Delivering Digital Services

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semNOTAM
Intelligent NOTAM Prioritization
Semantic DNOTAM

- Ontology-based representation & querying of DNOTAM
  - SWIM component which you can add to any application
  - Integrated Digital Briefing & In-Flight Briefing

- Started 2014, duration 3 years

- Joint Undertaking of FREQUENTIS & University of Linz
  - Industrial Research & Experimental Development project founded by the Austrian Research Promotion Agency (FFG)
  - Supported by AustroControl, Eurocontrol, FAA (FNS Distribution Service Demo) and various pilots
Motivation

- “The current pre-flight information bulletins contain on average 50% NOTAM messages that are irrelevant because it is not possible to filter out, for example, information that does not concern that type of aircraft or that flight.” [1, p. 10]

- Intelligent querying and filtering of Digital NOTAMs has been identified as important [1]

- “[...] the current NOTAMs system is clumsy to use and that it is easy to make mistakes using it.” [2, p. 2]
Requirements Analysis

■ Scenarios to be supported:
  ■ Pilot Briefing (Flight Planning, Departure Briefing, and Debriefing)
  ■ Dispatcher Briefing (Flight Preparation, Flight Update, and Debriefing)
  ■ On-board Briefing (context of pilot briefing)
  ■ Controller Briefing

■ Other requirements:
  ■ 100% recall
  ■ Prioritization/Grouping
  ■ Customizing/Personalization
  ■ Delta queries

[5, 6]
Query Interface

Interest Specification

for flight from Washington (IAD) to New York (JFK)
Architecture

Two-model architecture implementing the general approach

- Generic Model
- Application Specific Model
- Explication
- Configuration
- Execution
- Runtime Environment
  - Application Specific Model
  - Data
Semantic Filtering based on Event Scenarios

- Business relevance rules
  - Spatial rules
  - Temporal rules
  - User defined rules
- Relevance rules can use business terms
- Large number of rules
  - => split them into sets
  - regarding their event scenario
Business Terms

- Business terms in SemNOTAM are defined in an intuitively understandable, precise, and machine-readable form called concept.
  - Concept contains all elements compliant
  - Part of the SemNOTAM Ontology

- Types of business terms:
  - NOTAM business terms (special type event scenarios)
  - Auxiliary business terms

- Relations between business terms
Business Relevance Rules

Business relevance rules are specified in an intuitively understandable, precise, and machine-readable form called *SemNOTAM Rule*.

Example NOTAMs:
- N1: Runway Closure for wingspan greater than 150ft
- N2: Airport closed for helicopters

Rules:
- An runway closure restricted to greater than x is irrelevant if the aircraft’s wingspan is smaller than x ± buffer.
- An airport closure is irrelevant if the aircraft restriction does not meet the aircraft type.
Semantic Annotation

- Used for prioritization and grouping
- Topic groups and groupings
- Annotation rules
  - can use business terms
  - assign topic groups to NOTAMs
- Large number of rules can be split into sets
- Graphical arrangement specification
Groupings, Topics

- **Grouping**: used for linking
  - Either ordered
  - Must be complete

- **Topic**: name of a group of topic groups

- **Topic group**: semantically close NOTAMs

Diagram:

- Flight Phase Grouping
  - Flight Phase
  - Take Off
  - Approach
  - En Route
  - Aerodrome
Ordered Viewing - Grouping Arrangement

- Two possibilities for ordered viewing
  - View single ordered grouping
  - Use grouping arrangements

- Grouping arrangement
  - Allows ordering of results regarding several groupings
  - Specified as a list of topics
SemNOTAM in Relation to AIRM

- SemNOTAM prototype is specific to AIXM 5.1
- SemNOTAM methods can be used with other domain models
  - Weather Information Exchange Model
  - Aviation Information Data Exchange
  - Flight Information Exchange Model

- Future Possibilities:
  - Flight relevant Information display in the Electronic Flight Bag
  - Weather Information prioritized according to the situation awareness and needs of the pilot
Conclusion and Outlook

- Introduced SemNOTAM enabling fine-grained semantic filtering and prioritization of NOTAMs
  - Semantic annotation
- Flexible and adaptable architecture
- Can be used in the scenarios described

- Future work: personalization/customization
- Acquire more input from operational people
Questions
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References


