OGC®
Open Geospatial Consortium

OGC Web Services Testbed OWS-7

Nadine Alameh, Ph.D.
OGC, Director of Interoperability Programs

May 6, 2010
AIXM/WXXM Conference
Washington DC

Copyright © 2010, Open Geospatial Consortium, Inc.,

Agenda

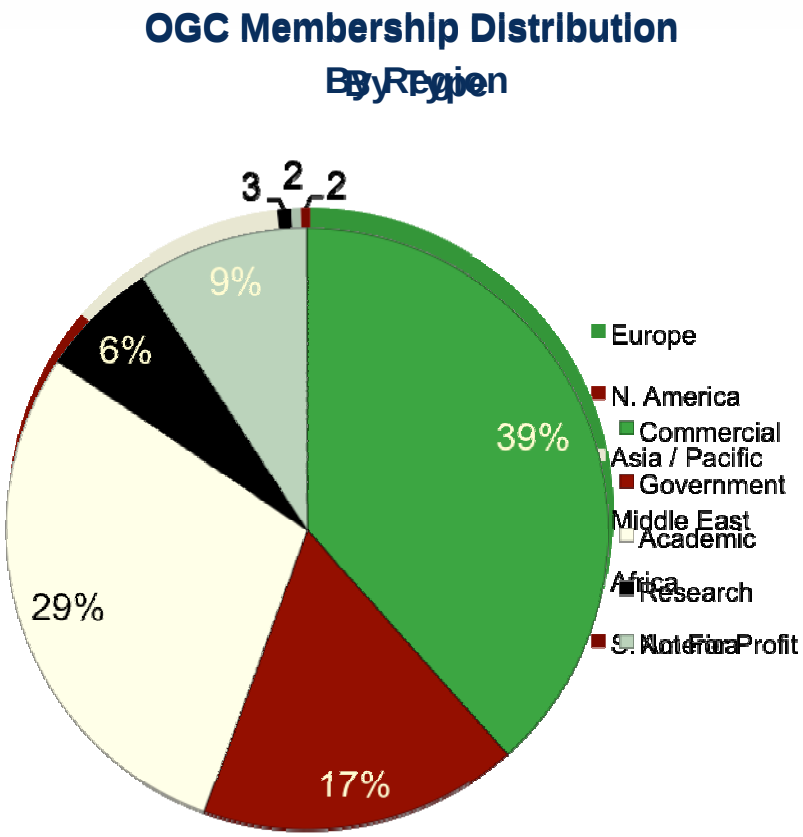
- OGC
  - Interoperability Program
- Aviation in OWS Testbeds
  - From OWS-6 to OWS-7
- OWS-7 Aviation
  - Work areas
  - Architecture
  - Scenarios
- Presentations by OWS-7 participants

OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,

What is the Open Geospatial Consortium (OGC)?

- An International Voluntary Consensus Standards Organization, founded in 1994.
- 395 members and growing: industry, government, research, university
- 28 implementation standards
- Hundreds of product implementations in the market
- Alliances and collaborative activities with many other SDO's



OGC Mission

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

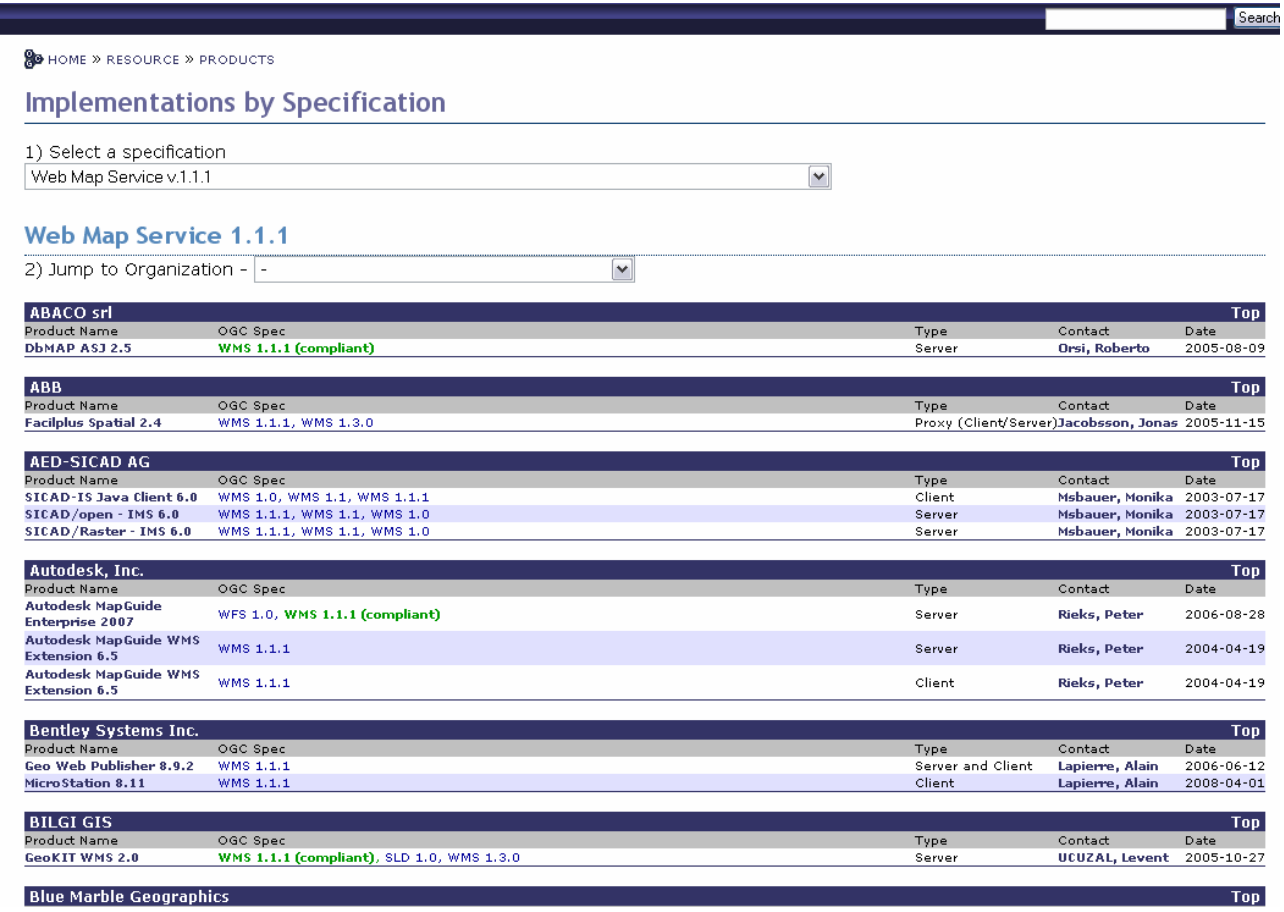
OGC

Copyright © 2010, Open Geospatial Consortium, Inc.,

Helping the World to Communicate Geographically

Market Availability

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



Search

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 Top

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

CERTIFIED OGC COMPLIANT

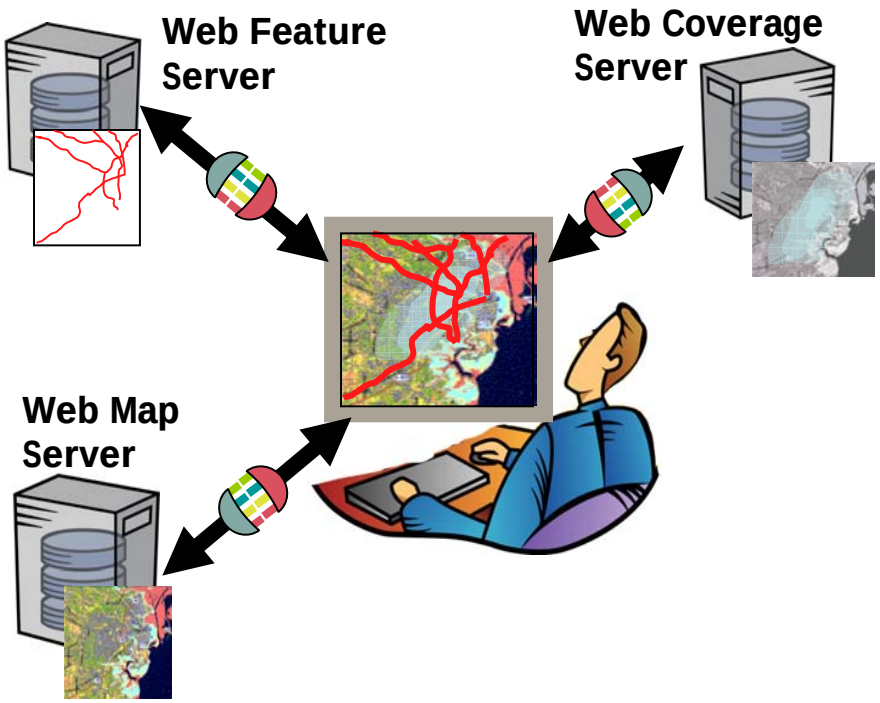
OGC

Helping the World to Communicate Geographically

Copyright © 2010, Open Geospatial Consortium, Inc.,

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, Aviation, Defense & Intelligence, Oceans Science, others

OGC

Helping the World to Communicate Geographically

Copyright © 2010, Open Geospatial Consortium, Inc.,

OGC's Approach for Advancing Interoperability

- ***Interoperability Program* (IP)** - a global, innovative, hands-on rapid prototyping and testing program designed to unite users and industry in accelerating interface development and validation, and the delivery of interoperability to the market

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

- ***Compliance Testing and Certification Program -*** allows organizations that implement an OGC standard to test their implementations with the mandatory elements of that standard

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

Copyright © 2010, Open Geospatial Consortium, Inc.,

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)
- Oct 2008 - May 2009

OGC

© 2010 Open Geospatial Consortium, Inc..

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

Apply the OGC Interoperability Program rapid prototyping global collaborative testbed process

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

OGC®

Demonstration Scenario

North America

Sweden

Destination Airport
Pilot notified during flight that airport is closed

ARN/ESSA

Pilot notified of bad weather over ILN

Diversion Airport
ILN

Alternate Destination Airport

NRK/ESSP

ATL

Alternate to Diversion Airport (Returned by WFS query)

Airport of Departure
DFW

CFE

OGC®

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

OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,

OWS-7

- **Jan 2010 – June 2010**
- **Sponsors**
  - **US National Geospatial Intelligence Agency (NGA)**
  - **US Federal Aviation Administration (FAA)**
  - **EUROCONTROL**
  - **EADS DCS**
  - **Army Geospatial Center (AGC, formerly TEC)**
  - **Joint Program Executive Office (JPEO)**
  - **USGS**
  - **BAE**
  - **PCI**
  - **LMCO**

- **Themes**
  - **Sensor and Feature fusion** for semantics, analysis, and decision support
  - **Aviation**

OGC®

© 2010, Open Geospatial Consortium, Inc.

OWS-7 Aviation Thread Objectives

- **Demonstrate applicability of OGC standards, in conjunction with AIXM and WXXM, to applications & tools that support Airline Operations Centers/Flight Dispatch Applications**
    - **Accessing, filtering, integrating and portraying information** for representing a Common Operating Picture; supporting flight planning (including GA) and preparation (MET and AIM); calculating weight balance; estimating fuel requirements; in-flight emergency response, etc
    - **Same timely, up-to-date, relevant information** directly to EFB and Flight Dispatcher
- **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

Copyright © 2010, Open Geospatial Consortium, Inc.,

OWS-7 Aviation Participants

- Comsoft (Germany)
- Envitia (UK)
- Frequentis (Austria)
- Galdos (Canada)
- iGSI (Germany)
- LISAsoft (Australia)
- Luciad (Belgium)
- Meteo France/Alticode/Atmosphere (France)
- NNEW (USA)
- NOAA MDL (USA)
- Planet9 (USA)
- Snowflake (UK)
- UM-ifGI (Germany)
- Uni-BW (Germany)
- 52 North (Germany)

OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,

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

Copyright © 2010, Open Geospatial Consortium, Inc.,

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
  - Exercising the OGC FE to filter and retrieve information based on metadata

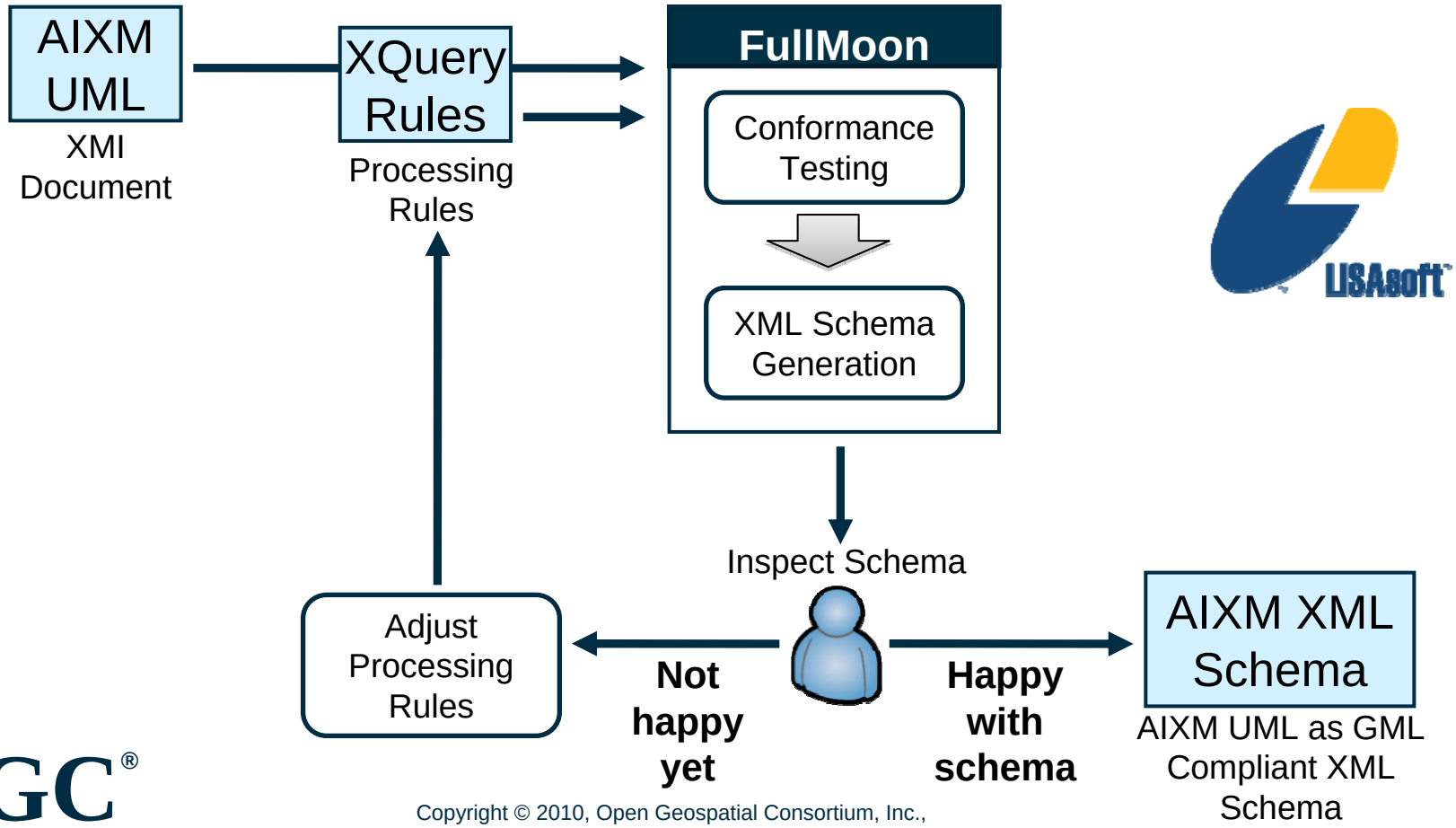
- **Developing reusable components/tools for**
  - Generating AIXM schemas from UML using current schema generators
  - Validating and parsing AIXM (including business rules)

- **Supporting the portrayal of AIXM information**
  - Considering the use of OGC SLD, and symbol and styling management architecture

Copyright © 2010, Open Geospatial Consortium, Inc.,

AIXM UML to XML Schema Conversion

- Test the process of generating GML compliant XML schemas for AIXM5.1
- Document process and provide XML schemas and Schematron rules for comparison with existing schemas

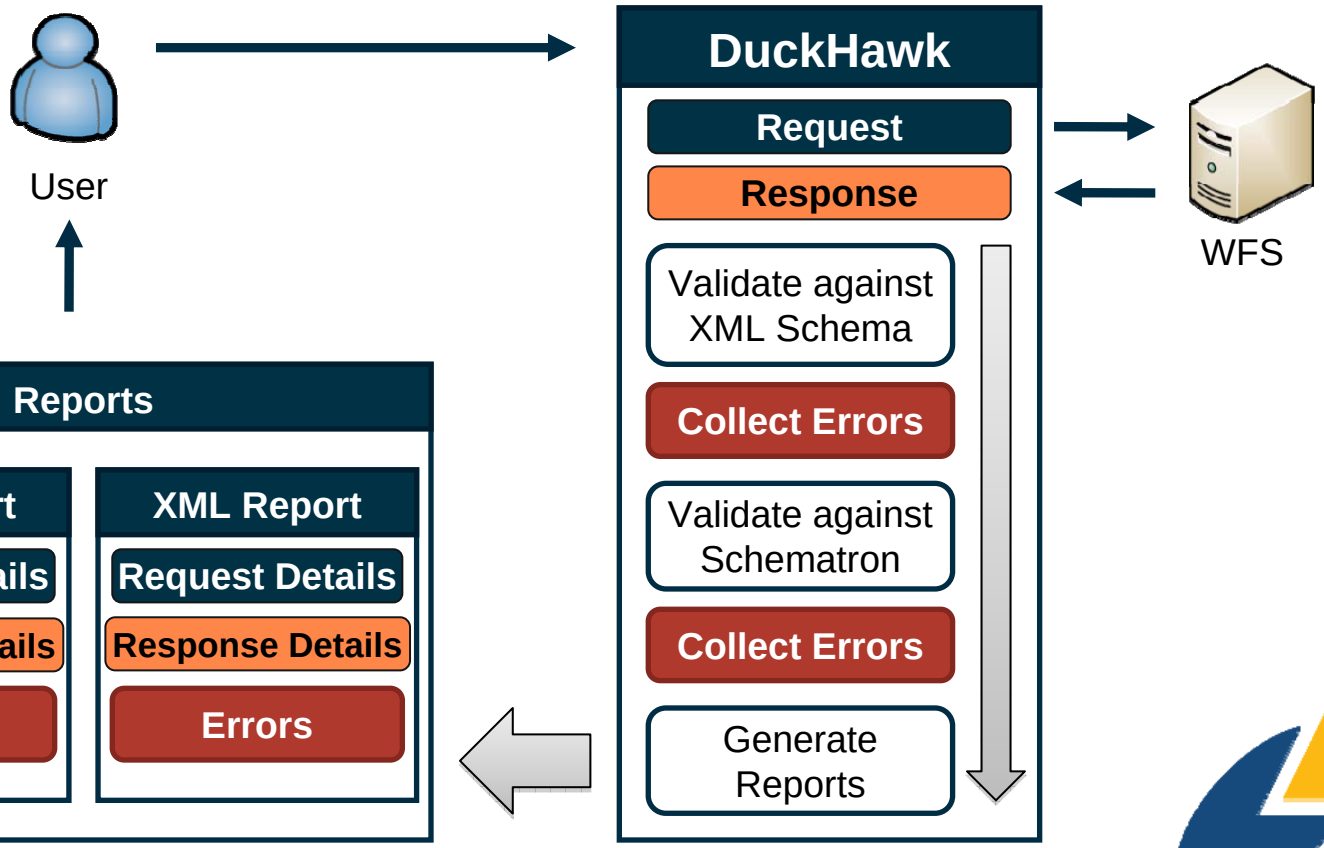


OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,

WFS Validation

- Automated tool to test WFS output for conformance to the AIXM XML Schema
  - Extend and generalize functionality of the open-source Duckhawk implementation
- Use the WFS Validator schema to validate multiple WFS implementations in the field



OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,

LISAsoft

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
  - Exercising the OGC FE to filter and retrieve information based on metadata

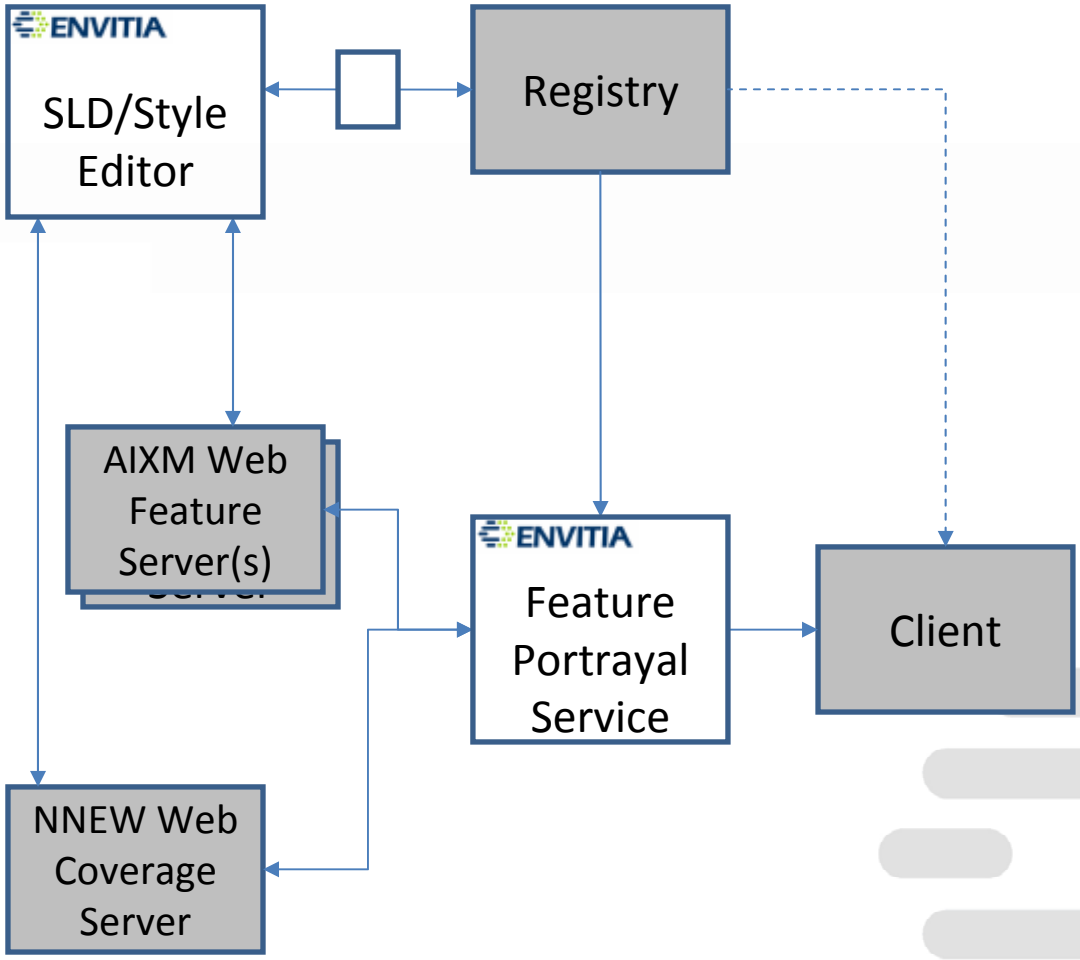
- **Developing components/tools (possibly open source) for**
  - Validating and parsing AIXM (including business rules)
  - Generating AIXM schemas from UML using current schema generators

- **Supporting the portrayal of AIXM information**
  - Considering the use of OGC SLD, and symbol and styling management architecture

Copyright © 2010, Open Geospatial Consortium, Inc.,

FPS: Overall Components and Workflow

- Editor can create an SLD.
- Registry holds SLDs and Symbols.
- FPS Portrays WFS/WCS with styles from the Registry (selected by the client).



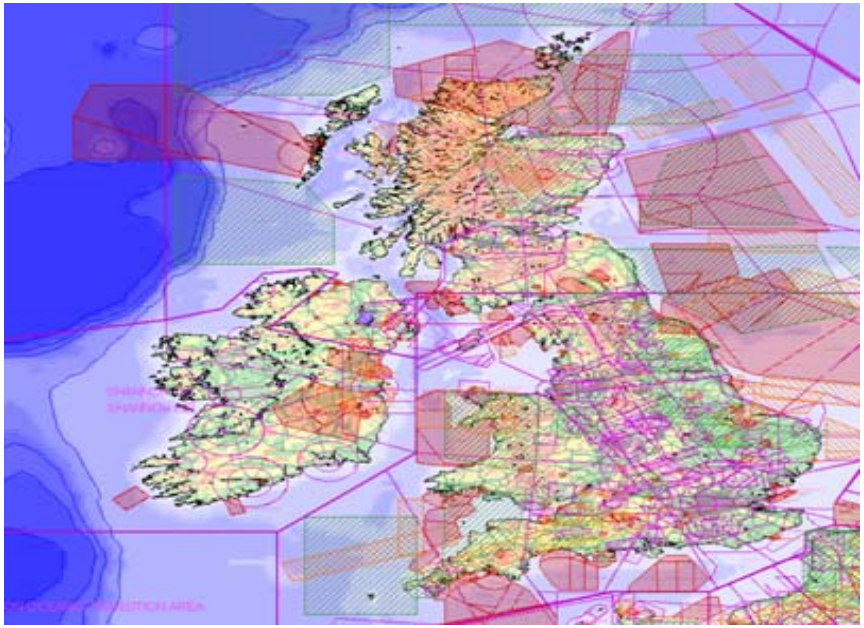
Note, coverage styling not stored in SLD.

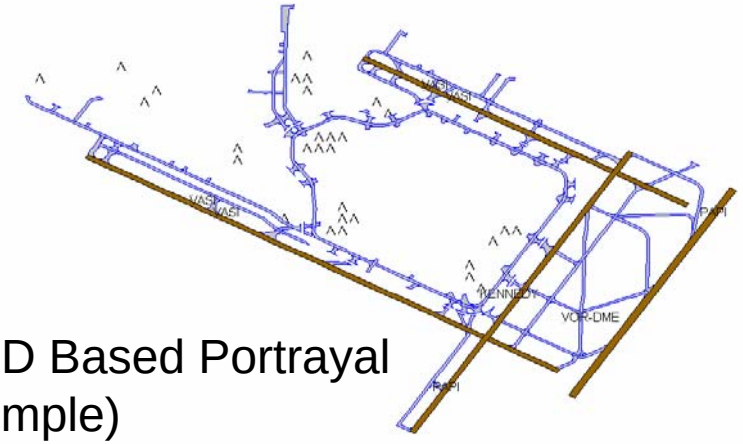
Copyright © 2010, Open Geospatial Consortium, Inc.,

Vector Portrayal

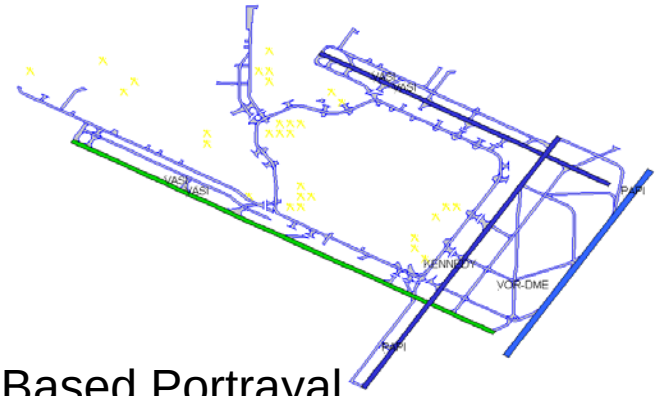
Advanced, user supplied portrayal based on Styled Layer Descriptor Documents.

These can be supplied ad-hoc or referenced in the registry.





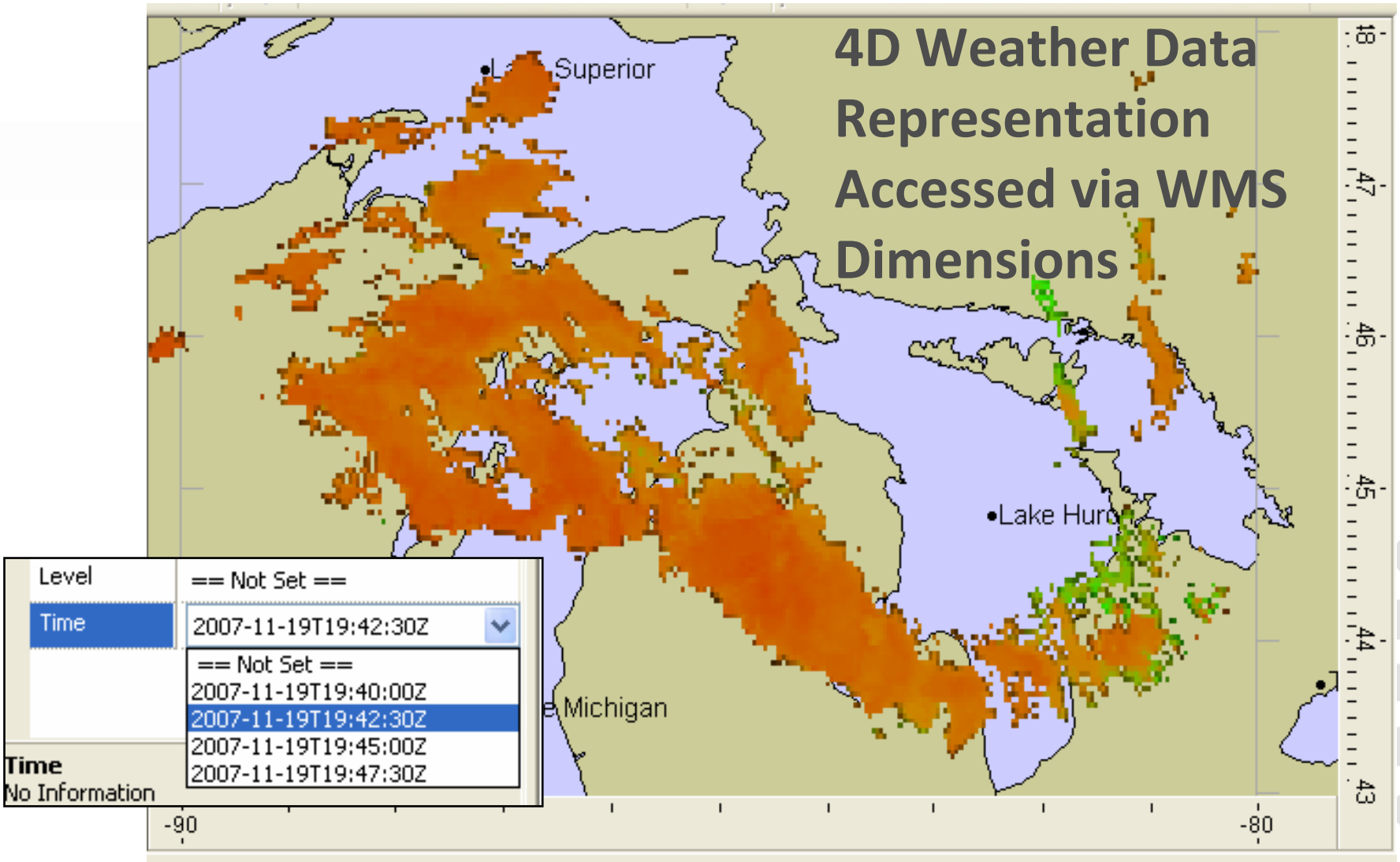
SLD Based Portrayal (Simple)



SLD Based Portrayal Runways coloured based on length

Copyright © 2010, Open Geospatial Consortium, Inc.,

Gridded Data Portrayal



Copyright © 2010, Open Geospatial Consortium, Inc.,

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

Copyright © 2010, Open Geospatial Consortium, Inc.,

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

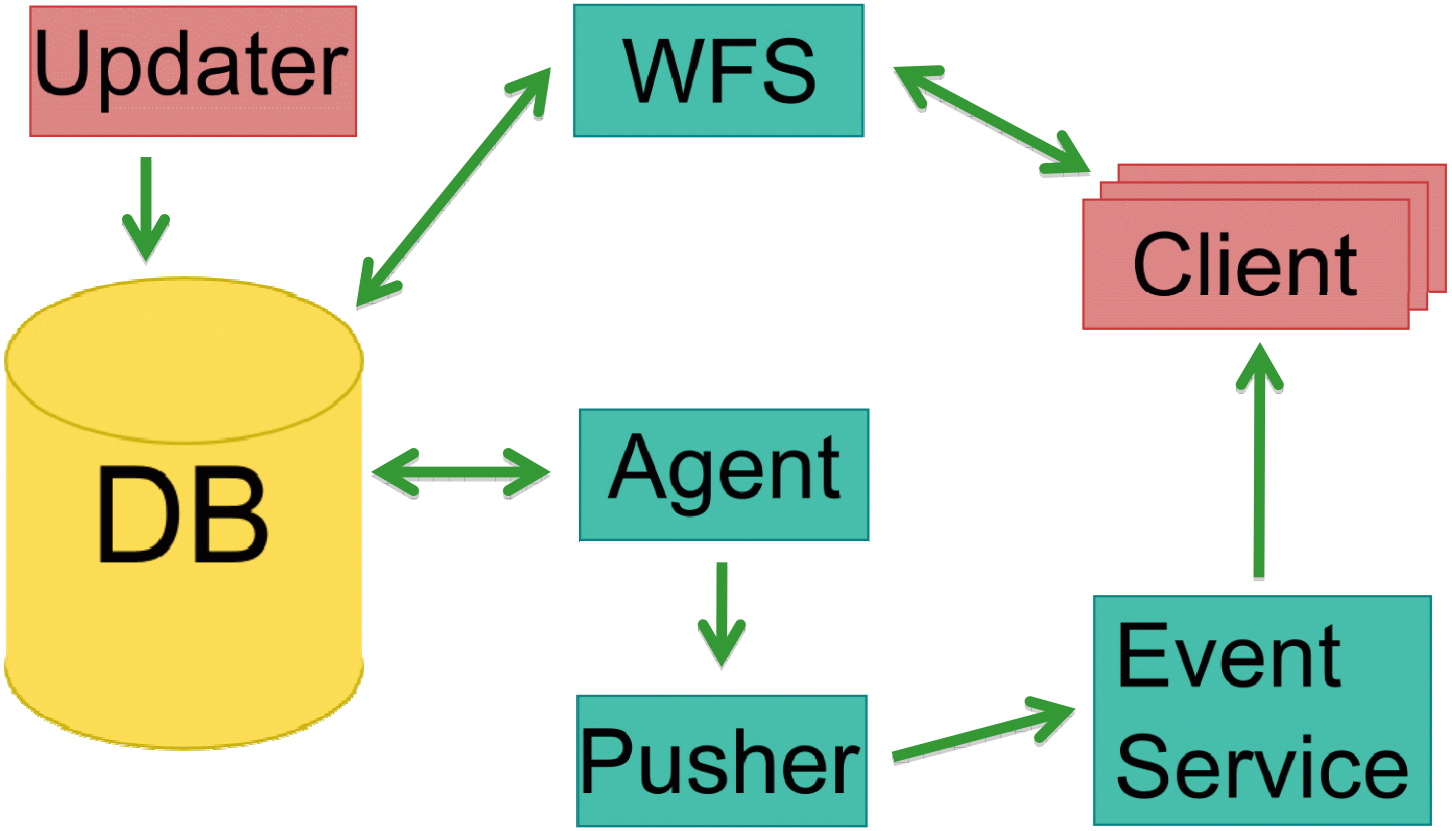
Copyright © 2010, Open Geospatial Consortium, Inc.,

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

Copyright © 2010, Open Geospatial Consortium, Inc.,

Eventing components



Copyright © 2010, Open Geospatial Consortium, Inc.,

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
  - Supporting different delivery protocols (push/pull)
  - Addressing registration & subscription lifecycle management
  - Incorporating domain-specific/schema-specific matching between events and subscriptions

Copyright © 2010, Open Geospatial Consortium, Inc.,

OWS-7 Aviation Work Areas

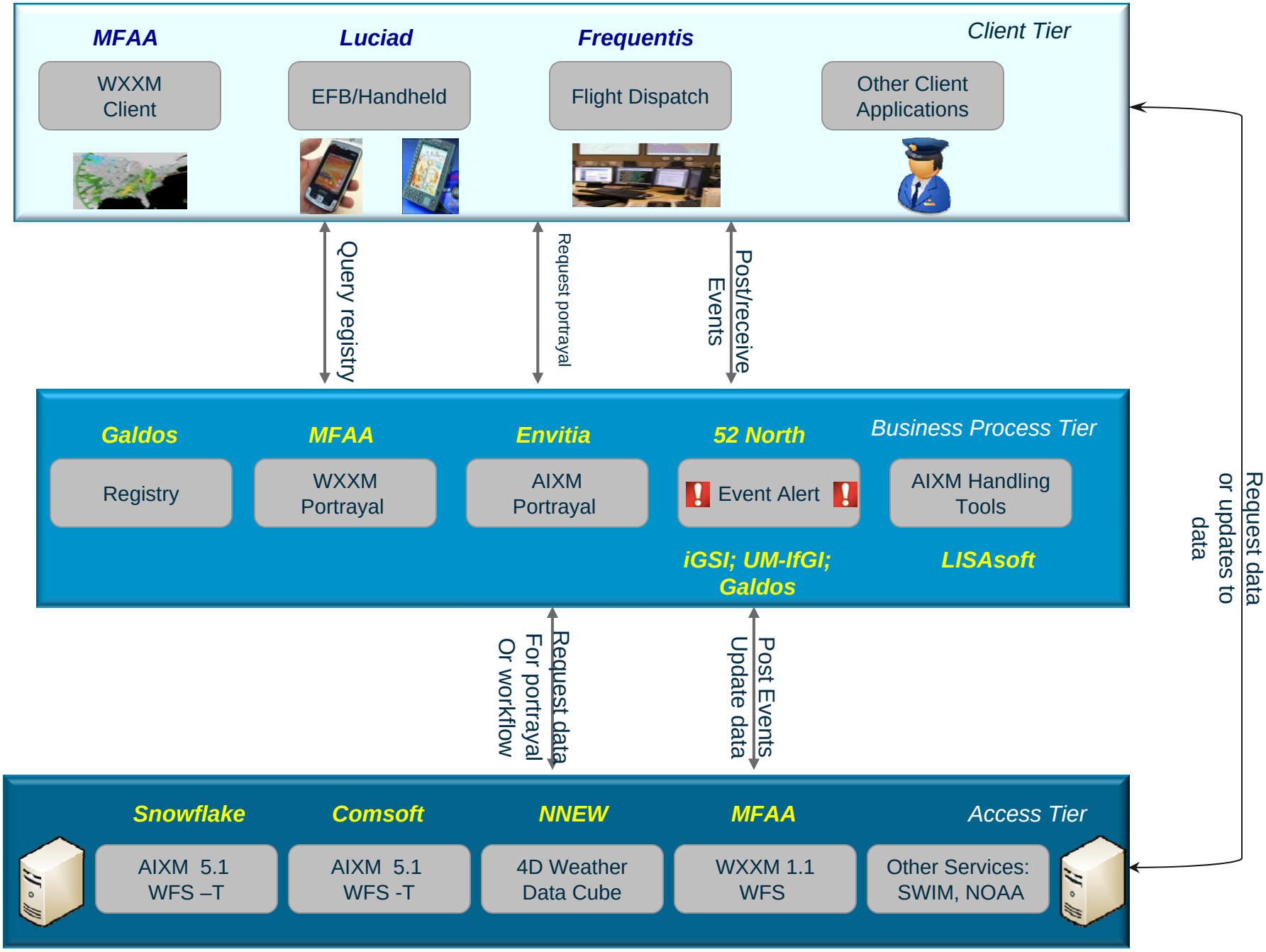
1. Evaluation and advancement of AIXM
2. Evaluation and advancement of WXXM
3. Advancement of Event Notification Architecture
4. Integration of AIXM/WXXM in SWIM environment

Copyright © 2010, Open Geospatial Consortium, Inc.,

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

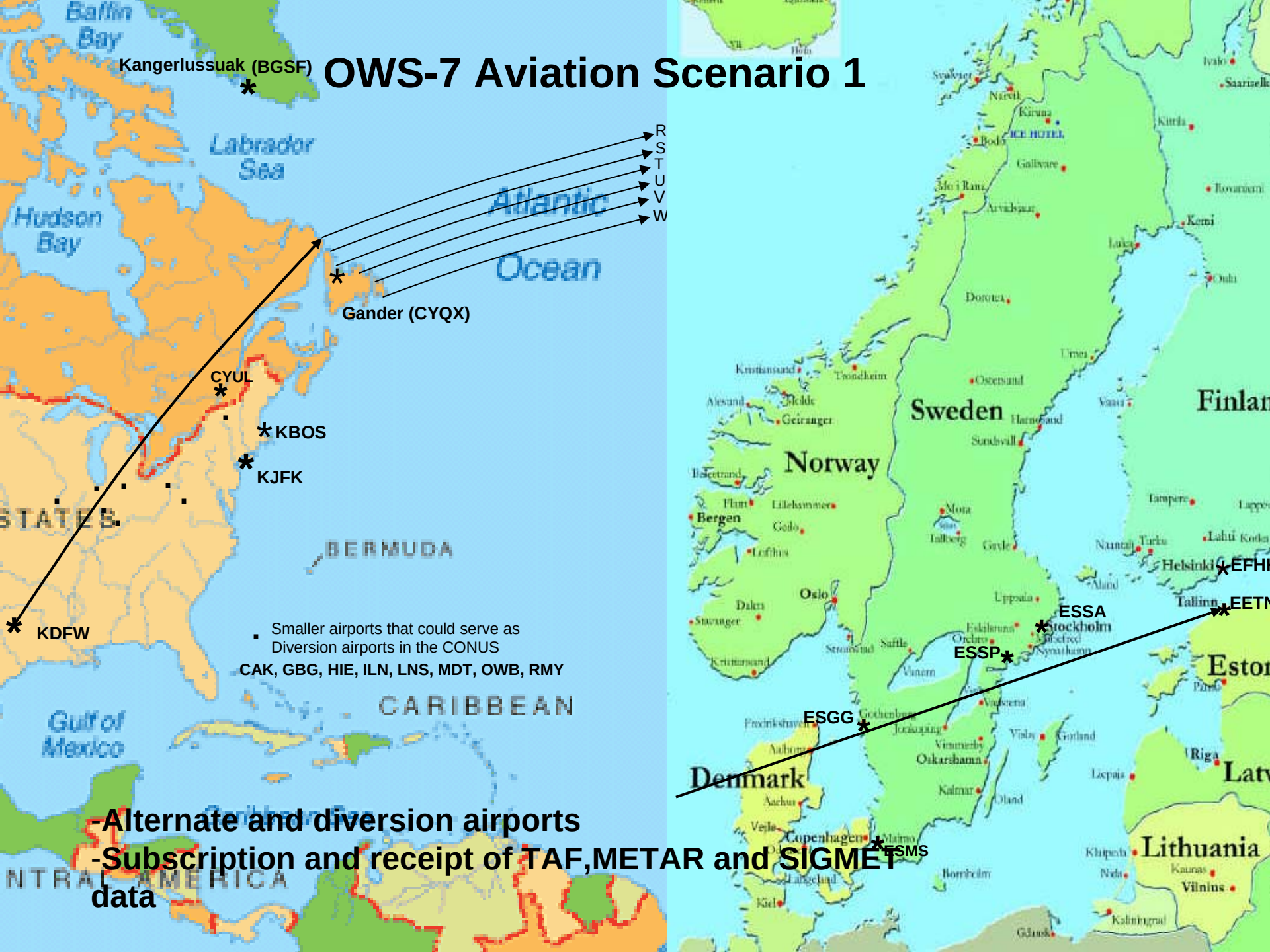
Copyright © 2010, Open Geospatial Consortium, Inc.,


MFAA
Luciad
Frequentis
Client Tier
WXXM Client
EFB/Handheld
Flight Dispatch
Other Client Applications
Query registry
Request portrayal
Post/receive Events
Galdos
MFAA
Envitia
52 North
Business Process Tier
Registry
WXXM Portrayal
AIXM Portrayal
Event Alert
AIXM Handling Tools
iGSI; UM-IfGI; Galdos
LISAsoft
Request data For portrayal Or workflow
Post Events Update data
Request data or updates to data
Snowflake
Comsoft
NNEW
MFAA
Access Tier
AIXM 5.1 WFS –T
AIXM 5.1 WFS -T
4D Weather Data Cube
WXXM 1.1 WFS
Other Services: SWIM, NOAA

Scenario

- The Flight Dispatcher at the OWS Flight Operations Center starts his shift and finds that he is responsible for providing preflight briefing packages and flight following services to the following aircrafts that are due to depart within the next 8 hours:
  - OWS-7A, a twin engine aircraft flying a trans-Atlantic route from Dallas Fort Worth {KDFW} to Tallinn {EETN} with 170 passengers
  - OWS-7B, an EJR-145 type aircraft flying a ‘fractional’ service from Atlanta (KATL) to Fairbanks, Alaska (KFAI).

Copyright © 2010, Open Geospatial Consortium, Inc.,



-Alternate and diversion airports

-Subscription and receipt of TAF,METAR and SIGMET data

OWS-7 Aviation Scenario 2

Kasatochi Island

PAFA

PANC

PAJN (Juneau)

CYYC

KPDX

Devils Lake East SAA

Grand Forks AFB

KSFO

KDEN

KATL

-Diversion due to volcanic ash
-Exercising of SUA data

OWS-7 Aviation Session

- **Overview of OWS-7 Aviation** – Nadine Alameh, *OGC*
- **WFS-T for AIXM and WXXM** – Ian Painter & Debbie Wilson, *Snowflake*
- **WFS-T for Estonian AIP data** – Ulrich Kaage, *Comsoft*
- **WXXM in OWS-7** – Bruno Simmenauer, *Alticode, Meteo France Team*
- **Event Architecture & AIXM Changes** – David Burggraf, *Galdos Systems*
- **OWS-7 Aviation Dispatch Client** – Hannes Brunner, *Frequentis*
- **OWS-7 EFB Client** – Demetreus Lancsweert , *Luciad*

Copyright © 2010, Open Geospatial Consortium, Inc.,

OWS-7 Aviation Session

- Cutting-edge work and a world of opportunities
  - Latest versions of AIXM and WXXM
  - Access to AIXM 5.1 and WXXM 1.1 data via same open standard OGC WFS
- Changes to AIXM,WXXM, OGC standards will be documented
  - Change Requests
  - Engineering Report
- Work in progress!
  - Final demonstration during OGC TC meeting June 17, Silver Spring MD
  - Webinar in June/July. Stay tuned!

Copyright © 2010, Open Geospatial Consortium, Inc.,

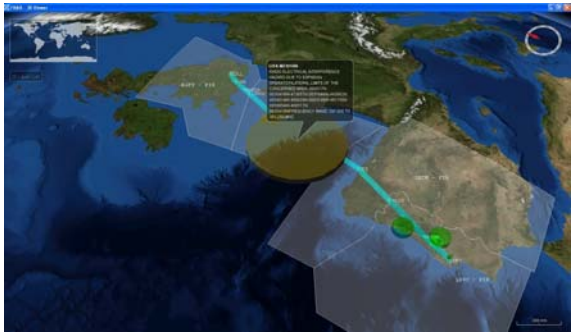
For More Information

Open Geospatial Consortium, Inc
www.opengeospatial.org

OWS-6 Demo Website
http://www.opengeospatial.org/pub/www/ows6/index.html

OGC Aviation Domain Working Group
http://www.opengeospatial.org/projects/groups/aviationdwg

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



OGC®

Copyright © 2010, Open Geospatial Consortium, Inc.,