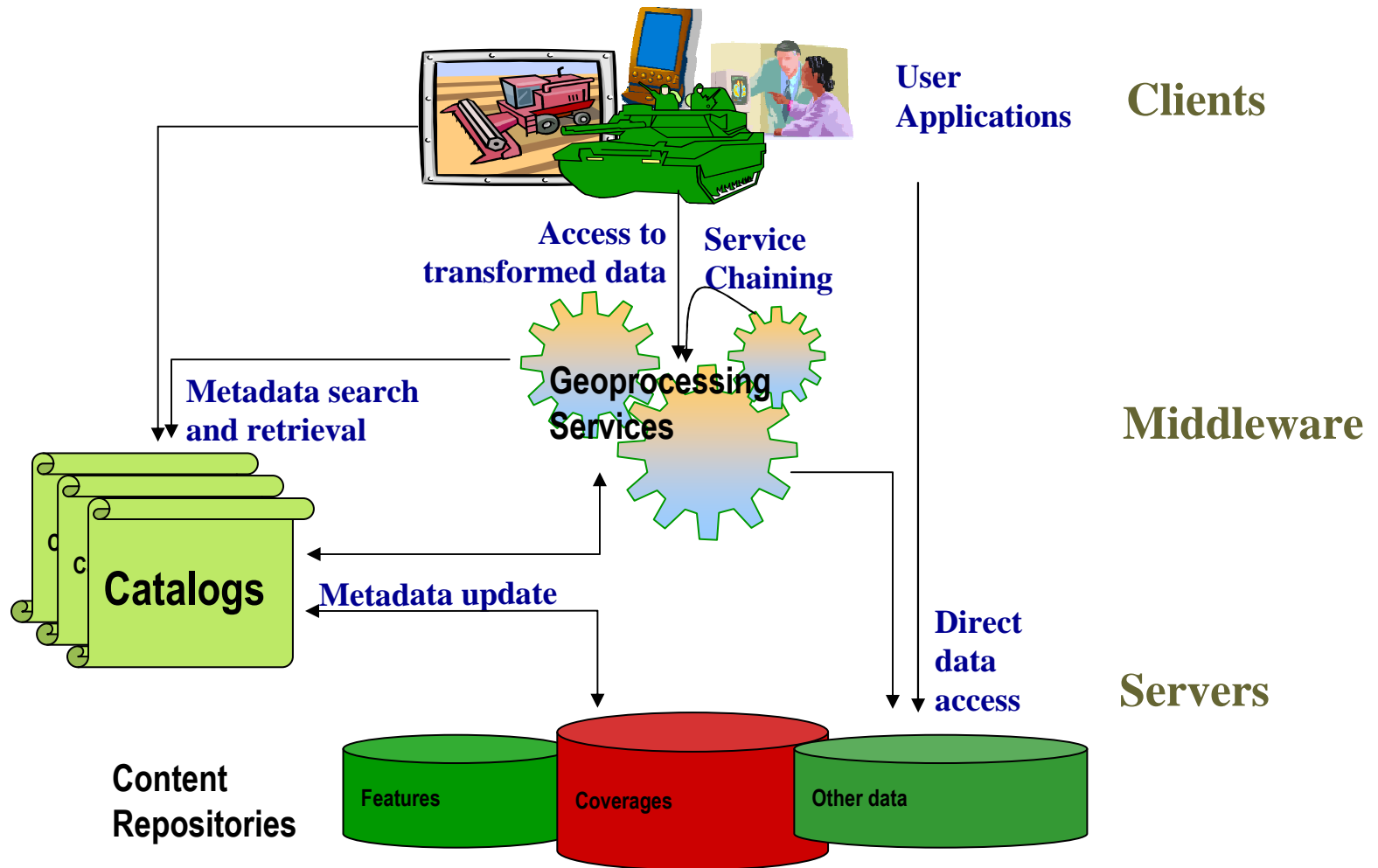
www.opengeospatial.org/standards/orm

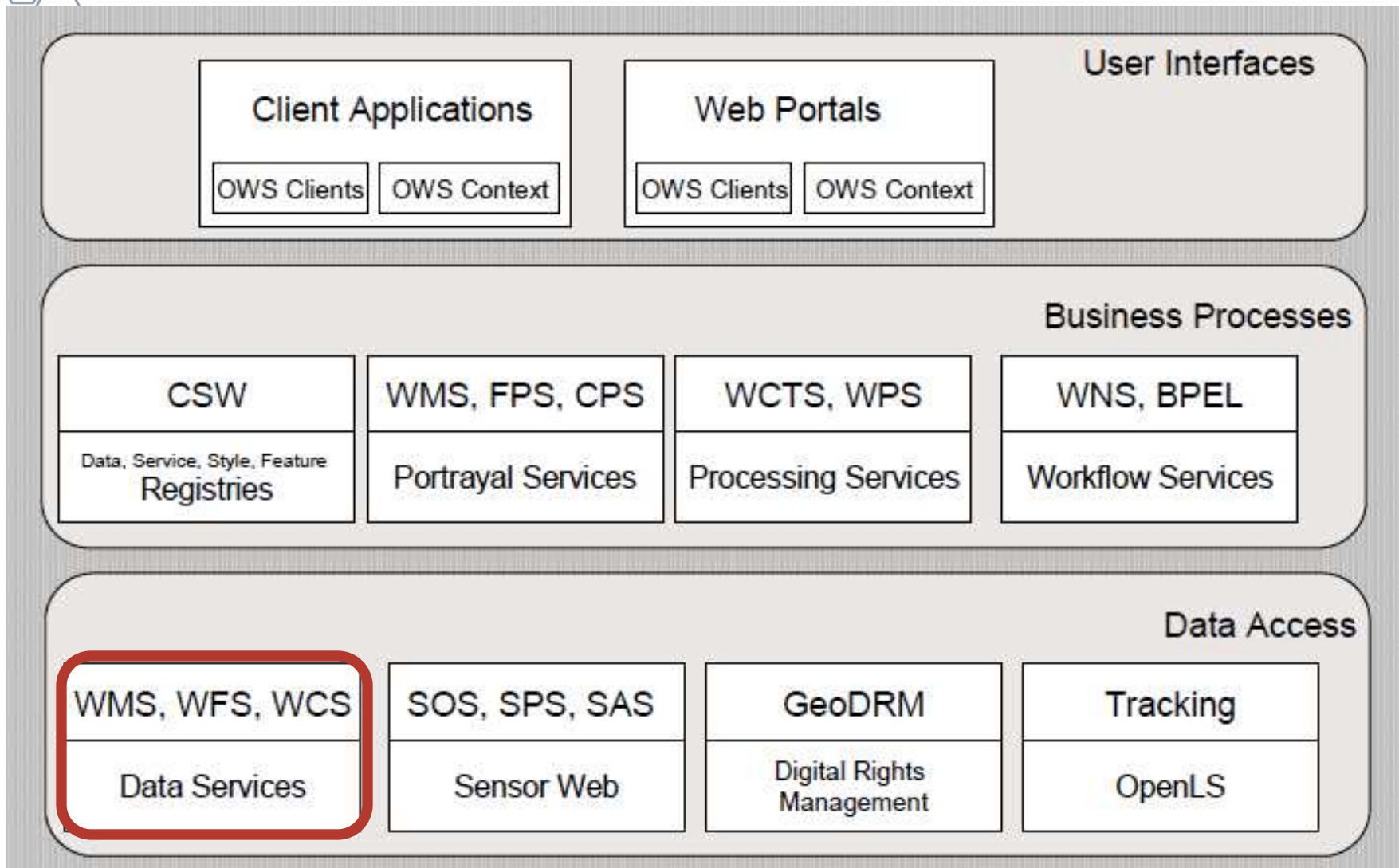


- What is the purpose of the ORM?
 - Overview of OGC Standards Baseline
 - Insight into the current state of the work of the OGC
 - Basis for coordination and understanding of the OGC documents
 - Resource for defining architectures for specific applications

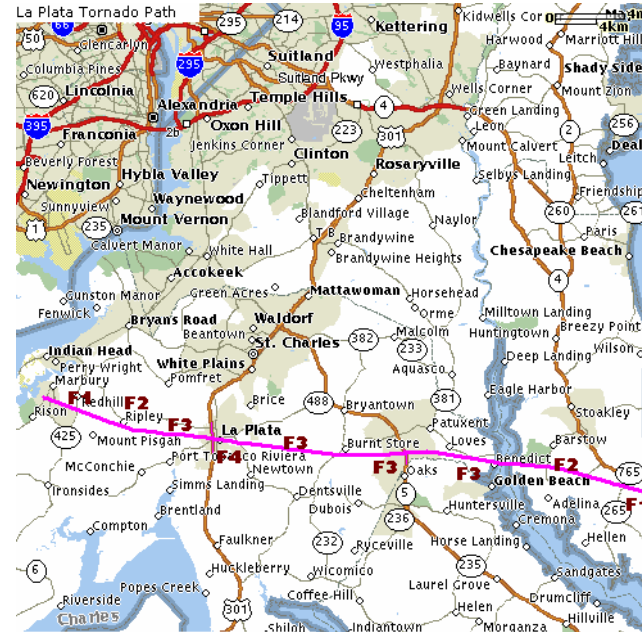
- Why Read This Document?
 - Better understand the OGC Standards Baseline
 - Better understand the ongoing work of the OGC
 - Gain an understanding necessary to contribute to OGC process
 - Aid in implementing one or more of the OpenGIS Standards

Interoperability "Stack" - Service Viewpoint





Web Map Service (WMS)



- Rendering geographic information as visually meaningful maps is what makes the data “come alive” to users.
- A map is a two-dimensional visual portrayal of geospatial data; a map is not the data itself!

OGC Web Mapping

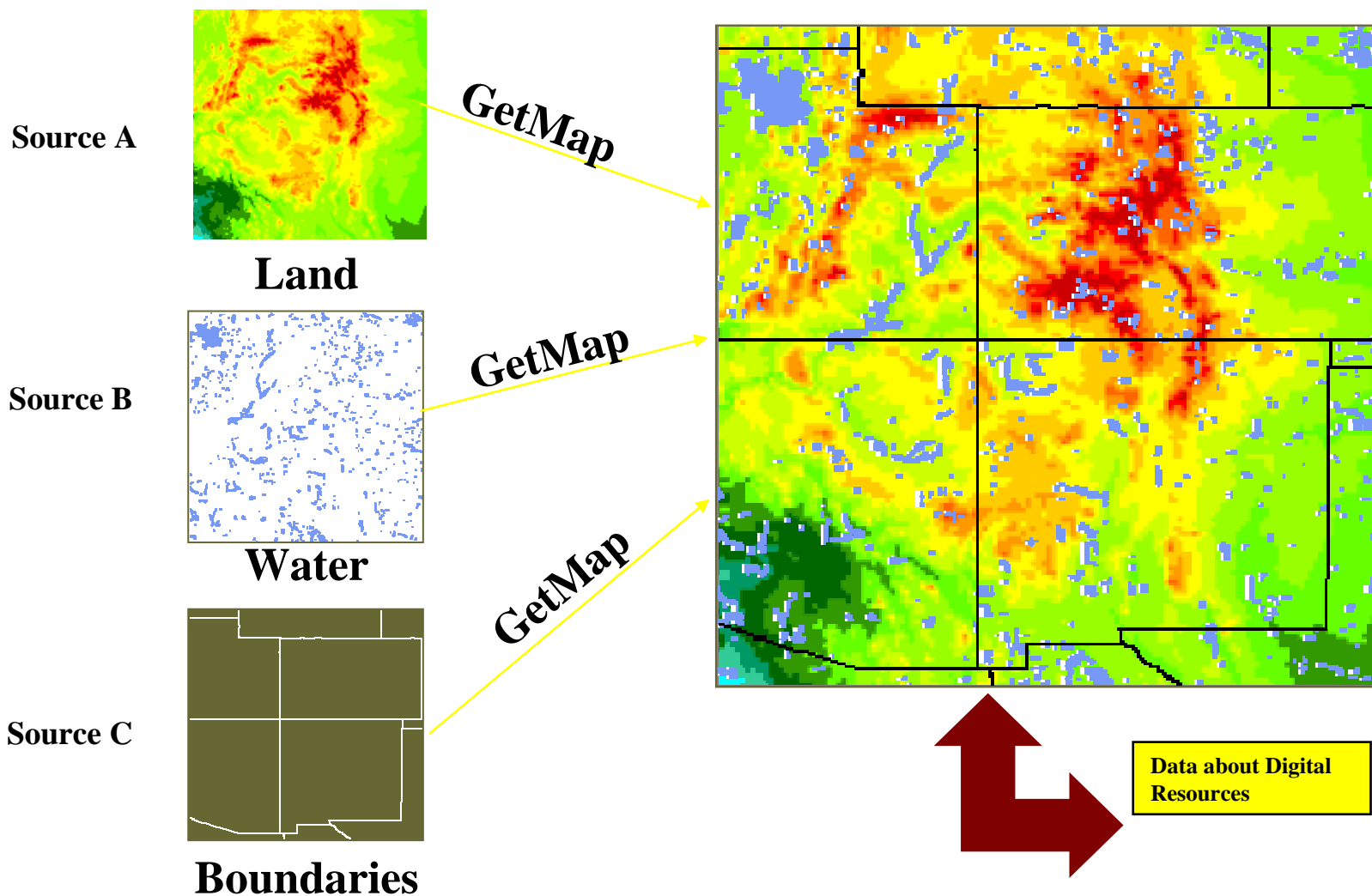
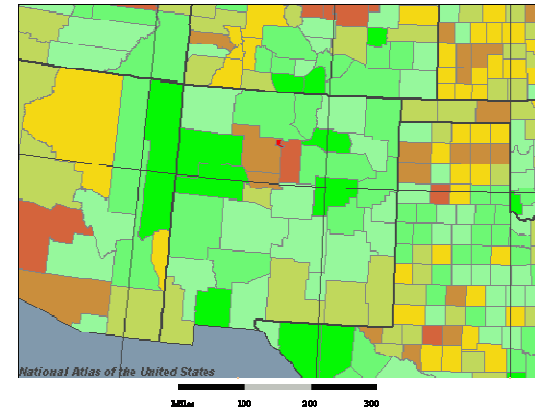
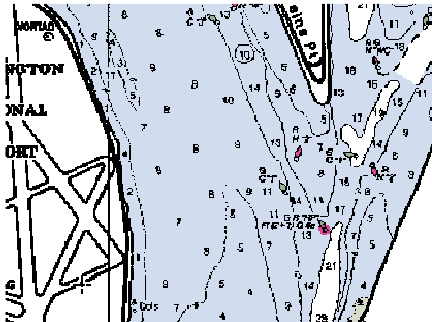
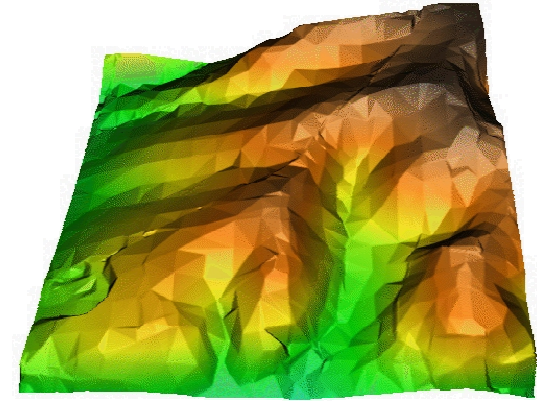
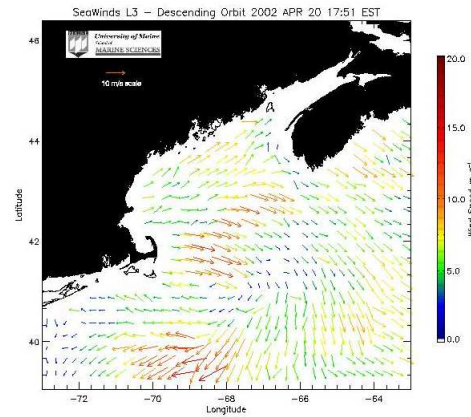
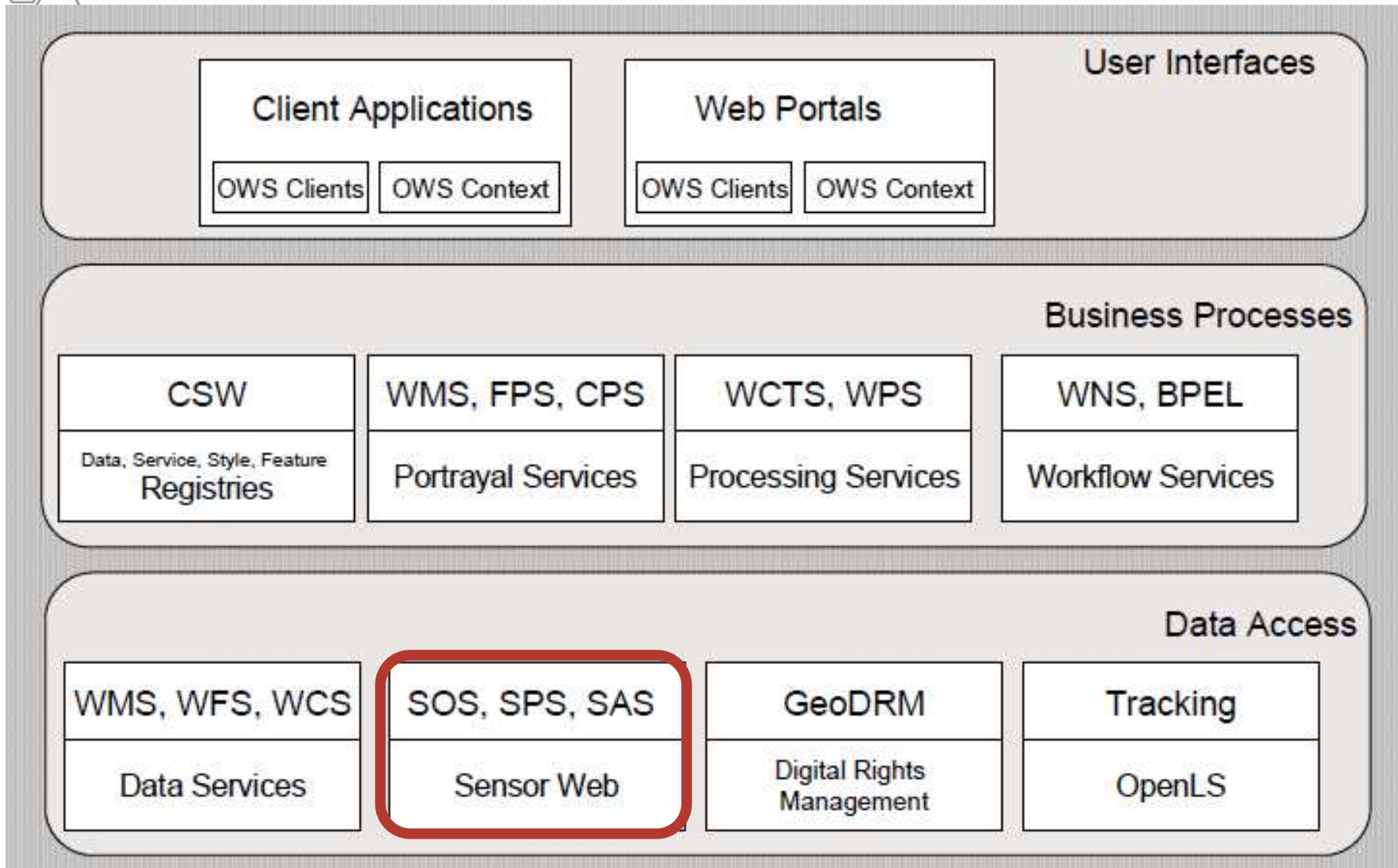


Figure © Jeff de La Beaujardiere, NASA

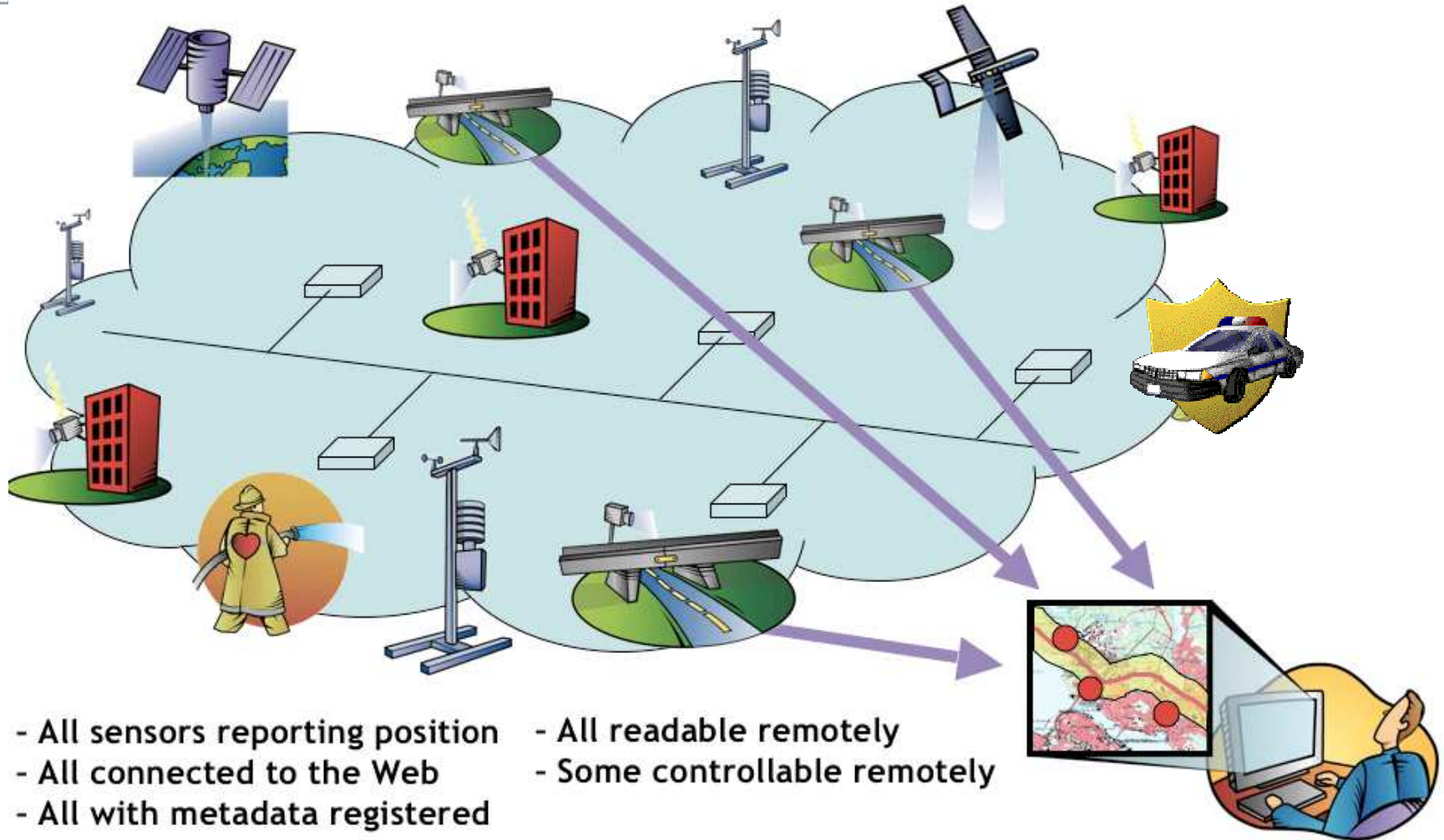
Helping the World to Communicate Geographically

Web Coverage Service (WCS)





Sensor Web Enablement (SWE)

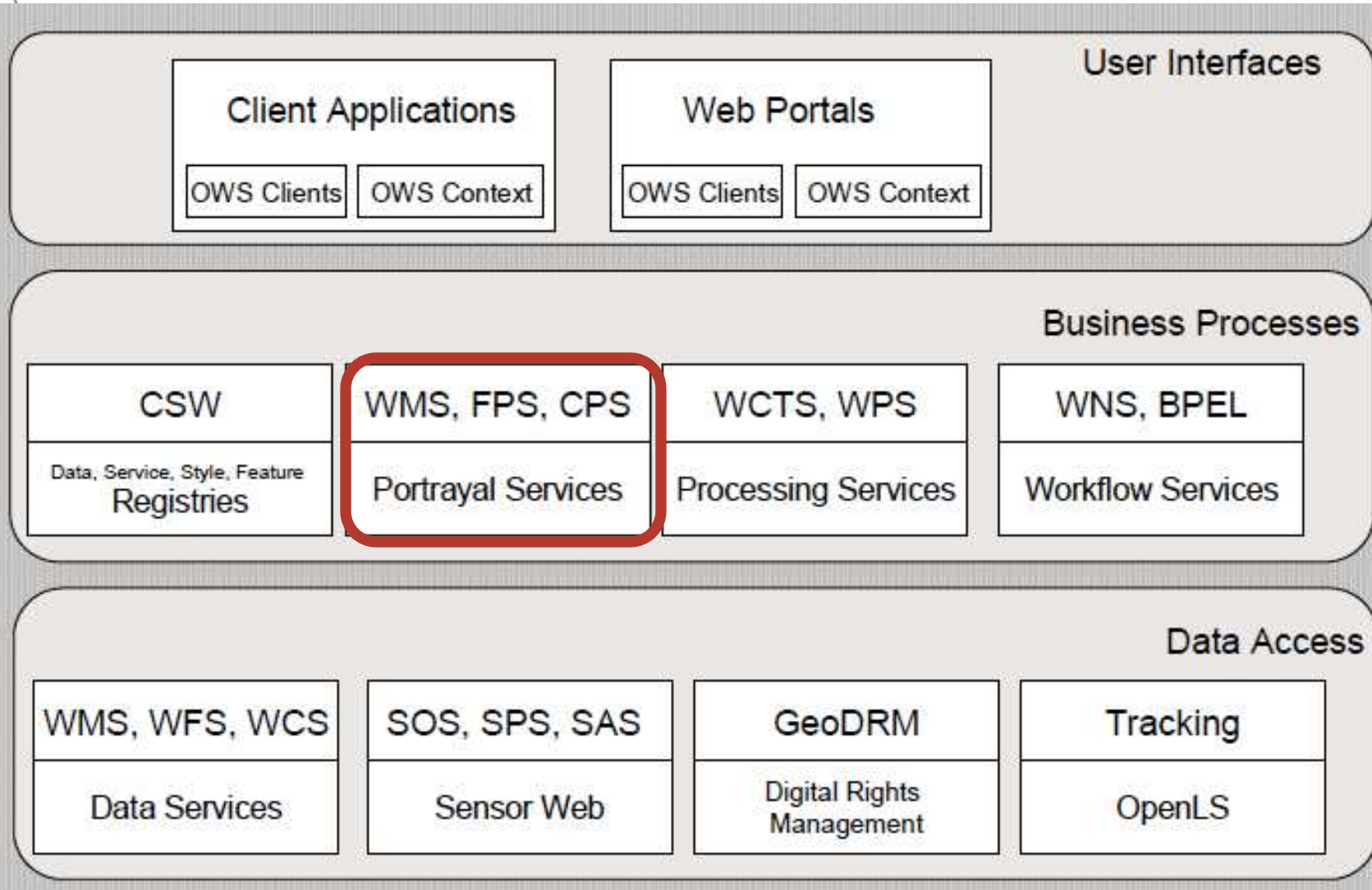




OGC Sensor Web Enablement (SWE) Services

The goal of OGC's Sensor Web Enablement (SWE) is to enable all types of Web and/or Internet-accessible sensors, instruments, and imaging devices to be accessible and, where applicable, controllable via the Web. The vision is to define and approve the standards foundation for "plug-and-play" Web-based sensor networks.

- The OpenGIS [Sensor Planning Service \(SPS\)](#) Implementation Specification defines an interface to task sensors or models. Using SPS, sensors can be reprogrammed or calibrated, sensor missions can be started or changed, simulation models executed and controlled. The feasibility of a tasking request can be checked and alternatives may be provided.
- The OpenGIS [Sensor Observation Service \(SOS\)](#) Implementation Specification defines a web service interface for requesting, filtering, and retrieving observations and sensor system information. Observations may be from in-situ sensors (e.g., water monitoring devices) or dynamic sensors (e.g., imagers on Earth-observation satellites).
- The OGC [Sensor Alert Service \(SAS\)](#) Best Practice Document defines a web service interface for publishing and subscribing to alerts from sensors. Sensor nodes advertise with an SAS. If an event occurs the node will send it to the SAS via the publish operation. A consumer (interested party) may subscribe to events disseminated by the SAS. If an event occurs the SAS will alert all clients subscribed to this event type.

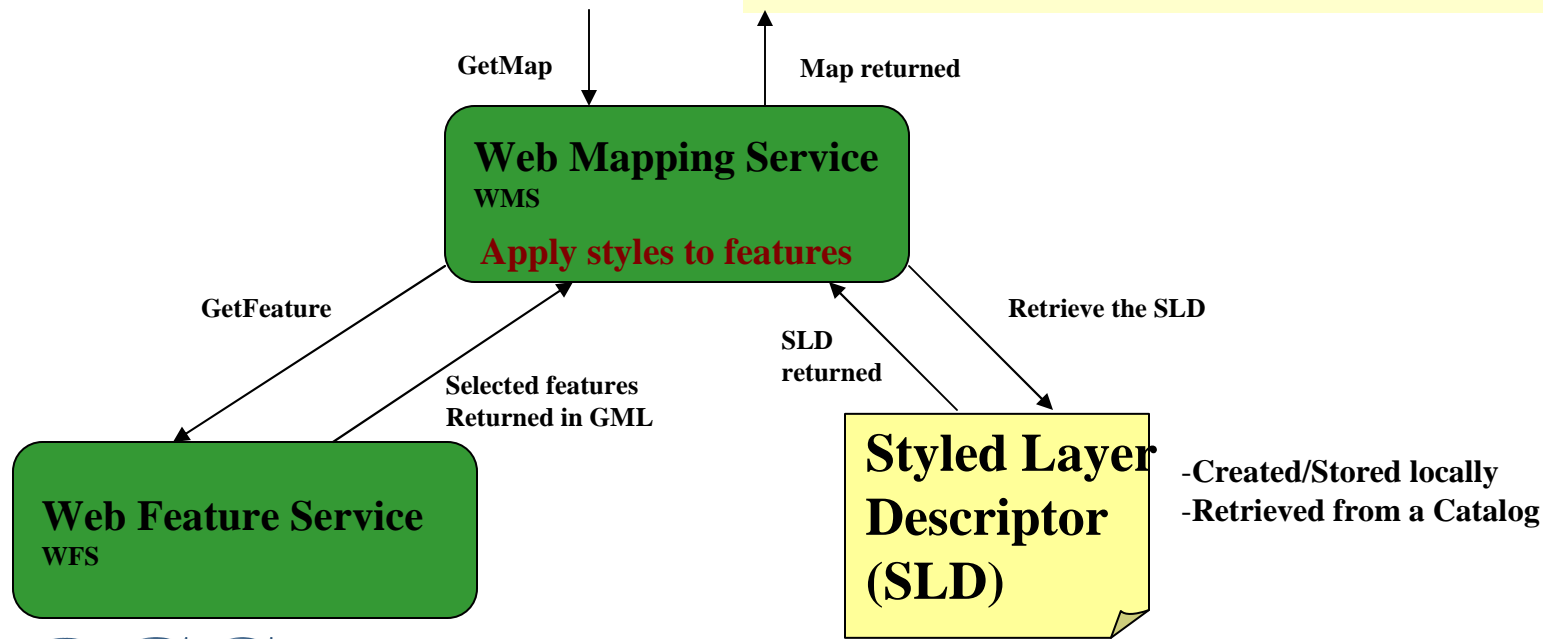


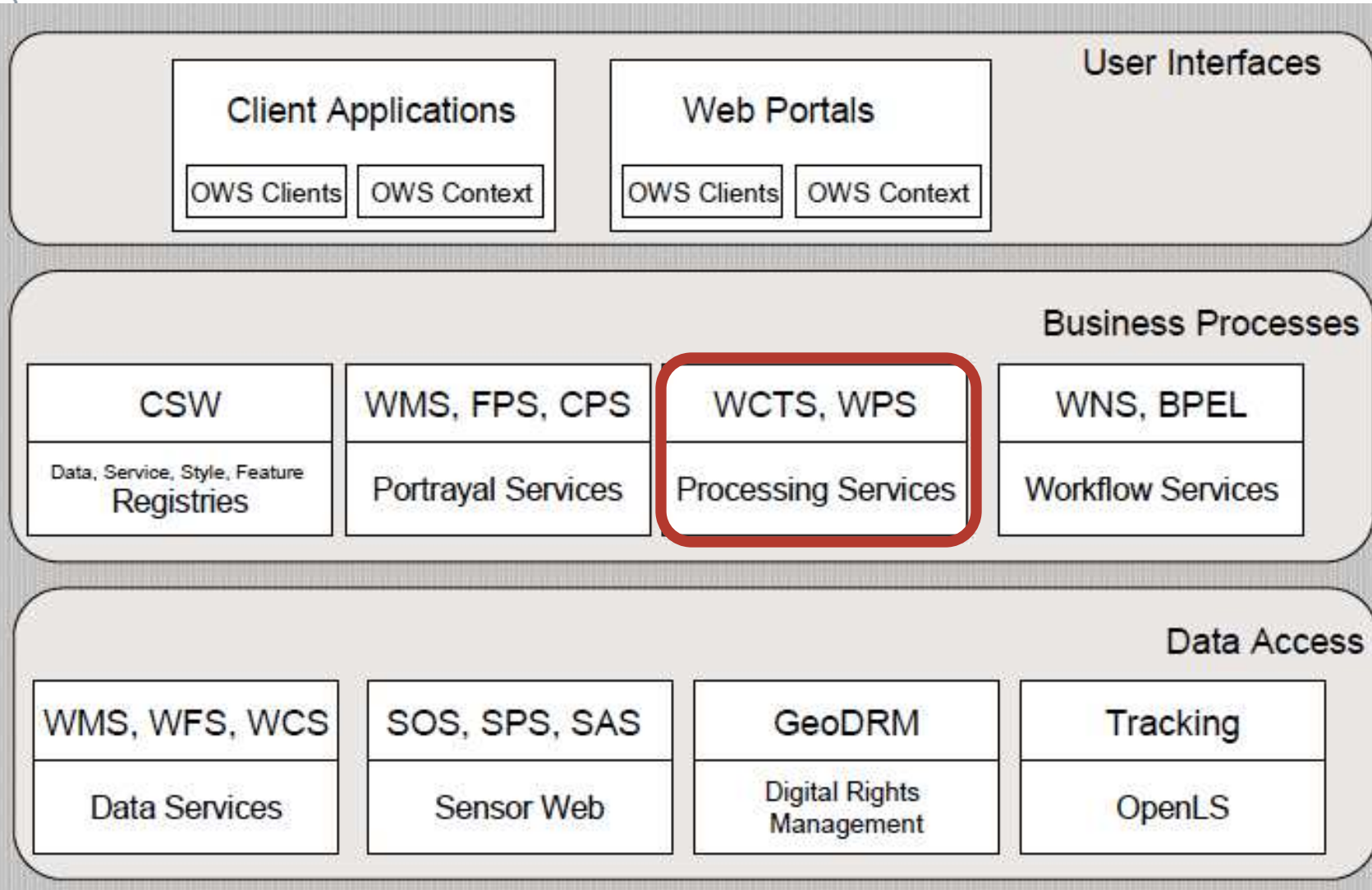
- A WMS might symbolize feature or coverage data stored in a remote WFS or WCS.

Styled Layer Descriptor (SLD)



REQUEST: [http://yourfavoritesite.com/WMS?
VERSION=1.0.5&REQUEST=GetMap&
SRS=EPSG%3A4326&BBOX=0.0,0.0,1.0,1.0&
SLD=http://myclientsite.com/mySLD.xml&
WIDTH=400&HEIGHT=400&FORMAT=PNG&
REMOTE_OWS_TYPE=WFS&
REMOTE_OWS_URL=http%3A%2F%2Fanothersite.com%2FWFS%3F](http://yourfavoritesite.com/WMS?VERSION=1.0.5&REQUEST=GetMap&SRS=EPSG%3A4326&BBOX=0.0,0.0,1.0,1.0&SLD=http://myclientsite.com/mySLD.xml&WIDTH=400&HEIGHT=400&FORMAT=PNG&REMOTE_OWS_TYPE=WFS&REMOTE_OWS_URL=http%3A%2F%2Fanothersite.com%2FWFS%3F)







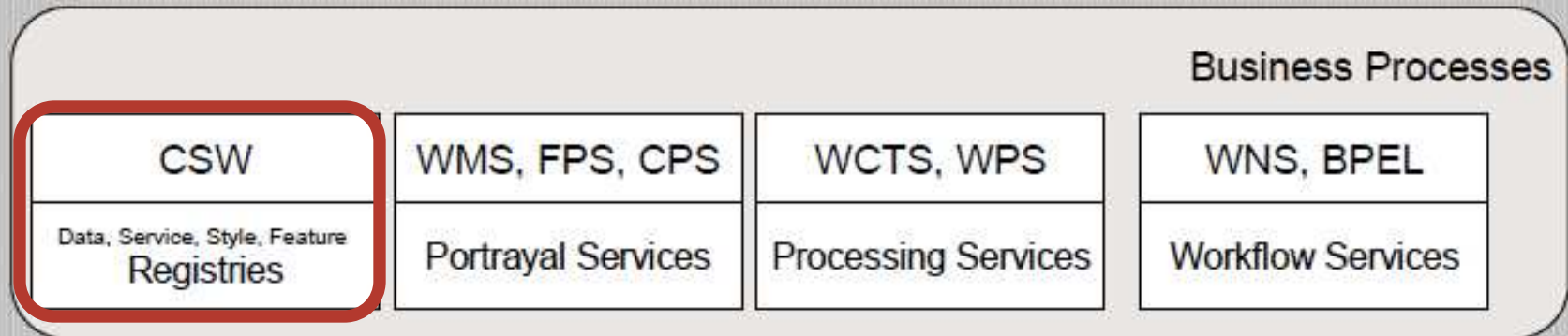
OGC Web Processing Service (WPS)

The OpenGIS [Web Processing Service \(WPS\)](#)

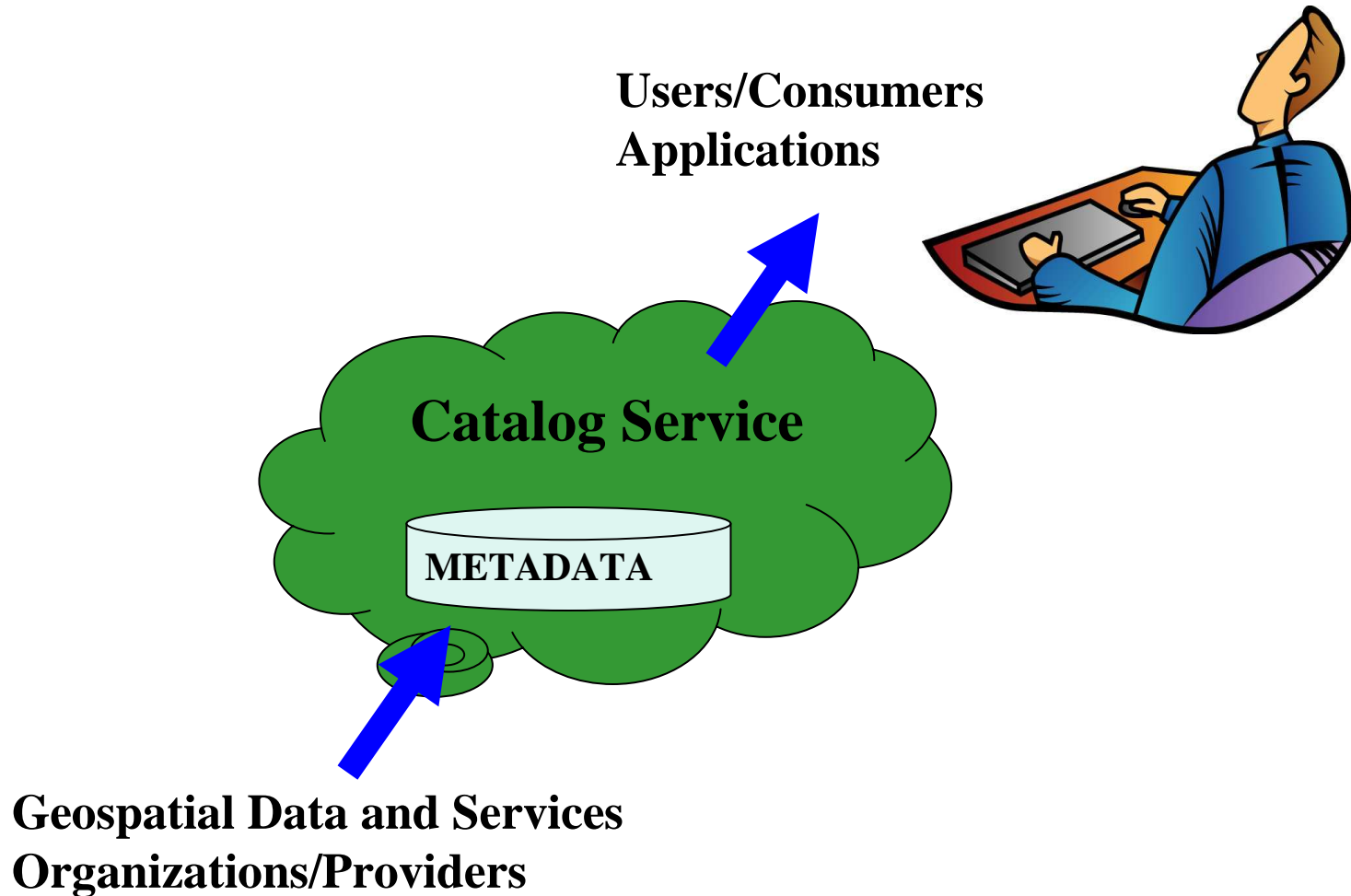
Implementation Specification defines an interface that facilitates the publishing of geospatial processes, and the discovery of and binding to those processes by clients. Processes include any algorithm, calculation or model that operates on spatially referenced data.

A WPS may offer calculations as simple as subtracting one set of spatially referenced numbers from another (e.g., determining the difference in influenza cases between two different seasons), or as complicated as a global climate change model.

The data required by the WPS can be delivered across a network using OGC Web Services.



Catalogs Provide Access to Metadata





OGC Web Services

OGC Web Service standards have been established for geospatial data:

- The OpenGIS® [Web Map Service \(WMS\)](#) Implementation Specification provides three operations (GetCapabilities, GetMap, and GetFeatureInfo) in support of the creation and display of registered and superimposed map-like views of information that come simultaneously from multiple remote and heterogeneous sources.
- The OpenGIS [Web Feature Service \(WFS\)](#) Implementation Specification allows a client to retrieve and update geospatial data encoded in Geography Markup Language (GML) from multiple Web Feature Services. The specification defines interfaces for data access and manipulation operations on geographic features. Via these interfaces, a Web user or service can combine, use and manage geodata from different sources. A Transactional WFS includes the optional Transaction operation to insert, update, or delete a feature.
- The OpenGIS [Web Coverage Service \(WCS\)](#) Implementation Specification allows clients to access part of a grid coverage offered by a server. The data served by a WCS is grid data usually encoded in a binary image format. The output includes coverage metadata.
- The Catalogue Service for the Web (CSW) is one binding defined in the OpenGIS [Catalogue Services Specification](#). The Catalog standard defines common interfaces to discover, browse, and query metadata about data, services, and other potential resources.
- The OpenGIS Web Service Common Implementation Specification provides specifics that are common to OWS interface Implementation Specifications. These common aspects are primarily some of the parameters and data structures used in operation requests and responses. Each Implementation Specification details additional aspects of that interface, including specifying all additional parameters and data structures needed in all operation requests and responses.



OGC Web Services

OGC Standards that support use of WMS, WFS, WCS and CSW include:

- **The Geography Markup Language (GML).** GML is an XML encoding for the transport and storage of geographic information, including both the geometry and properties of geographic features. Both AIXM and WXXM are based on GML. Check <http://www.ogcnetwork.net/node/210> for a list of GML Application Schemas and Profiles.
- The OpenGIS [Symbology Encoding](#) Implementation Specification defines an XML language for styling information used to portray Feature and Coverage data.
- The OpenGIS [Styled Layer Descriptor Profile](#) of the Web Map Service Implementation Specification explains how WMS can be extended to allow user-defined symbolization of feature and coverage data. This profile defines how the Symbology Encoding specification can be used with WMS.
- The OpenGIS [Filter Encoding](#) Implementation Specification defines a common component that can be used by a number of OGC web services. Any service that can query objects from a web-accessible repository can make use of the Filter Encoding. For example, WFS may use Filter Encoding in a GetFeature operation
- The OpenGIS [Web Map Context](#) Implementation Specification defines how a specific grouping of one or more maps from one or more WMS servers can be described in a portable, platform-independent format for storage in a repository or for transmission between clients. A Context Document contains sufficient information for Client software to reproduce the map, and ancillary metadata used to annotate or describe the maps and their provenance for the benefit of human viewers.



-
- [Aeronautical Information Exchange Model \(AIXM-GML\)](#)
 - [AgriXchange - GML Application Schema for agriculture \(INSPIRE\)](#)
 - [ALKIS/ATKIS - German National Cadastre](#)
 - [CAAML - Canadian Avalanche Association Markup Language](#)
 - [Canadian Road Markup Language \(for Road Network File\)](#)
 - [CityGML](#)
 - [CleanSeaNet - Near real time oil spill monitoring](#)
 - [Climate Science Modelling Language \(CSML\)](#)
 - [Cyclone Warning Markup Language \(CWML\) - DRAFT](#)
 - [Digital Weather Geography Markup Language \(dwGML\)](#)
 - [GDF-GML](#)
 - [GeoRSS: GML Serialization](#)
 - [GeoSciML - Geological Sciences ML](#)
 - [GML 3.1.1 Application schema for Earth Observation products](#)
 - [GML GeoShape Application Schema for use in internet standards developed by the IETF](#)
 - [GML in JPEG2000](#)
 - [GML Point Profile](#)
 - [GML Simple Features Profile](#)
 - [GPlates Markup Language](#)
 - [Groundwater Markup Language](#)
 - [KuntaGML - Finland](#)
 - [MarineXML](#)
 - [NcML/GML \(NetCDF and GML\)](#)
 - [OS MasterMap® – GML](#)
 - [S57/GML](#)
 - [SoTerML \(Soil and Terrain Markup Language\)](#)
 - [TDWG GML Activity](#)
 - [Tiger/GML \(tm\) - US Census](#)
 - [Tsunami Warning Markup Language \(TWML\) - Draft](#)
 - [US NSDI GML Schemas for Framework datasets](#)

OGC Web Services



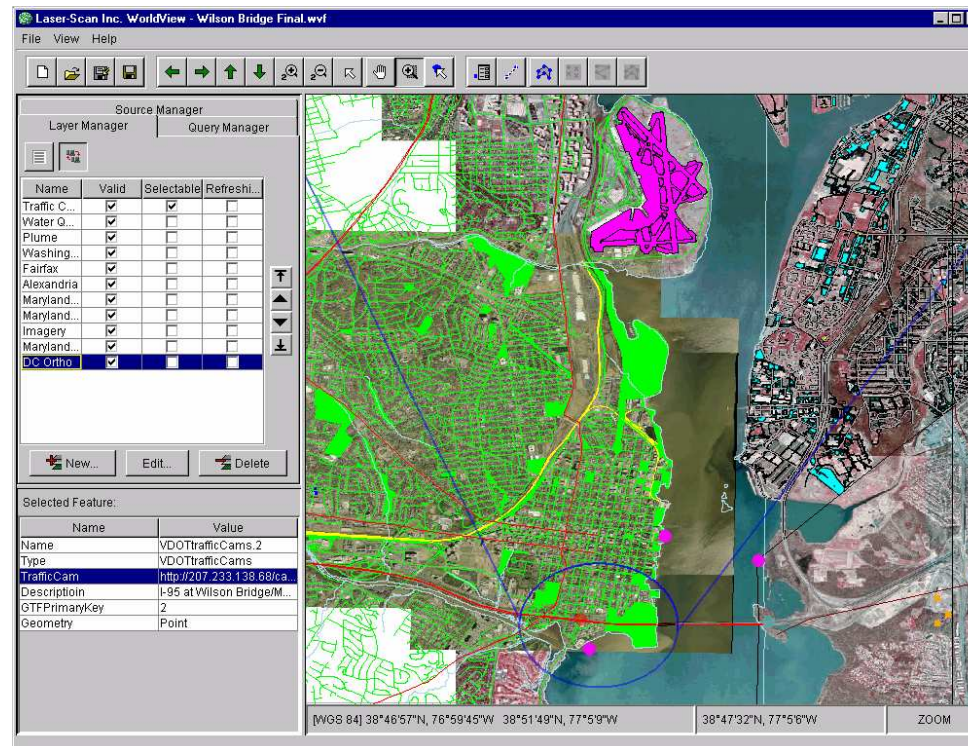
OGC Standards that support use of WMS, WFS, WCS and CSW include:

- **The Geography Markup Language (GML).** Check <http://www.ogcnetwork.net/node/210> for a list of GML Application Schemas and Profiles
- **The OpenGIS Symbology Encoding Implementation Specification** defines an XML language for styling information used to portray Feature and Coverage data.
- **The OpenGIS Styled Layer Descriptor Profile of the Web Map Service Implementation Specification** explains how WMS can be extended to allow user-defined symbolization of feature and coverage data. This profile defines how the Symbology Encoding specification can be used with WMS.
- **The OpenGIS Filter Encoding Implementation Specification** defines a common component that can be used by a number of OGC web services. Any service that can query objects from a web-accessible repository can make use of the Filter Encoding. For example, WFS may use Filter Encoding in a GetFeature operation
- **The OpenGIS Web Map Context Implementation Specification** defines how a specific grouping of one or more maps from one or more WMS servers can be described in a portable, platform-independent format for storage in a repository or for transmission between clients. A Context Document contains sufficient information for Client software to reproduce the map, and ancillary metadata used to annotate or describe the maps and their provenance for the benefit of human viewers.

Web Map Context (WMC)



- Approved specification for describing, in a portable and platform-independent format, a specific grouping of one or more maps from one or more map servers for storage in a repository or for transmission between clients.



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

- **Specification Development Program**
–Consensus processes similar to other Industry consortia (World Wide Web Consortium, OMA, OMG, etc.).

- **Outreach and Community Adoption Program** – education and training, encourage take up of OGC specifications, business development, communications programs

Market Adoption

OGC

OGC Web Services Testbed Phase 6 (OWS-6)



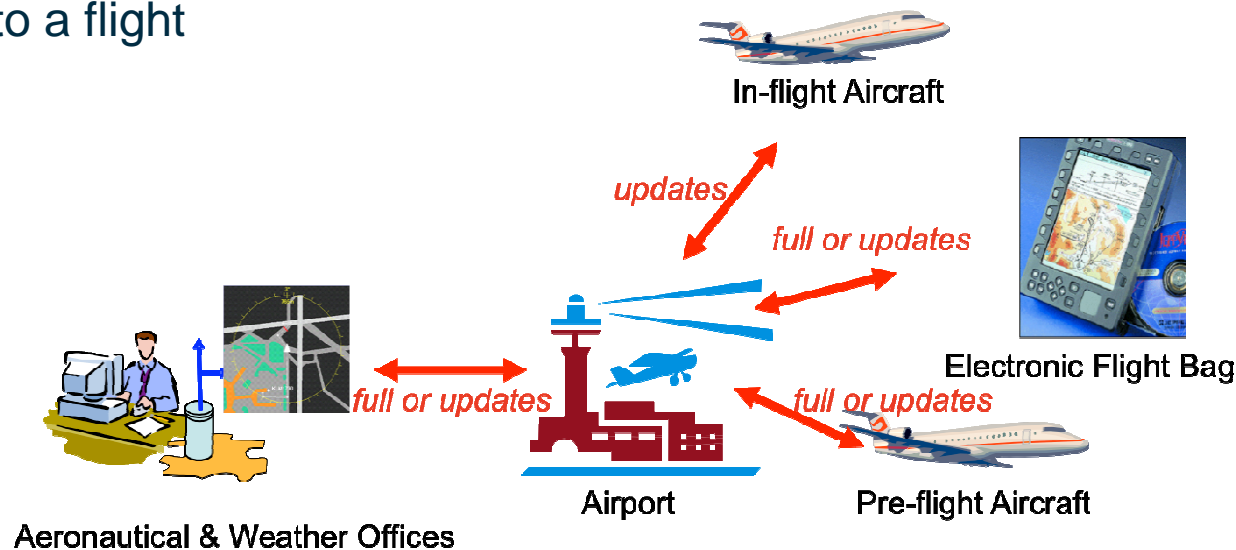
- Aeronautical Information Management (AIM) thread in OWS-6, sponsored by FAA and EUROCONTROL to:
 - Develop and demonstrate the use of AIXM 5.0 in an OGC Web Services Environment
 - Evaluate and advance various AIXM 5.0 characteristics in realistic scenario setting
- Develop and test standards-based service-oriented architecture to support the provision of valuable aeronautical information directly to flight decks and Electronic Flight Bags (EFB)



OWS-6 AIM Goals: Right Data, Right Time, Right Place



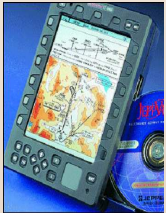
1. Use and enhancement of Web Feature Service and Filter Encoding specifications in support of AIXM 5.0 features and 4-D flight trajectory filtering,
1. Architecture and demonstration of standards-based Event Alert mechanism to notify users of changes to selected relevant aeronautical information,
1. Prototype of Aviation Client(s) for retrieval, integration and visualization of AIXM and Weather data based on relevant and up-to-date information in relation to a flight



Aviation Clients



EFB



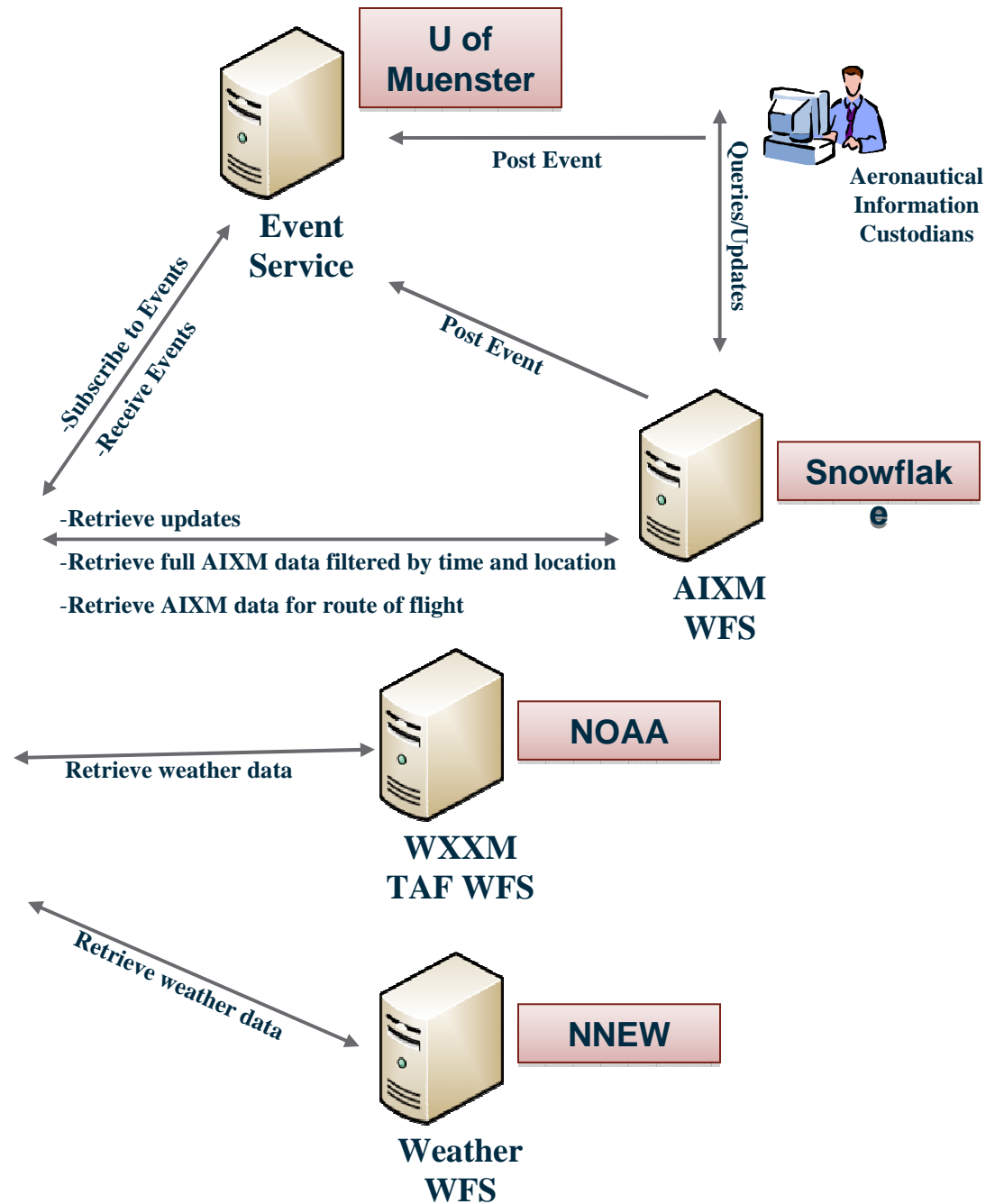
PDA Aeronautical Information User



Avionics Systems



- Carbon Project
- Luciad
- PCAvionics
- Lufthansa Systems



Demonstration Scenario



North America

Sweden

Pilot notified of bad weather over ILN



O Diversion Airport
ILN

Destination Airport
Pilot notified during flight
that airport is closed

ARN/ESSA



Alternate
Destination
Airport

O
NRK/ESSP

ATL
O Alternate to Diversion Airport
(Returned by WFS query)



O Airport of Departure

DFW

OGC[®]

CFE



OGC[®]

<http://www.opengeospatial.org/pub/www/ows6/index.html>

Areas of Lessons Learned



- Data model mapping, data loading and validation
- Data integration and integrity at the client side in service-oriented architecture
- Spatio-temporal queries using WFS 2.0 and FE 2.0
 - Change requests to GML and FE
- Event Service architecture (technologies/standards, generic vs. domain-specific, aeronautical vs. weather events)
- OGC services for weather data and events

Lessons Learned



- **Demonstrated successful use of WFS and FE for on-demand access to AIXM 5.0 baseline and delta data**
 - Accurate and timely retrieval of information based on spatio-temporal filters
- **Demonstrated successful access and retrieval of WXXM and other GML-based weather data via WFS**
 - Same service for Aeronautical and Weather data = lower implementation barrier for clients
- **Demonstrated successful incorporation of standards-based architecture for Event handling and notification**
 - Feasibility of incorporating the OASIS WSN mechanism
 - SOAP approach creates overhead for clients
- **Demonstrated quick prototyping and implementation of AIXM Aviation Clients**
 - Issues encountered: parsing complex GML schemas; mapping existing data models to AIXM
 - Identified data integration and integrity issues
- **Submitted 2 Change Requests (CR) to support AIXM temporal queries**
 - FE: Supporting the return of features with estimated/unknown endpoints for timeslices
 - GML: Allowing “estimated” to be a valid value for indeterminatePosition

Lessons Learned on web-services architecture



- Standards-based web-services architecture
 - Except for minor changes/glitches, the underlying OGC and ISO standards (GML, WFS, FE) fully supported the Aviation requirements for timely on-demand data access, integration, notification and visualization
 - By enabling access to subsets of information (rather than full downloads of data), the web-services architecture opens up issues related to data integrity and consistency at the client
 - AIS data bases using AIXM5 need data validation and QA at load time or update time to avoid data inconsistencies e.g. missing identifiers, tangling references etc.
 - The need for frequent client-server communications in this architecture (for updates and events) highlights issues related to reliability, security and bandwidth of underlying messaging channels

Lessons Learned on WFS/FE



- Demonstrated feasibility of using WFS/FE
 - Identified changes to GML and FE to accommodate for the uncertainty in the end time periods of aviation data changes
 - This has been addressed in a GML change request
 - Identified need to query data based on time of upload/update of data/changes
 - Achieved by adding appropriate metadata to features in the database (and the events) using ISO GML metadata
 - Increased the size of the data significantly making it harder for Aviation clients to efficiently parse and interpret the data
 - Uncovered limitations in AIXM 5.0 data model in supporting certain expected queries (such as returning airports with 3 or more runways)
 - Uncovered issues with time indeterminate position “Unknown”

Lessons Learned on Weather Data Access



- Demonstrated integration of timely weather data
 - Demonstrated successful access and retrieval of relevant WXXM and other GML-based weather data via WFS
 - Using the same standard interface (WFS) and exchange format (GML) for both weather and aeronautical information lowers the learning curve and implementation barrier for Aviation clients
 - Uncovered issues related to textual nature of aeronautical weather data and consistent portrayal/symbology options

Lessons Learned from Aviation Clients



- Rapid prototyping/implementation of Aviation clients based on open standards
 - experiences highlight overhead associated with web-services architecture and AIXM 5.0 including
 - Inherent complexity of GML schemas and impacts on parsing and processing efficiencies given the hierarchical sub-classing from GML abstract data types and substitution groups
 - Difficulty in mapping of AIXM data model to existing data models in operational software (e.g. PCAvionics' MountainScope)
 - Critical responsibility of data integration at the client (baseline, deltas, events, etc) to continuously maintain an accurate and up-to-date representation of the data
 - Critical responsibility of resolving and maintaining feature and property inter-dependencies in AIXM 5.0
 - Reliable messaging and connection issues in support of push-based event alert mechanism
 - Issues of pushing notifications to clients that have dynamic IP addresses
 - Issues of pushing notifications to clients behind a firewall

Lessons Learned on Event Alert Architecture



- Demonstrated standards-based architecture for event alert notifications
 - Demonstrated the feasibility of
 - subscription based data updates
 - incorporating the OASIS WSN mechanism in the architecture
 - reliability of mechanism for matching subscription requests (based on time and space) to various events
 - Experience to-date uncovered issues related to latency of events and reliability of messaging
 - WSN SOAP-based approach creates a considerable overhead for Aviation clients (open connection issues, firewall issues, etc)

Future Work (from Engineering Report)



- **Further improving/adapting underlying standards**
 - GML ISO metadata, WFS FE spatio-temporal filters
 - Simplify schemas/metadata/filters
- **Understanding/improving metrics for system**
 - Performance of spatio-temporal filters, Latency of events and updates, Data integrity strategies
- **Investing in future client development**
 - Componentize Client SW (AIXM SDK, etc)
 - Reusable components, More advanced data visualization (weather symbology, etc)
- **Improving the Event Architecture**
 - Weather events, Intermittent access issues
 - Other Event protocols (WS-Eventing), Transport and Message Level Security, Reliability, etc
- **Building on the OWS-6 AIM Architecture**
 - Update of feature base via WFS-T, Intermittent access issues (reliable messaging), elements of existing infrastructure (e.g. SWIM)
 - IValidation of AIXM 5.1 in Web Services environment
- **Advancing incorporation and filtering of weather information**

OWS-7 Aviation Thread Objectives



- **Develop and demonstrate the use of AIXM and WXXM in an OGC Web Services Environment**
 - Demonstrate applicability of OGC standards, in conjunction with AIXM and WXXM, to applications & tools that support Airline Operations Centers/Flight Dispatch Applications
 - Scenario will focus on ground usage of information and will include preparation of data for upload on Class 2 and handheld EFB devices
- **Increase industry adoption of AIXM and WXXM and support the operational use and validation of these emerging standards**
 - Results of OWS-7 expected to be contributed to the SWIM portion of the SESAR program and the FAA SWIM program

OWS-7 Aviation Work Areas



1. Evaluation and advancement of AIXM
2. Evaluation and advancement of WXXM
3. Advancement of Event Notification Architecture
4. Integration of AIXM/WXXM in SWIM environment

1. Evaluation and Advancement of AIXM 5.1



- **Using and testing new AIXM 5.1 features, e.g.**

- Serving, filtering and updating AIXM 5.1 data via the OGC WFS-T interface,
- Recommending guidelines or cross-walks for interpreting the new AIXM 5.1 schedules in conjunction with the Timeslice model in a web services environment
- Recommending approaches for the management of value lists in AIXM (such as by leveraging the OGC Catalog Service for the Web (CSW) specification)

- **Addressing metadata requirements**

- Developing ISO 19139 profile that implements the metadata analysis document previously developed for AIXM 5.0
 - Addressing performance issues
 - Investigating requirements for data integrity/quality information and cyclic redundancy check
- Exercising the OGC FE to filter and retrieve information based on metadata

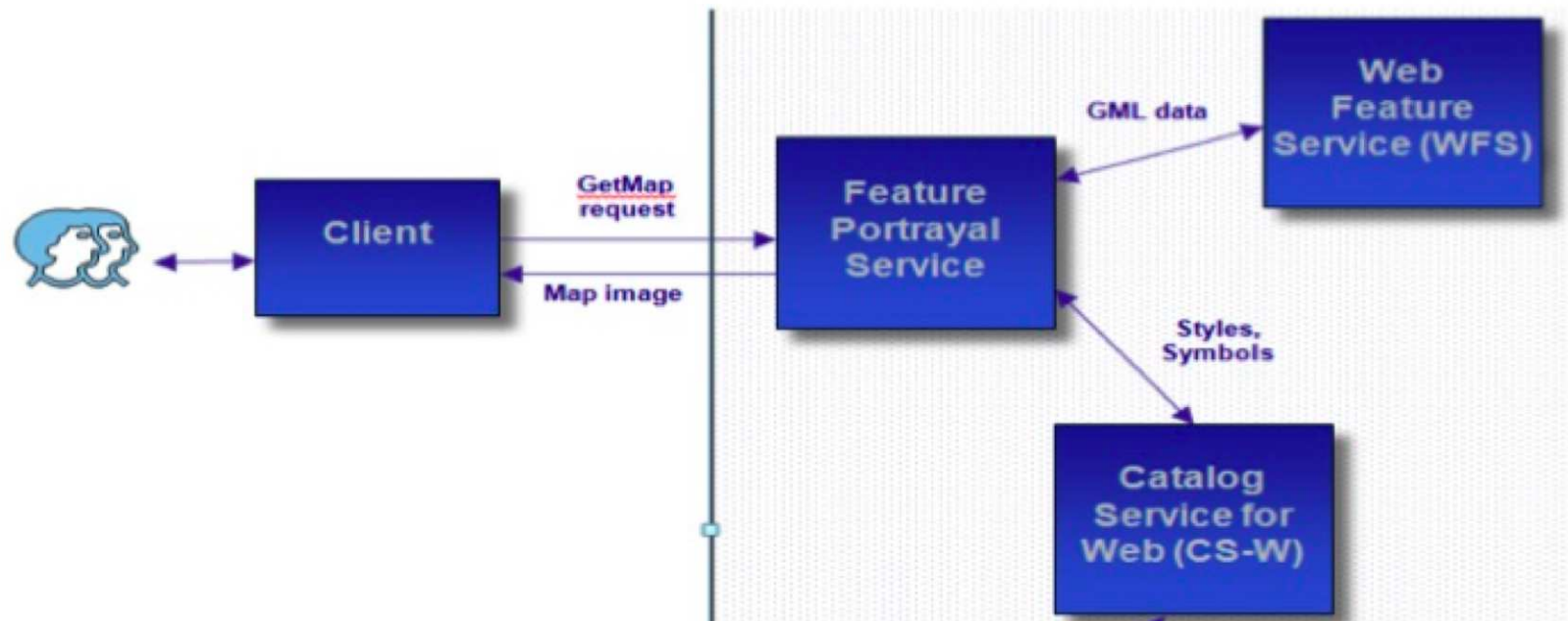
- **Developing components/tools (possibly open source) for**

- Validating and parsing AIXM (including business rules)
- Converting in-memory representations of information to/from AIXM
- Generating AIXM/EXI schemas from XMI using current schema generators

- **Supporting the portrayal of AIXM information**

- Considering the use of OGC SLD, and symbol and styling management architecture

Feature Portrayal for Symbology

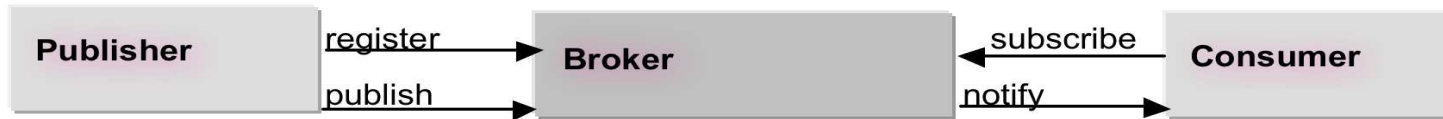


2. Evaluation and Advancement of WXXM 1.1



- **Demonstrating new weather concepts such as the 4-D Weather Data Cube, including**
 - Impact on Event Architecture (given that weather events are not discrete events)
 - Evaluation of WXXM current design with respect to support for user oriented and efficient mechanism for dispatching probabilistic weather events
 - Investigation of WXXM time model with respect to representing different notions of time associated with meteorological information (issuing time, observation time, valid time, model run time, etc.)
- **Portrayal of WXXM**
 - Considering the use of OGC SLD, and symbol and styling management architecture

3. Advancement of Event Notification Architecture



- **Advancing/evolving OWS-6 Event Architecture**

- Supporting multiple sources of events and data changes
- Supporting multiple types of events (aeronautical and weather) and data changes (AIXM, WXXM)
- Using WFS-T for posting AIM events to AIXM data source
- Investigating different delivery protocols (push/pull)
- Addressing registration & subscription lifecycle management
- Incorporating domain-specific/schema-specific matching between events and subscriptions

4. Integration in SWIM Environment

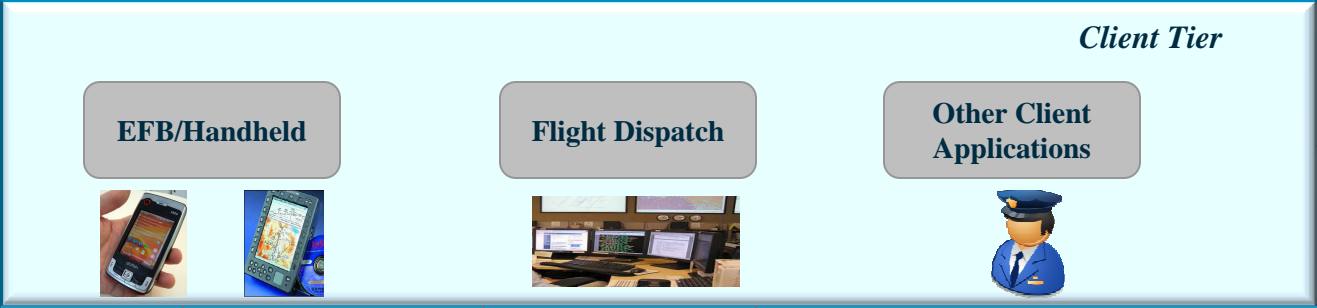


- **Investigating the connection to the FAA SWIM environment and leveraging SWIM services accessible by External Users**
 - Investigating approaches for Aviation Clients to support access to different types of services: OGC services and SWIM services
 - Investigating approaches for leveraging SWIM Interface Management, Messaging and Security capabilities
 - Investigating approaches for dealing with security (including access control, authorization and vulnerability) such as for data transmission between air and ground, and ground to ground
 - Investigating approaches for ensuring data integrity, reliable messaging and assured delivery of information

SWIM Services to be Used in OWS-7



- The Integrated Terminal Weather System (ITWS) integrates terminal weather data to automatically provide current weather information and predictions in easily understood graphic and textual form, including windshear and microburst predictions, storm cell and lightning information and terminal area winds aloft. It provides a 60-minute forecast of anticipated weather conditions. ITWS uses WCS/WFS as one of its service interfaces. Although planned, ITWS will not provide data back in WXXM in time for use in OWS-7.
- The Corridor Integrated Weather System (CIWS) provides advanced weather product generation to help air traffic users reduce convective weather delays. CIWS provides national, en route, and terminal air traffic flow managers and airline system operation centers with automated, rapidly updated weather information as well as weather products including storm locations, radar measured storm tops, and two-hour storm forecasts including storm growth and decay. A prototype service will be available for use and accessible in OWS-7. CIWS also uses WCS/WFS as one of its service interfaces. Although planned, CIWS will not provide data back in WXXM in time for use in OWS-7.



Query registry

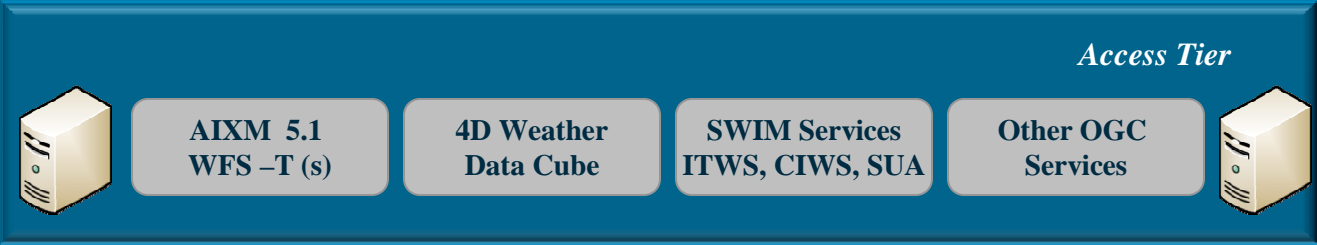
Request portrayal

Post/receive
Events



Request data
For portrayal
Or workflow

Post Events
Update data



Request data or
updates to data

OWS-7 Aviation Deliverables



	1. AIXM	2. WXXM	3. Events	4. SWIM
Engineering Report	X	X	X	X
AIXM Change Requests	X			
WXXM Change Requests		X		
OGC specs Change Requests	X	X		
AIXM schemas (19139 profile)	X			
WXXM schemas		X		
AIXM handling tools & guides	X			
AIXM WFS/WFS-T (2 instances)	X			
WXXM WFS (or other OWS)		X		
FPS for AIXM	X			
FPS for WXXM		X		
EFB Aviation Clients (2 instances)	X	X	X	X
Dispatch Aviation Client	X	X	X	X
Event Architecture Components			X	
Security Architecture Components				X
SWIM bridges or proxy services				X
Registry Service	X	X		

Agenda



- OGC Introduction
 - OGC Reference Model (ORM)
- OGC's Approach for Advancing Interoperability
 - Aviation Threads in OGC Testbeds
 - OGC Web Services Initiative Phase 6 OWS-6
 - OGC Web Services initiative Phase 7 OWS-7
- OGC Working Groups of interest
 - Meteorology Domain Working Group
 - Aviation Domain Ad-hoc Working Group

Meteorology Domain Working Group



- The ability to easily exchange atmospheric meteorological and climatological information in a timely and useful fashion is becoming increasingly important. Further, oceanographic data is increasingly exchanged in near real time for operational purposes as well as through the more traditional research campaigns. Oceanographic data is used both to force atmospheric models and to explicitly model the oceans, seas, tides, waves and swell.
- Meteorological and oceanographic data, in general, are/is multidimensional, continually evolving, highly spatial and highly temporal in nature. This Meteorology and Oceanography Domain Working Group brings together OGC members in an open forum to work on oceanographic, meteorological and climatological data, metadata, and web services interoperability, greatly improving the way in which this information is described, shared and used.



Proposal for Aviation Domain Working Group to Develop and Advance AIXM and WXXM

AIXM - Situation



- AIXM 4.5
 - Is implemented in a number of countries
 - Industry supports it
 - A number of extensions are included by different vendors
 - Data exchange and export/import uses it
- AIXM 5.x
 - Is not yet used operational, at least not full
 - Industry has started to support it in parts
 - A number of extensions are included already
 - No data exchange nor export/import uses it yet
 - There are plans for first usage in Europe in 2010
- ICAO AIS to AIM Study Group had two meetings

AIXM – ICAO AIS-AIM/SG/2



- AIS-AIM/SG/2 10.-13.11.2009 (Agenda Item 6.1) agreed that the ICAO AIS Guidance Material (Doc 8126) would not mention any particular AIXM version,
- Annex 15 will contain in para 3.6.5 SARPs reference to „ digital data exchange“,
- Doc 8126 will contain a CD with AIXM 5 documentation (Action 2/3),
- AIXM 5 will be described as general “performance” requirement,
- AIXM 5 would then be mentioned as a possible means of compliance,
- An appropriate body with technical and broad-based representation to support the governance of the evolution of AIXM shall be proposed in Nov 2010 on SG/3 (Action 2/4).

AIXM - Action



- OGC Aviation Domain Working Group could be considered as appropriate body to further develop AIXM 5,
- The different Use Cases of using AIXM 5 shall further be developed
 - export/import,
 - publish/subscribe,
 - connect/find/bind),
- Meta Data shall be addressed (see outcome OWS-6).

Benefits - Participation in OGC Programs



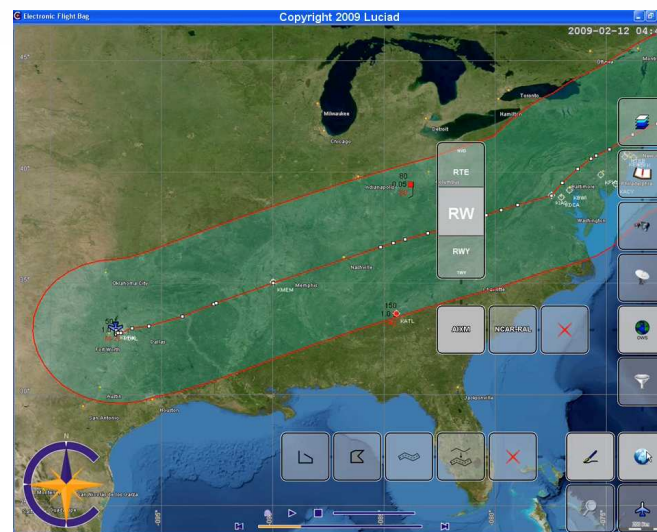
- **Direct, legal, and broad dialog with industry on interoperability needs**
- **Align industry on priority standards needs** – User community organizations help to identify and prioritize requirements for new standards.
- **Small investments in OGC process reduces life cycle risk and cost** – minor investments by many OGC members often yields industry action and consensus on standards. When this happens, organizations reduce their reliance on custom solutions and associated maintenance costs
- **Improve choice and competition in the marketplace** – Involvement in OGC helps create broad industry incentive to advance and implement OGC standards in their products. This increases the pool of standards-based products that can be plugged into a system or enterprise -- no single application meets the needs of all users

Questions & Comments



Nadine Alameh, Ph.D.
nadinesa@mobilaps.com

Open Geospatial Consortium, Inc
www.opengeospatial.org



OGC®

Copyright © 2009, Open Geospatial Consortium, Inc.,