Modernising Aeronautical Information Management

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Context

• Air Traffic flows are estimated to be 2-3 times higher by 2025 than today

• Both initiatives aim to develop secure, net-centric information services that:
  – Provide a common operating picture enabling access to right information, in right place at right time
  – Enable end to end information management
  – Improve aeronautical safety and efficiency
Future Air Traffic Management Systems

- Effective information exchange is at the heart of future ATM
  - SWIM

- Data Exchange Models

IT infrastructure program to develop a SOA that will provide aeronautical and weather data to authorized users

Used in OWS -7 Aviation Thread
OWS-7 Aviation Thread

- Ambitious 6 month project: Jan-June 2010

Evaluation & Advancement of AIXM
- Serve, filter & update using WFS-T 2.0
- Dynamic portrayal using FPS
- Metadata & Code lists
- Validate WFS against Business Rules

Evaluation & Advancement of WXXM
- 4D weather data cube
- Event Architecture
- Time model

Advancement of Event Notification Architecture
- Multiple sources/types of events/schemas
- WFS-T updates

Integration of WFS onto SWIM Environment
- WFS deployment on FUSE
- FAA SWIM security
Demonstration Scenarios

• Two scenarios were developed to represent real-world ATM processes for:
  1. Transatlantic flight (USA – Estonia)
  2. Charter Flight (USA – Canada)

• Both scenarios covered:
  – Flight planning
  – Pre-flight briefing
  – In-flight monitoring and assistance:
    • Diversion due to severe icing at destination airport (scenario 1)
    • Diversion due to volcanic ash plume (scenario 2)
Flight dispatch system
Data Maintenance Sub-System

Aviation / Met Edit Client

- Insert timeslice
- Publish AIXM/WXXM files

WFS-T 2.0

- SQL Insert

AIXM / WXXM Data store

Maintain
Load
Build
Transforming and loading baseline data

Able to load, transform and serve data via WFS within a week of project kick-off
Near-Real Time Update and Data Exchange

Aviation Decision Support Client

Dispatch Client  EFB client

Event Service

Push events

Subscribe

getFeature request

getFeature response

WFS-T 2.0  WFS 2.0  Event Publisher

Aviation Edit Client

Insert change

SQL Insert

Feature Table  Trigger  Queue Table
Configuring Data Access Services
Requesting data via WFS 2.0

Constructs a WFS query to select possible diversion airports:
- Are within 100 nm of Tallinn
- Have a runway > 5,000ft and hard surface
- Must have Navaids and refuelling facilities
- Passenger terminal must be in operation between 18:00 and 23:00
Requesting data via WFS 2.0
Visualising Data via Feature Portrayal Service
Flight Dispatch System using INSPIRE Services

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<thead>
<tr>
<th>WFS-T 2.0 (ISO 19142 &amp; 19143)</th>
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<tbody>
<tr>
<td><strong>On-the-fly transformation, load and publication</strong></td>
<td>Enabling real-time update and exchange (using existing datastores)</td>
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<td><strong>SOAP Binding and security</strong></td>
<td>Enables integration into SOA to ensure secure messaging and access control</td>
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<td><strong>GetCapabilities &amp; WSDL</strong></td>
<td>Enables discovery and use</td>
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| **GetFeature & GetPropertyValue:**  
  &  
  • Spatial & Temporal (NEW) filtering and Stored queries | Highly specific data retrieval reducing data traffic & stored queries improve client integration |

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<th>Feature Portrayal Service (WMS 1.3.0)</th>
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<td><strong>Dynamic generation of images using data from WFS</strong></td>
<td>Ensures consistency between data available in view service and data access services</td>
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<td><strong>User-controlled portrayal</strong></td>
<td>Integrate data from distributed WFS and visualise consistently</td>
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<td><strong>Decouples view and download service</strong></td>
<td>Data providers only have to focus on provision of data access services</td>
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Accomplishments

• Dispatch clients and EFBs were able to successfully consume and use OGC web services:
  – WFS 1.1 & WFS 2.0
  – Feature Portrayal Service (WMS 1.3.0)
  – Event Service
• Demonstrated services can support all data access requirements for dispatcher and pilots
• Aeronautical & weather data can be exchanged in near-real time through distributed web services to enable common operating picture
Thanks & Questions

Further Information

- http://www.snowflakesoftware.com/aviation