OGC Web Services Initiative, Phase 8 (OWS-8): Aviation Thread - WFS

Surely you can’t be serious

I am serious

.. And don’t call me Shirley

Can WFS really support AIXM in an operational situation

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Introduction

• Providing access to trusted, definitive data is the foundation of aeronautical information management (AIM) systems.

• In a SOA environment such access is facilitated through middleware interfaces:
  – OGC Web Feature Service 2.0 (request/response)
  – WS-Notification (publish/subscribe)
WFS 2.0 specification

- WFS 2.0 is a comprehensive web services specification for retrieving/maintaining features & property values
WFS 2.0 specification

- Retrieve features or properties defining queries (ad hoc or stored) that contain:

Select functions

<table>
<thead>
<tr>
<th>Filter Expressions</th>
<th>XPath Expressions</th>
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<tbody>
<tr>
<td>Logical &amp; Comparison</td>
<td>XPath predicates</td>
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<tr>
<td>Spatial</td>
<td>Schema-element()</td>
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<tr>
<td>Temporal</td>
<td>valueOf()</td>
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<tr>
<td>Resource ID</td>
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Pestentation functions

- Sorting
- PropertyName
- CRS Transformation
- Presentation Parameters (startIndex, count, outputFormat, resultType)
WFS Architecture

Aviation Decision Support Clients
- Envitia
- LuciadMap
- Frequentis

Access Control
- PEP/PIP
- Context Handler
- GeoPDP

WFS 2.0 (transaction)
- FPS
- Event Service

WFS 2.0 (read-only)
- AIXM 5.1 + extensions

Event Publisher (WS-Notification)
- Digital NOTAM Events (v1.0)

Local consolidated WFS data store (AIXM 5.1)
- Insert only
- AIXM 5.0
- AIXM 5.1
- SUA schedules

Data Sources:
1. EANS Estonia
2. LFV
3. Eurocontrol: Digital Snowtam Trial
4. FAA: SUA data feed, AMDB & NASR

- Snapshot generation
- Reverse associations extension
- Addition of bounding box extents
Using the WFS to support flight planning and dispatch

- Do any active SUA airspaces intersect my proposed route?

- What is the state at destination airport when aircraft shall land?
Using the WFS to support flight planning and dispatch

• Several issues were identified:
  1. WFS Providers support different parts of the WFS specification
  2. Querying to retrieve specific timeslices of a feature?
     - Cannot subset a feature to contain only those timeslices corresponding to query
     - Ensuring gml:id uniqueness for each feature instance containing 1 timeslice
     - Version handling
     - Properties with schedule (fes:function - evaluateDuring)
  3. Supporting SNAPSHOT timeslices is essential
     - Time instant vs time period valid times for SNAPSHOTs
     - On-the-fly generation of SNAPSHOT timeslices has performance implications and technical limitations exist for some WFS
  4. Simplify requests by supporting advanced filter parameters
     - Resolve, valueOf() accessor and join queries
     - Need to support reverse associations
The key objectives of this document are to provide:

1. An overview of the WFS 2.0 specification and how these support aeronautical information use case requirements
2. Recommendations for a minimum set of operations and functions that a WFS 2.0 should support to meet AIM requirements
3. Best practice guidance for configuring and using a WFS 2.0 to support consistent community implementation
## Key Outcomes

<table>
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<tr>
<th>Specification</th>
<th>Outcome</th>
<th>Recommendations</th>
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<tr>
<td><strong>WFS/FE 2.0</strong></td>
<td>• Initial Recommendations for AIXM 5 WFS application profile to ensure interoperability and lower cost for client development</td>
<td>• Aviation DWG to develop an AIXM 5 WFS 2.0 application profile</td>
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<td>• Support for advanced query parameters (resolve, <code>valueOf()</code> accessor function, join queries) were identified but still unproven</td>
<td>• Investigate applicability in OWS-9</td>
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<td>• Need improved support for retrieving Dynamic Features via WFS:</td>
<td>• Develop and test proposed improvements (version clause/<code>temporalFilter/evaluateDuring</code> function) in OWS-9</td>
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<tr>
<td></td>
<td>• Version navigation</td>
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<td>• Properties with schedule</td>
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<tr>
<td><strong>AIXM 5.1/GML 3.2.1</strong></td>
<td>• Need to better align AIXM 5 Temporality and GML Dynamic Feature Model</td>
<td>• Mature Dynamic Feature Model - aim to develop as ISO 19100 specification</td>
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<td>• Maintaining reverse associations in an AIXM extension leads to several open issues</td>
<td>• Investigate whether reverse associations should move into core</td>
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<td>• Ensuring <code>gml:id</code> uniqueness</td>
<td>• Updates to AIXM 5 Feature Identification &amp; Reference required</td>
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