Aeronautical Information Services

Towards a Global Digital NOTAM Specification

Presented to: ATIEC 2016
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“Digital NOTAM” – AIXM coding

VOR/DME “DCA” Out of service...

Event
-scenario = NAV.UNS

Navaid

NavaidEquipment

VOR

TempDelta
-operationalStatus=U/S

DME

TempDelta
-operationalStatus=U/S

TempDelta
-operationalStatus=U/S

Procedure

Etc.
Digital NOTAM Specification

• Identify types of “events” for which the information is currently provided through NOTAM
  – Example: runway closed, navaid u/s, new obstacle, etc.

• Provide the AIXM 5.1 encoding rules for each type of event
  – business rules!

• ... also, support the automatic generation of NOTAM messages (as long as necessary)
## Digital NOTAM Specification

<table>
<thead>
<tr>
<th>scenarios</th>
<th>scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Published special activity area – activation</td>
<td>Displaced threshold</td>
</tr>
<tr>
<td>Published ATS airspace - activation or deactivation</td>
<td>Declared distances changes</td>
</tr>
<tr>
<td>Ad-hoc special activity area – creation</td>
<td>Runway portion closure</td>
</tr>
<tr>
<td>Ad-hoc ATS airspace – creation</td>
<td>Airport Usage limitation</td>
</tr>
<tr>
<td>Route portion closure</td>
<td>Runway usage limitation</td>
</tr>
<tr>
<td>Route portion opening</td>
<td>Taxiway usage limitation</td>
</tr>
<tr>
<td>Aerodrome closure</td>
<td>Approach lights unserviceable</td>
</tr>
<tr>
<td>Runway closure</td>
<td>Approach lights downgraded</td>
</tr>
<tr>
<td>Navaid unserviceable</td>
<td>Runway lights unserviceable</td>
</tr>
<tr>
<td>New obstacle</td>
<td>Obstacle lights unserviceable</td>
</tr>
<tr>
<td>Taxiway closure</td>
<td>Visual Approach slope indicator unserviceable</td>
</tr>
<tr>
<td>Surface contamination (SNOWTAM)</td>
<td>Taxiway lights unserviceable</td>
</tr>
<tr>
<td>Other Event (any other situation that does not have a dedicated scenario)</td>
<td></td>
</tr>
</tbody>
</table>
Application: graphical briefing
Application: graphical briefing
Application: graphical briefing
Graphical NOTAM symbols

• No ICAO standard
• SAE International
    • Does not provide authoritative graphical symbols, just examples!
• OGC® Testbed 10
  – “Aviation Human Factor Based Portrayal of Digital NOTAMs” ER
• EUROCAE
  – Technical Work Programme 2016
  – develop a “standard for representation of digital NOTAM in PIB” (and other ground applications…)
Application: graphical briefing
Digital NOTAM in Europe

• EUROCONTROL Centralised Service CS#5 (EAIMS)
  – Digital NOTAM coding capability
  – Graphical briefing capability
    • Some NOTAM will have to be post-digitised by the service provider, at least in the initial phase
  – Operational around 2020
  – Will replace the current EAD system

• European ANSP with a local system
  – Digital NOTAM plans/trials

Expecting to receive Digital NOTAM from world-wide!
Scenarios

• DNOTAM Focus Group
  – Participants: Eurocontrol, FAA, NavCanada, industry
  – model the most common events, both airport and airspace (SAA.NEW, RWY.CLS, SAA.ACT, etc.)

• FAA
  – additional/alternative scenarios
  – initial focus on all airport events
  – fast deployment (FNS-NDS)
Scenarios

Digital NOTAM Specification

<event:Event gml:id="uuid.f50faa4a-3037-45ea-a69d-5e982d74991a">
  <gml:identifier codeSpace="urn:uuid:">f50faa4a-3037-45ea-a69d-5e982d74991c</gml:identifier>
  <event:timeSlice>
    <event:EventTimeSlice gml:id="evttsl-0046">
      <gml:validTime>
        <gml:TimePeriod gml:id="evtltp-814199">
          <gml:beginPosition>2016-01-14T06:23:00Z</gml:beginPosition>
        </gml:TimePeriod>
      </gml:validTime>
      <aixm:interpretation>BASELINE</aixm:interpretation>
      <aixm:sequenceNumber>1</aixm:sequenceNumber>
      <aixm:featureLifetime>
        <gml:TimePeriod gml:id="evtvtp-814199">
          <gml:beginPosition>2016-01-28T12:33:00Z</gml:beginPosition>
          <gml:endPosition>2016-01-29T12:33:00Z</gml:endPosition>
        </gml:TimePeriod>
      </aixm:featureLifetime>
    </event:EventTimeSlice>
    <event:encoding>DIGITAL</event:encoding>
  </event:timeSlice>
  <event:scenario>SFC.CON</event:scenario>
</event:Event>

FAA additional scenarios

<ns12:Event ns5:id="Event_1_11627044">
  <ns5:boundedBy xsi:nil="true" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"/>
  <ns12:timeSlice>
    <ns12:EventTimeSlice ns5:id="Event_TS_1_11627044">
      <ns5:validTime>
        <ns5:TimePeriod ns5:id="Event_TS_TP_1_11627044">
          <ns5:beginPosition>2015-04-17T21:25:00.000Z</ns5:beginPosition>
          <ns5:endPosition>2015-04-19T21:00:00.000Z</ns5:endPosition>
        </ns5:TimePeriod>
      </ns5:validTime>
      <ns9:interpretation>BASELINE</ns9:interpretation>
      <ns12:scenario>82</ns12:scenario>
      <ns12:extension>
        <ns6:EventExtension ns5:id="ext_01_11627044">
          <ns6:classification>DOM</ns6:classification>
          <ns6:accountId>SFO</ns6:accountId>
          <ns6:airportname>SAN FRANCISCO INTL</ns6:airportname>
          <ns6:lastUpdated>2015-04-17T21:25:00.000Z</ns6:lastUpdated>
          <ns6:icaoLocation>KSFO</ns6:icaoLocation>
        </ns6:EventExtension>
      </ns12:extension>
    </ns12:EventTimeSlice>
  </ns12:timeSlice>
  <ns12:scenario>82</ns12:scenario>
</ns12:Event>

What does this scenario mean?
Is it correctly encoded?
Is it complete?
How can I verify it?
Scenarios – verification rules

- Example
  - “[RWY.CLS] Event must have CLOSED operationalStatus”

It is prohibited that a RunwayDirectionTimeSlice with availability.ManoeuvringAreaAvailability.operationalStatus not equal-to 'CLOSED' belongsTo Event with scenario equal-to 'RWY.CLS' and with version equal-to '2.0'

```xml
for $runwayDirection in . return
  if
    (not($runwayDirection/aixm:availability/aixm:ManoeuvringAreaAvailability/aixm:operationalStatus='CLOSED'))
    and
    (count($event in //event:Event... :)
      for $event in //event:Event)
```

Coding specification rule
AIXM - SBVR rule
Executable computer code
Even more – data quality checks!
We need a **globally applicable** Digital NOTAM Specification

- a unique opportunity to do it right!

- a joint responsibility for the Digital NOTAM designers and the end users!

**Scenarios**

**Coding rules**

**Verification rules**

**Verification services**

**Metadata**

As produced by the engineers. As installed at the user’s site. What the customer really wanted.