A Semantic Decision Support Tool for Pilots

Ontologies for Information Integration (IO2) Workshop
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What is Big Data?

Big data are high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization.

- Gartner, 2012
Semantic Decision Support Tool (Demo)

• The demonstration was developed as part of an inter-agency demonstration with
  • United States Air Force A3O/BN (DOD NOTAM Office)
  • NextGen Joint Planning and Development Office.

• The objectives were to
  • Piece together information over the Web from disparate sources (e.g. NOTAMs and weather)
  • Deliver context-specific information to an end user (e.g., a pilot) based on flight mission, phase of flight, type of aircraft, etc.
Electronic Flight Bag
Pilots Need to Track Many Types of Data

- NOTAMS
- Charts
- Aircraft Procedures
- Takeoff/Landing Limitations
- Bird Advisories
- SID/STARs
- Aeronautical Information
- Flight Plan
- GPS Info
- Approach Plates
- Weather
- Fuel Requirements
Problem Statement

• What I really need is help in:
  • Putting together discrete and pertinent pieces of information
  • Executing a knowledgeable decision at the right time

• Today’s demonstration will use a Semantic Technologies approach to address the problem
  • During pre-flight planning
  • En route to a location; with a mechanical problem
  • Arriving at a destination
Demonstration Scenario

Preflight Planning

En-route Malfunction

Arrival at Location
Building on existing technologies including EFB

Information from multiple sources in a single place in the order of relevance
Potential integration with Onboard Sensors via Open Pod.

Recommendation of emergency land sites based on business rules.
Data Sources

- DoD
  - Defense Aeronautical Information Portal
- NGA
  - Digital Aeronautical Flight Information File
- FAA/NOAA*
  - Aviation Digital Data Service
- Google
  - Weather
  - Aircraft Characteristics
- File Server
  - Route Calculation (GIS)
- Federated Query Server
- Business Rules
- Automated Interpretation Server (D2R)
- Ontology Relationships (RDF Store)

User Interface

- Demo Scenario

Business Process Controller

- Business Rules
- Federated Query Server
- Route Calculation (GIS)
- Automated Interpretation Server (D2R)
- Ontology Relationships (RDF Store)
- File Server
From Data to Knowledge

Data Sources:
- NOTAMs
- Weather
- Airports
- Flight Plans

Standards:
- AIXM
- WXXM
- FIXM

Ontology:
- Aviation Ontology
Questions

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