# Digital NOTAM

May 12-14, 2009

AIXM/WXXM Conference | 2009

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EUROCONTROL

# Content

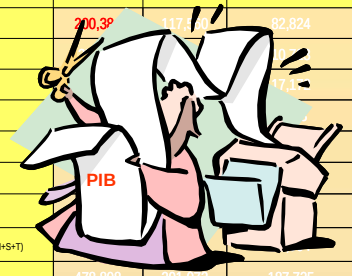
- Why Digital NOTAM
- From idea to implementation plans
  - AIXM 5
  - Trials
  - EUROCONTROL implementation project

# Why Digital NOTAM

- NOTAM problems

| ICAO region | 2006 | 2000 | Change in numbers | Change in % |
|---|---|---|---|---|
| Europe (L+E+B) | 200,3 | 117 | 82.824 | 70% |
| Pacific (A+N+Y) | | | | 63% |
| Asia (R+V+W+Z) | | | | 56% |
| Russia + Central Asia (U) | | | | 168% |
| Africa (D+F+G+H) | | | | 47% |
| Mid Asia (O) | | | | 133% |
| North America (C+K+P) | | | | 53% |
| South + Central America (M+S+T) | | | | 62% |
| Total | 478,808 | 291,073 | 187.735 | 65% |

Source: European AIS Database (EAI

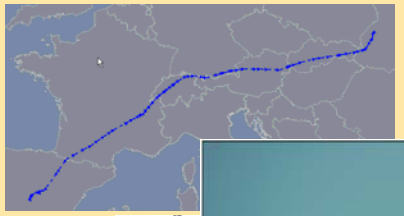


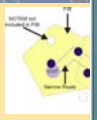

***Basic PIB***
- ADEP, FIRs, ADES, ALTN

❖ ***33 pages, 223 NOTAM***

***Advanced PIB***
- *example for 09 June 2008*
- narrow route
  - based on NOTAM centre + radius
  - ***not using real feature geometry and not using real impact!***

❖ ***20 pages, 121 NOTAM***





- We can do much better

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# What is digital NOTAM

## Current NOTAM

(A2018/07 NOTAMN
Q) EGPX/QMRLC/IV/NBO/A /000/999/5439N00613W005
A) EGAA B) 0709011344 C) 0709011344
E) RWY 07/25 WITHDRAWN FM SER DUE TO ESSENTIAL MAINT.
BOTH RWY CAN BE MADE AVBL TO FULL OPR CRITERIA WITH 30MIN PPR.
WIP WILL BE SUSPENDED WHEN THE CLOUD CEILING FALLS TO OR BLW 600FT
OR VIS FALLS TO OR BLW 5000M.)

*"A **notice** distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations."*

## Digital aeronautical information update

*"A **data set** made available through digital services containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to systems and automated equipment used by personnel concerned with flight operations."*

***Data Model***

**AIXM**

Aeronautical Information Exchange Model

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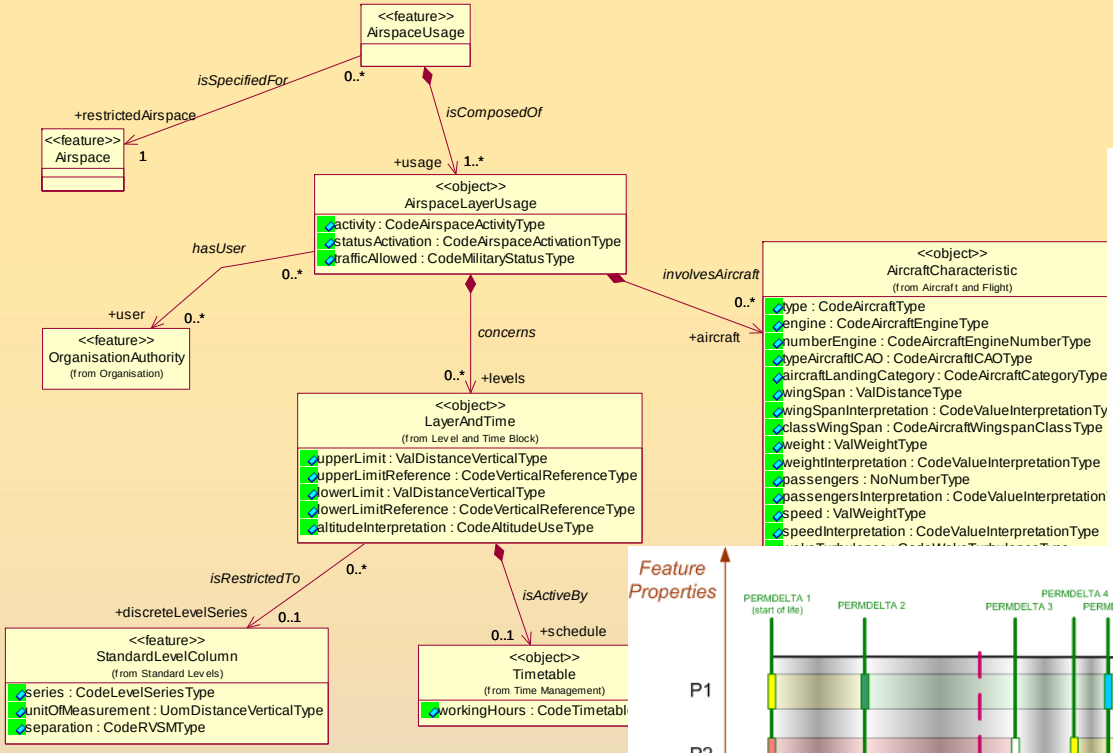
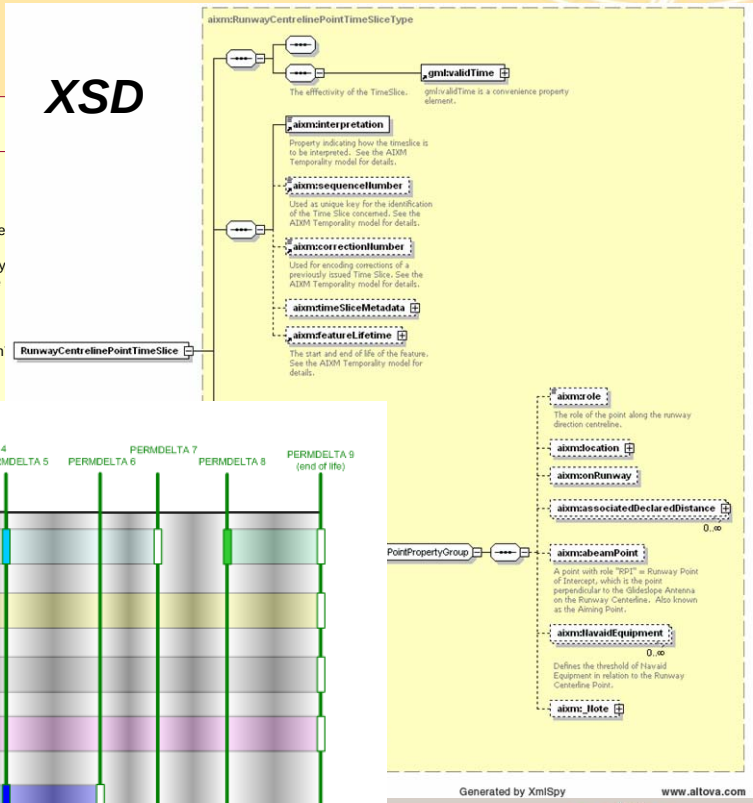
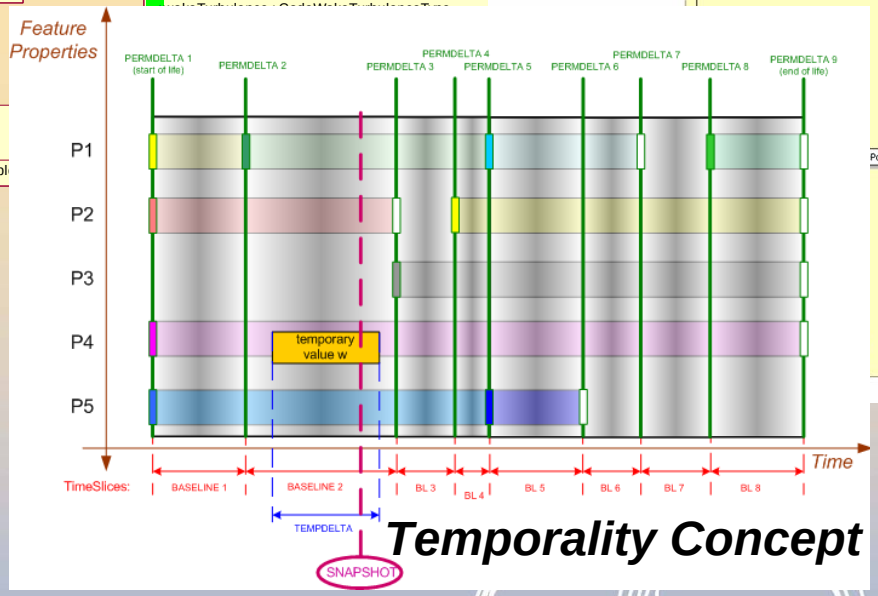
# AIXM 5

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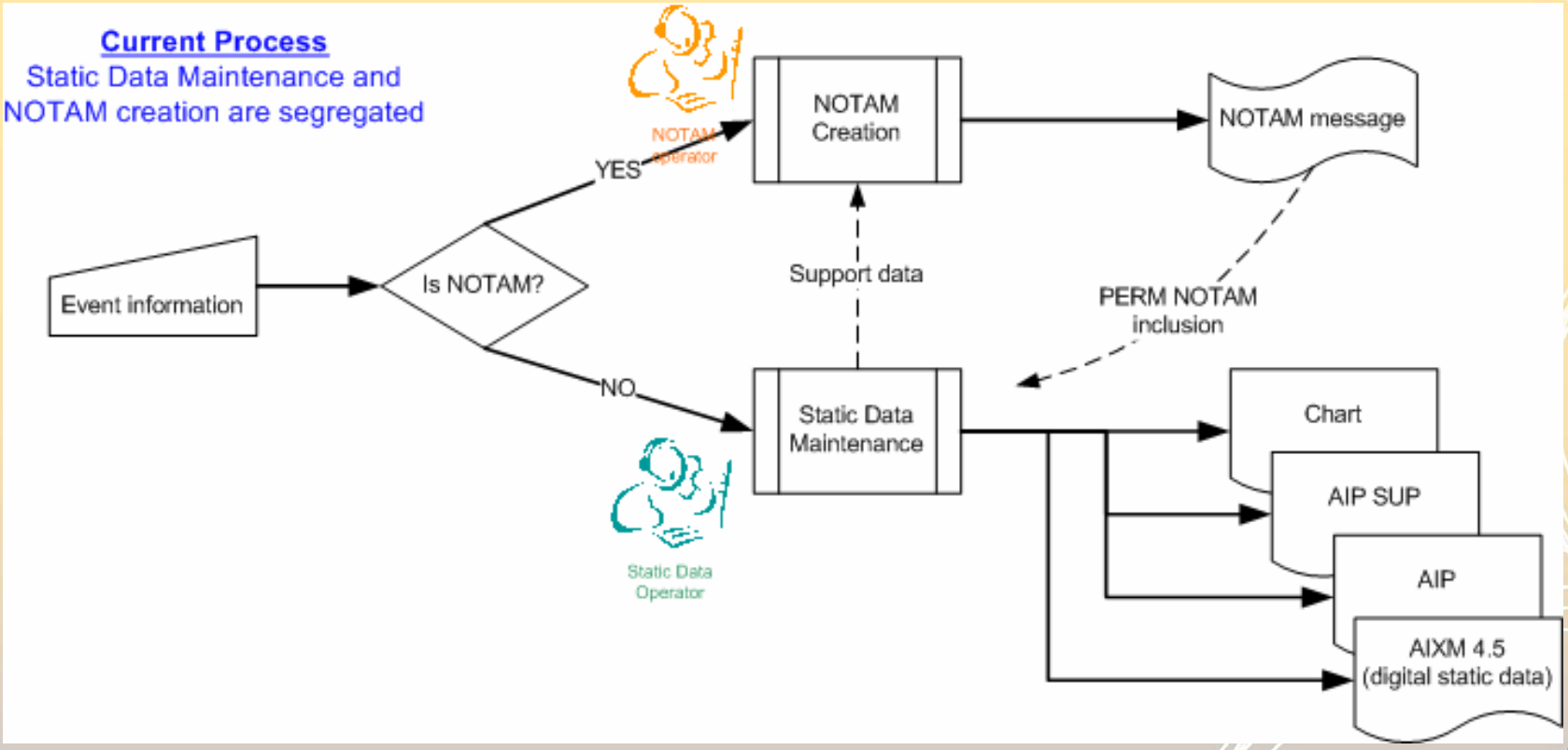
# NOTAM process - changes

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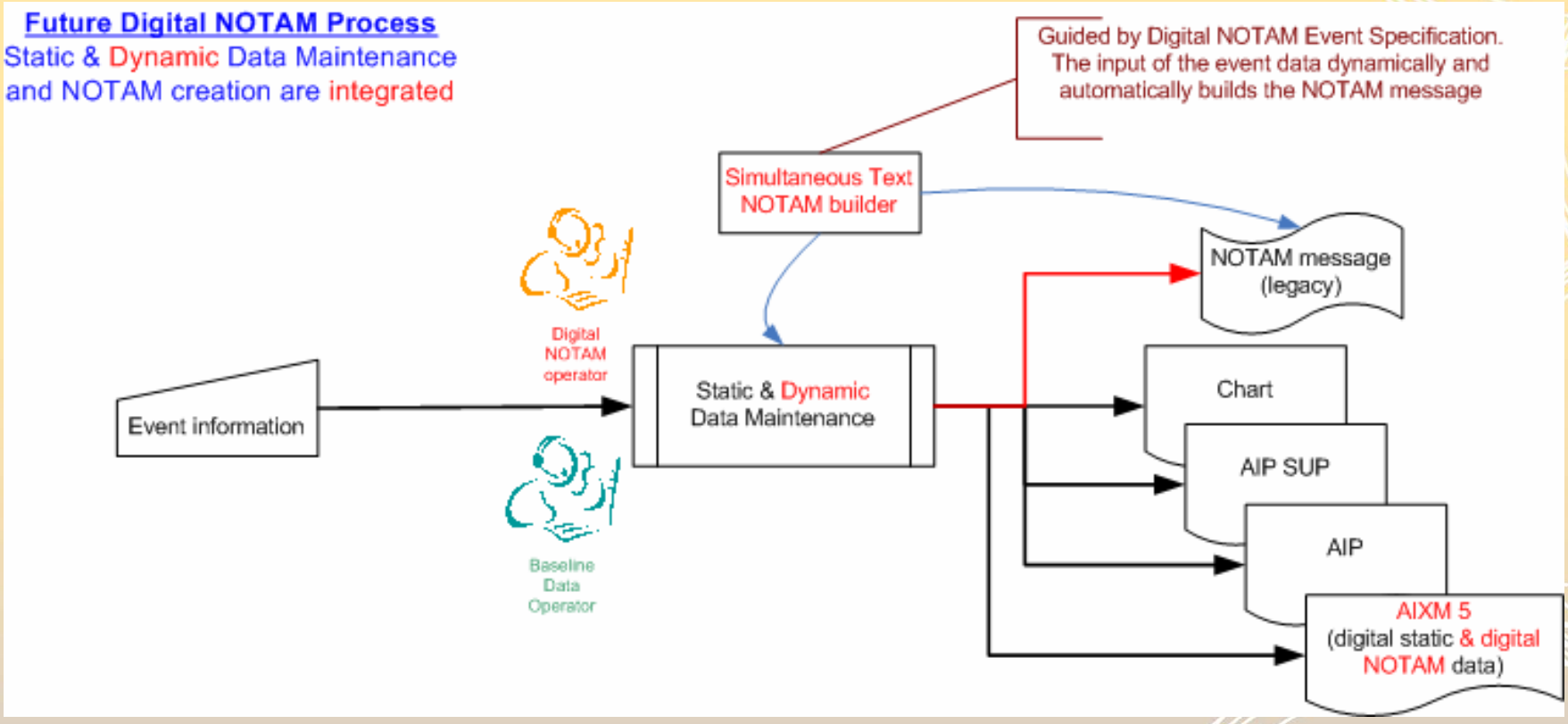


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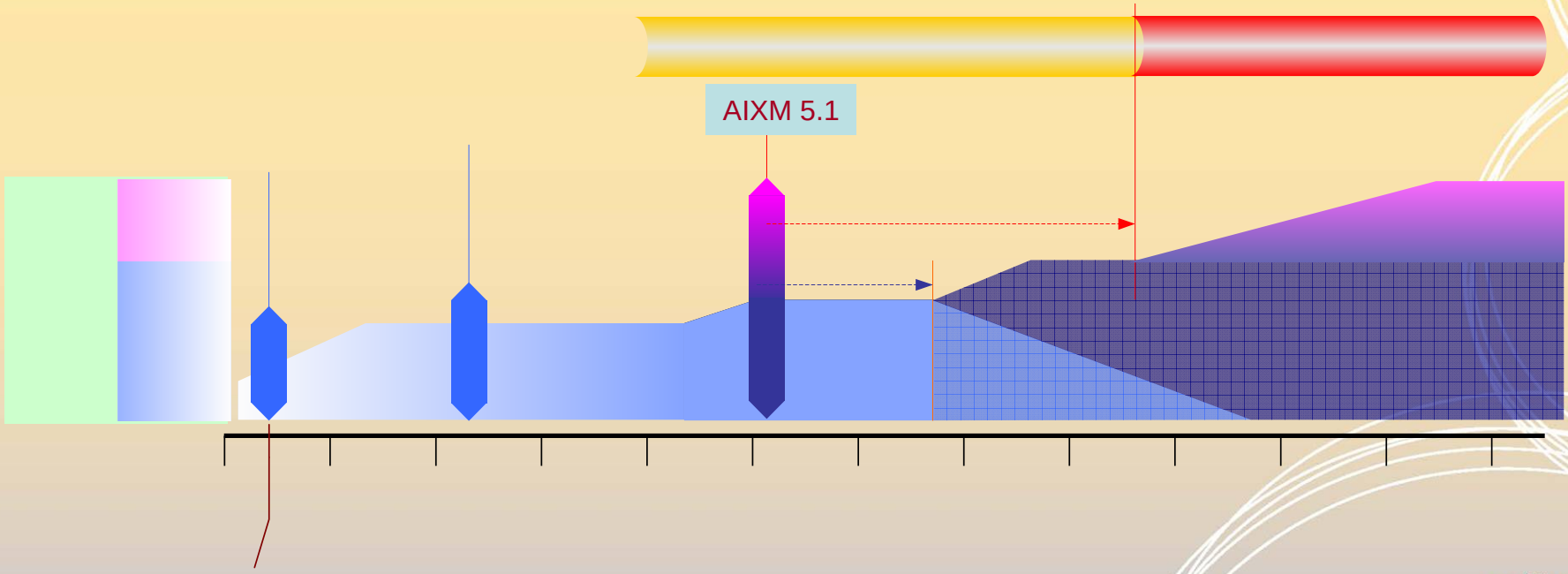
# Digital NOTAM

- Implementation schedule in Europe



# “xNOTAM” Trial - 2008

- To demonstrate the maturity of the “digital NOTAM”
  - based on AIXM version 5
- Objectives:
  - Verify AIXM 5
    - encoding the information contained in NOTAM messages
    - temporality concept
  - Provide a proof of concept for a “digital NOTAM encoding application”
    - demonstrate to NOTAM operators
    - not intended for operational use or for production
      - test bed for human-machine interface ideas
  - Provide a significant amount of test xNOTAM data
    - to system developers

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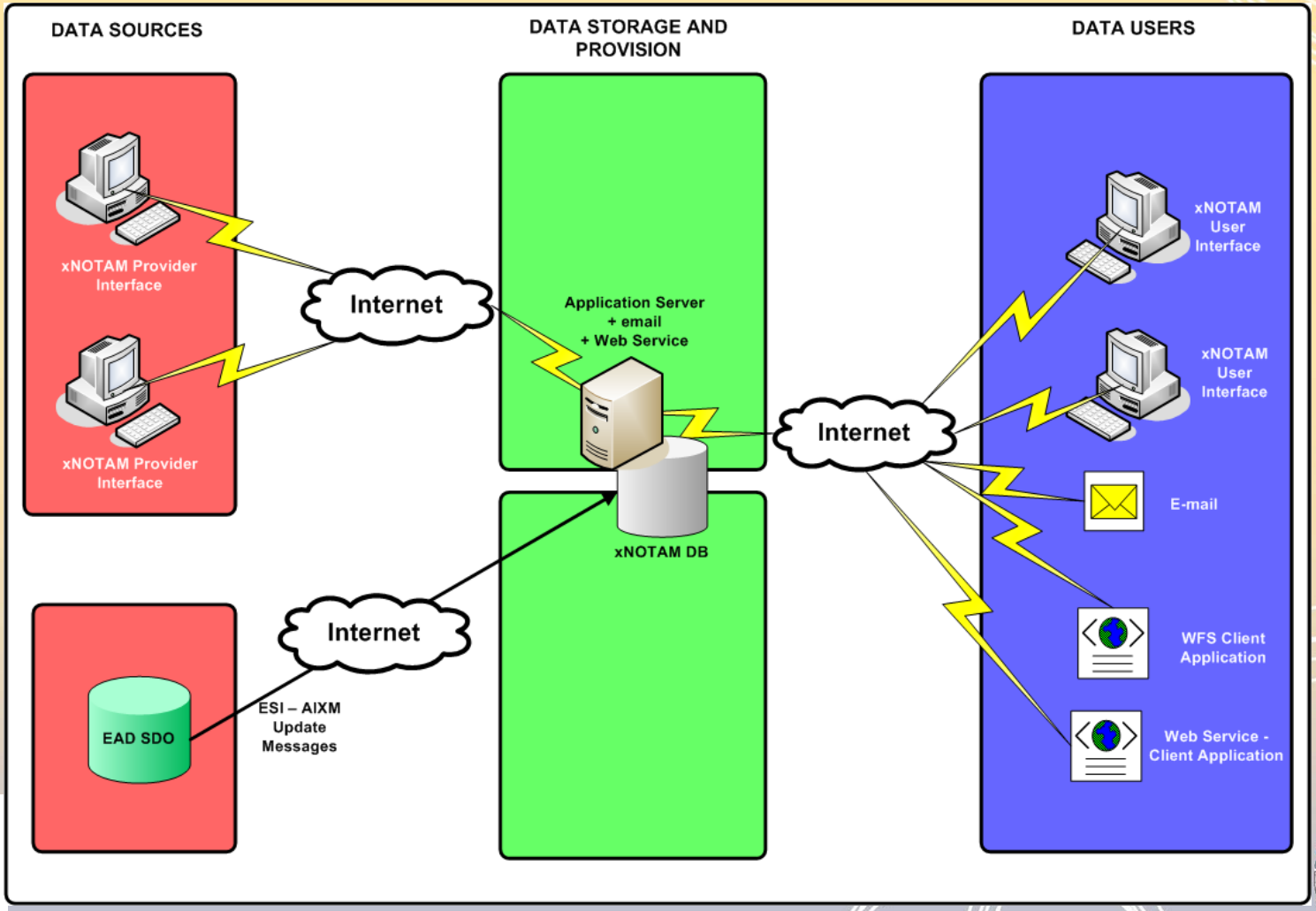

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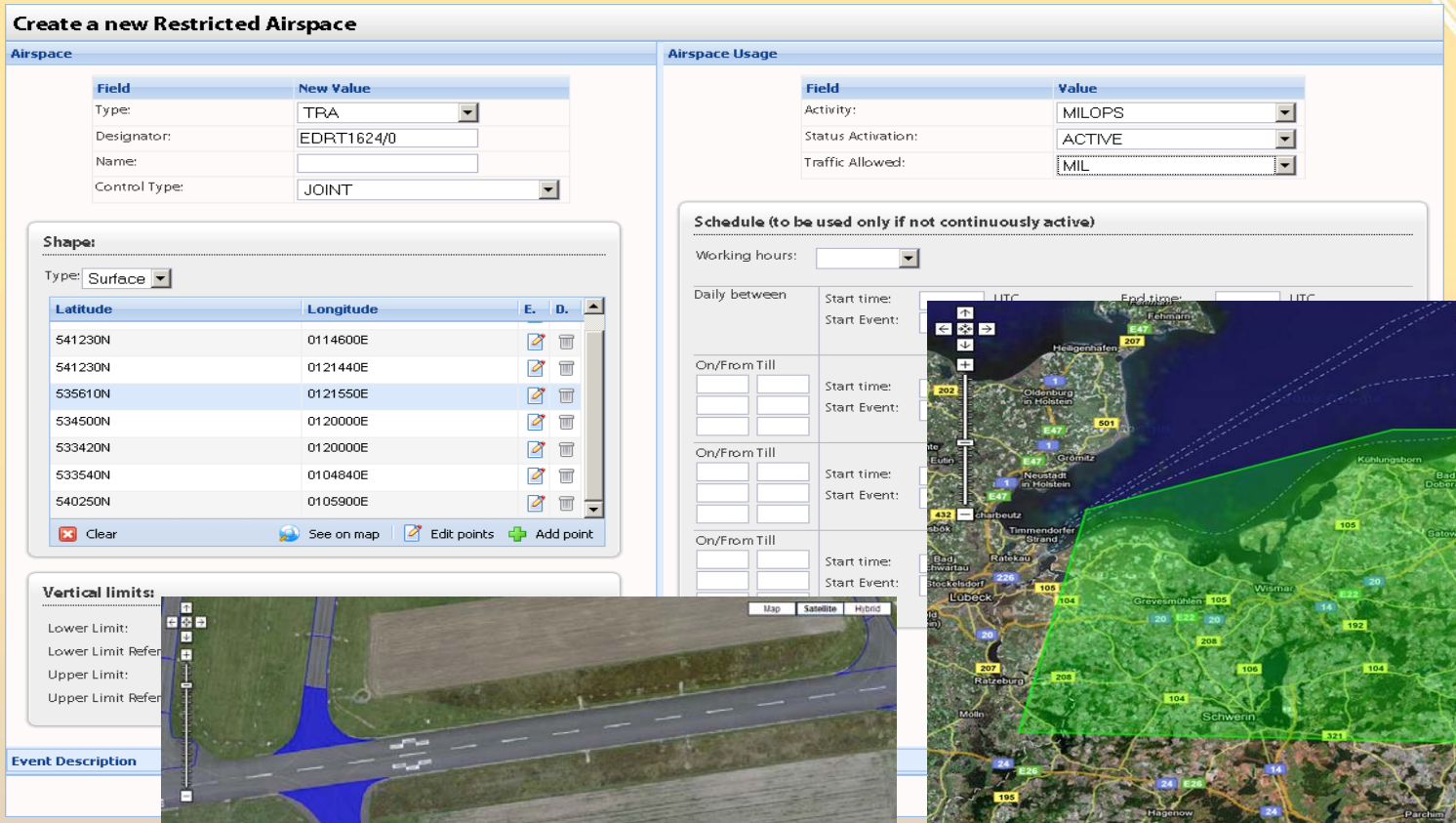

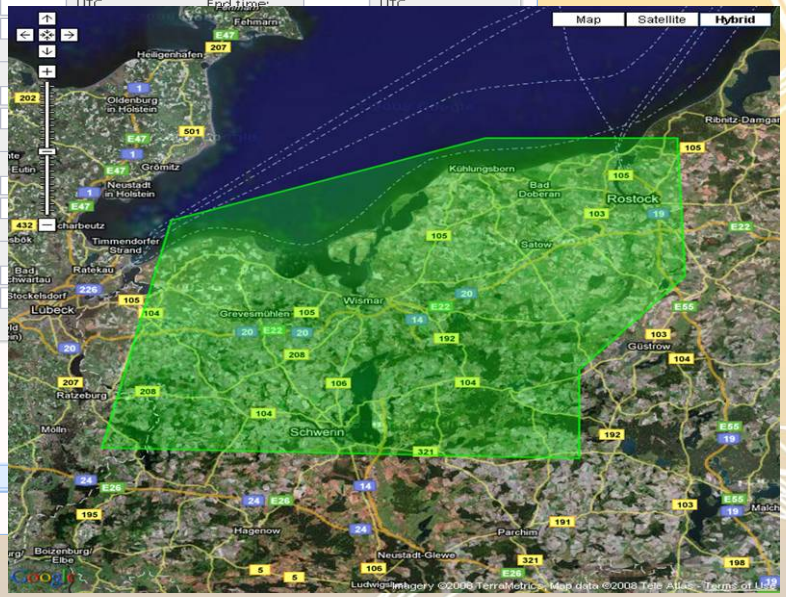


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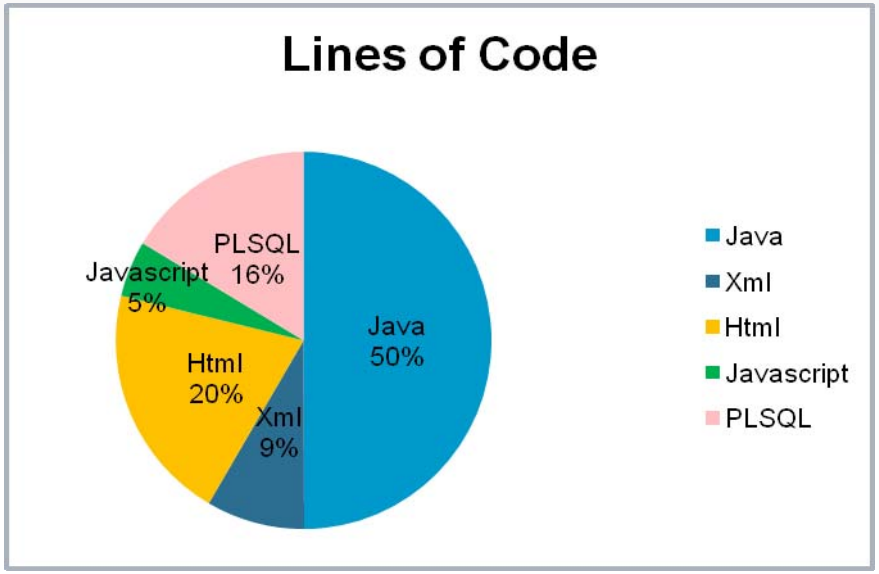
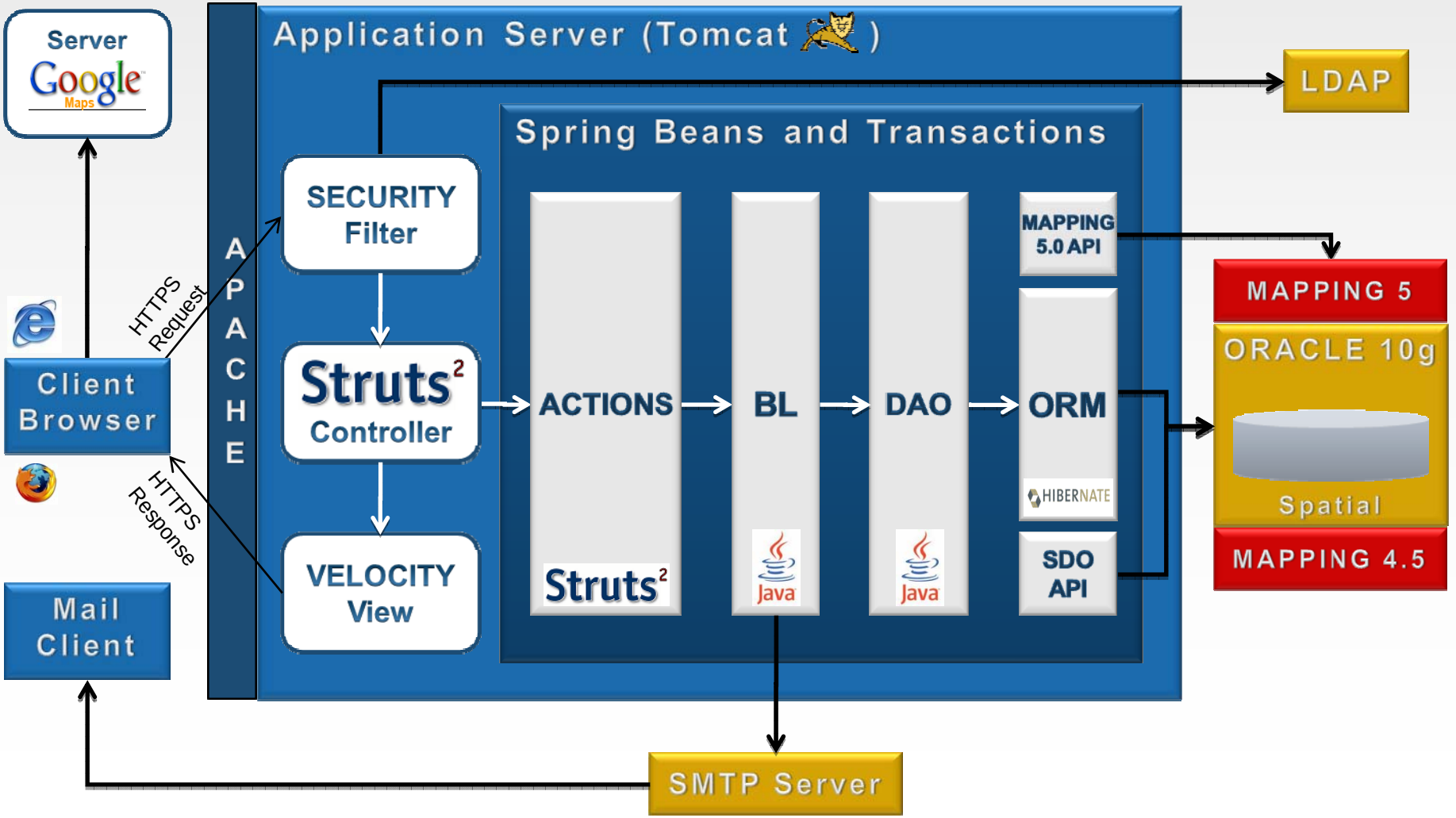
# Project Facts & Figures
## Application Metrics

- **More than 135 screens (main web pages, pop-ups, tabs)**
- **13 features types and 25 objects → 111 database tables**
  - AirportHeliport, Runway, RunwayDirection, RunwayCentrelinePoint
  - AirportHeliportUsage
  - Airspace, AirspaceUsage
  - Navaid, DesignatedPoint, Obstacles
  - Route, RouteSegment, RoutePortionUsage
  - RunwayElements and TaxiwayElements (only for graphical view)
- **110.000 lines of code**
  - **Java**: 535 files, **55.000** lines of code (+ 20.000 lines of comments)
  - **XML**: 120 files, **9.300** lines
  - **HTML**: **140** files, **22.500** lines;
  - **JavaScript**: 100 files, **5.300** lines
  - **CSS**: 5 files, **500** lines
  - **PLSQL**: **18.000** lines



# Application Architecture
## Web Diagram



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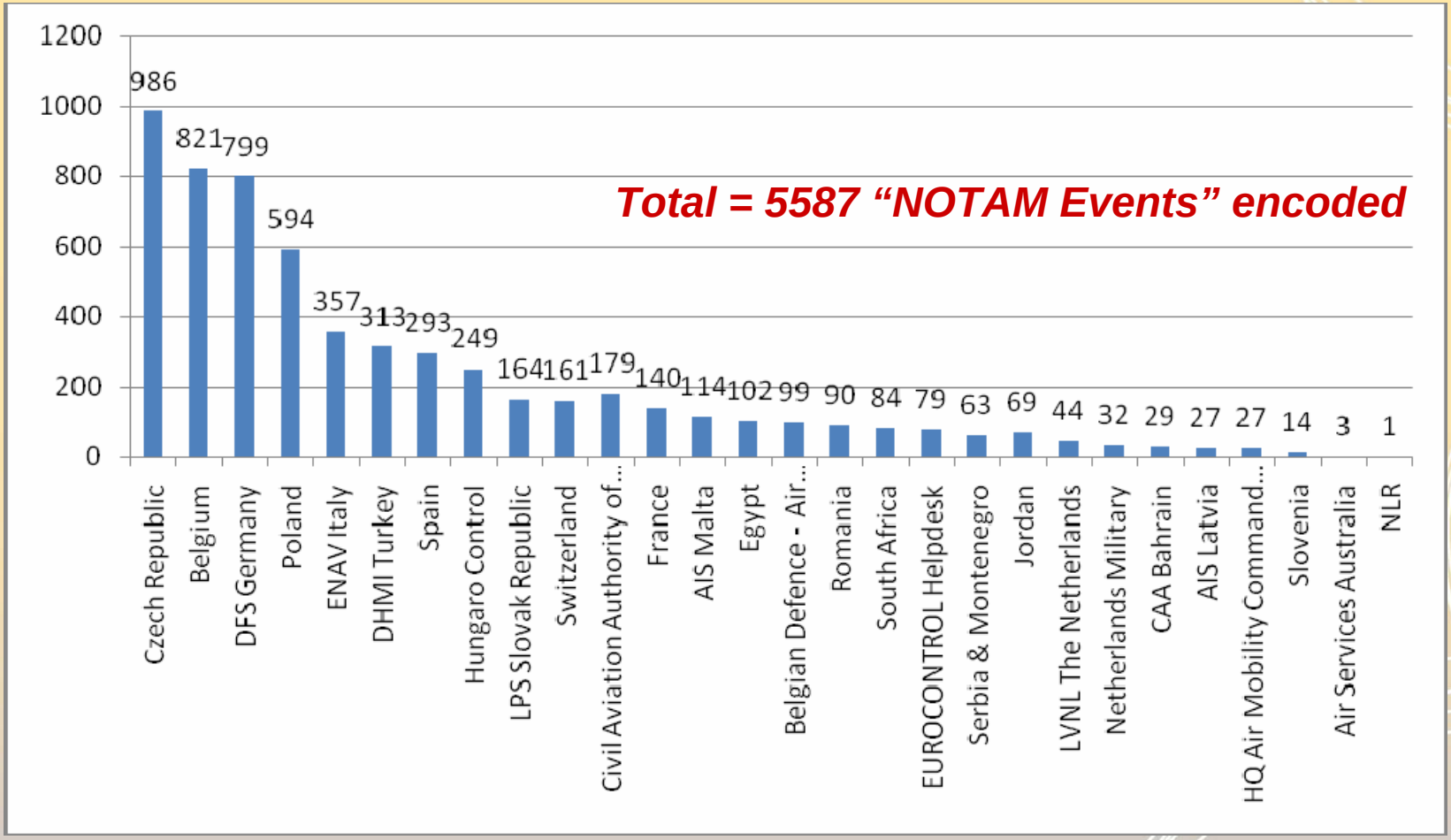


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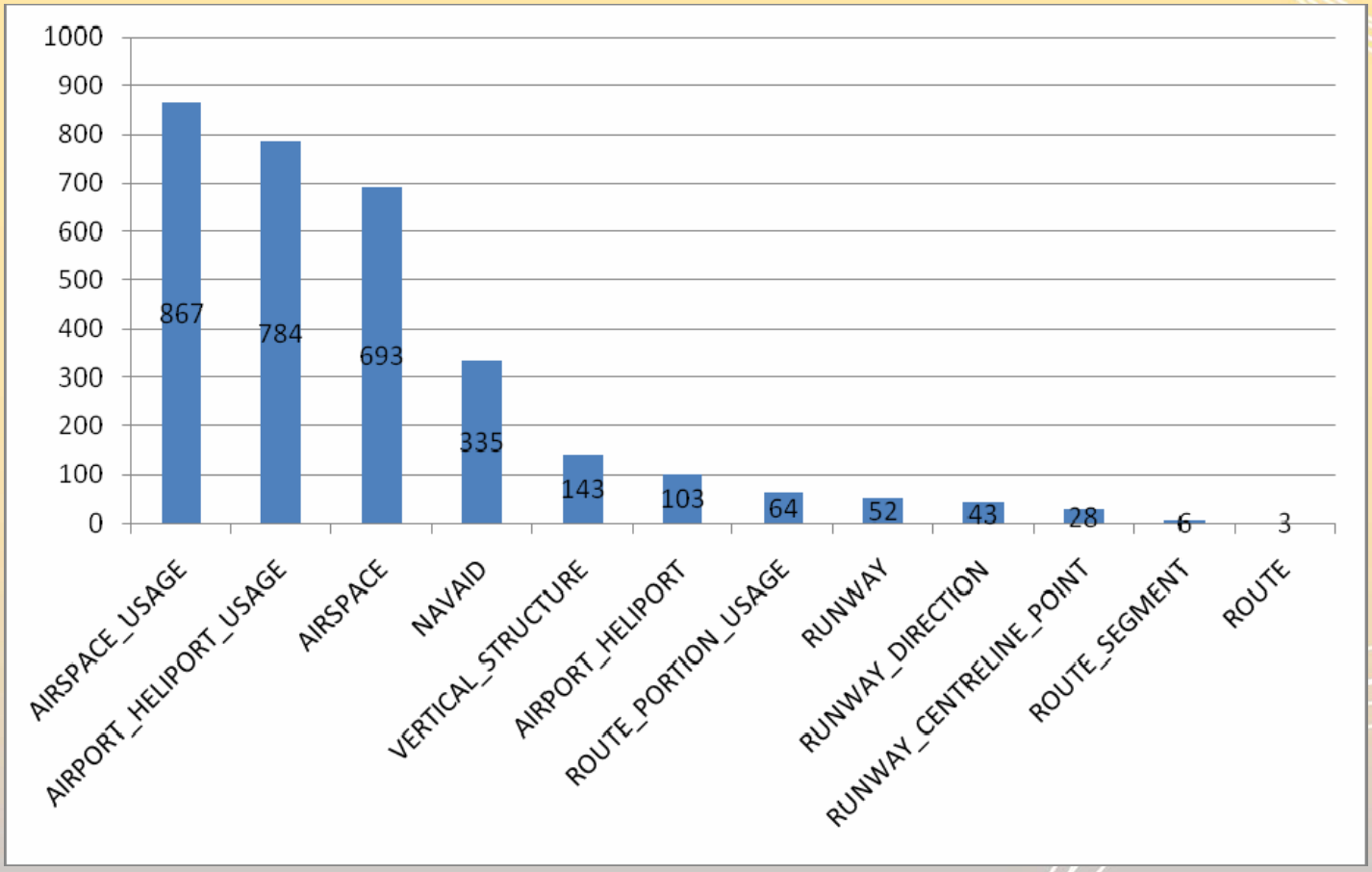


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# Lessons Learned from the Trial

- Some key features (airspace, airport usage, obstacle, etc.) account for 50-70% of the NOTAM
- End users are very likely to express priorities for what NOTAM should become digital first

**Incremental implementation !**

Candidates for increment 1
- Airspace activation
- Route closures
- Navaid outages
- Airport Runway Usage restrictions
- SNOWTAM
- Obstacles

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# Lessons Learned from the Trial

- Data provider application
  - Shall check the encoding against the rules
    - Is it according to the agreed standards?
    - Was all expected data provided?
    - Is data plausible?
  - Wherever possible, shall enable immediate graphical visualisation
  - Wherever appropriate, shall enable graphical input
  - If data is available in digital format from the source, it shall read it directly (not require re-typing)
  - As much as possible, shall enable ‘human readable text’ as input format for schedules
  - Shall have a consistent (unique?) workflow
  - Shall enable visualisation (text, graphic) before commit

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# Move to Implementation

- Implementation in Europe, US, Canada, Japan 2011 - 2012
- Main ideas (Eurocontrol)
  - incremental approach
  - re-use of existing and near-term investments (EAD, PENS, etc.)
  - close cooperation with FAA
  - coordination of a global implementation through the ICAO AIS-AIM Study Group
  - partnership with industry
- Work in progress
  - Concept of Operations document
  - Business case
  - Safety assessment
  - Technical and operational specifications

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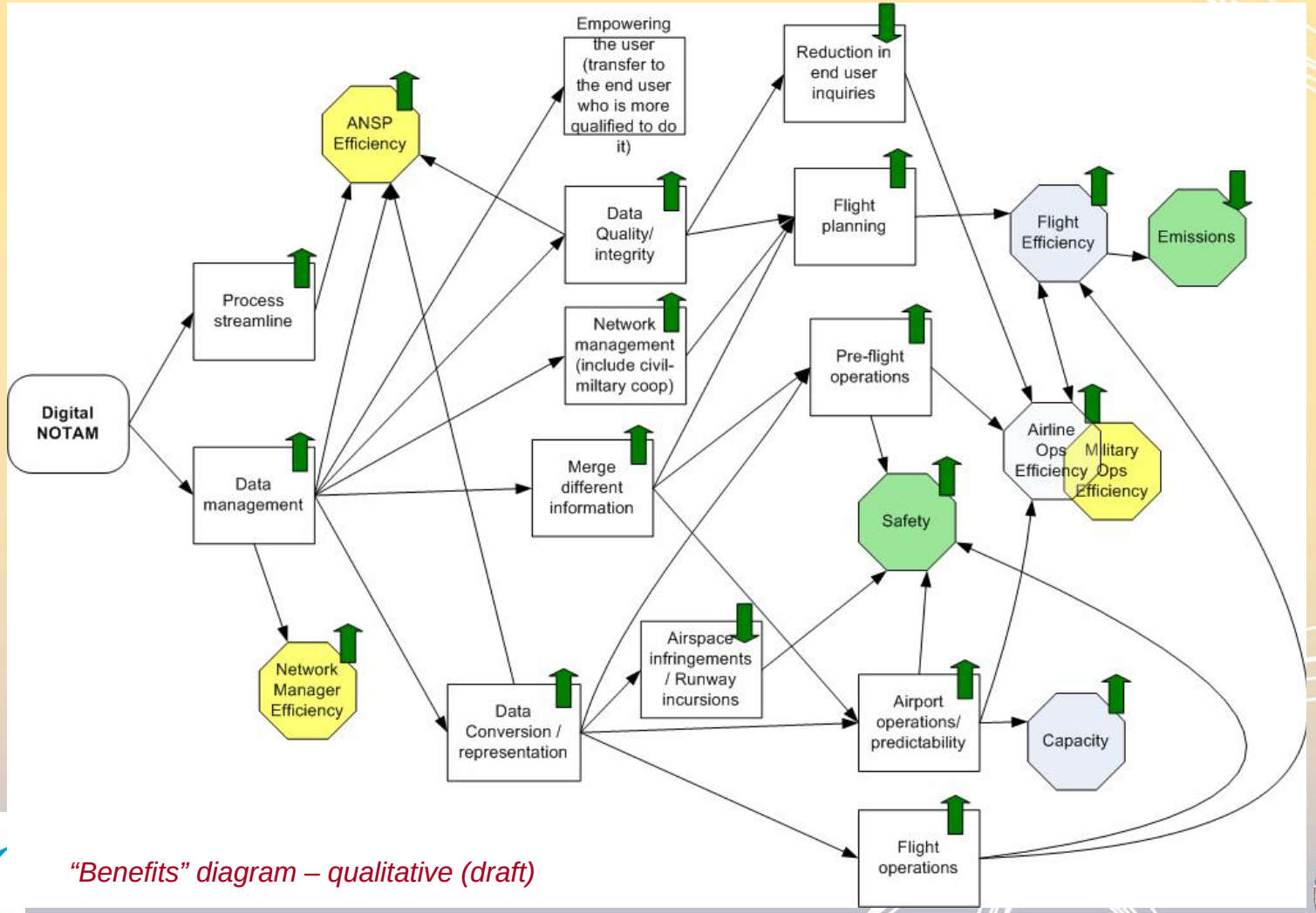
# Business Case Report




*"Benefits" diagram – qualitative (draft)*

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# Digital NOTAM Event

- Final (pre-implementation) Digital NOTAM Workshop
  - 9-10 September 2009, EUROCONTROL HQ, Brussels

# Digital SNOWTAM Trial (2009-2010)

- Demonstrate xNOTAM benefits to end users -> Airlines
- Verification of the AIXM 5 Surface Contamination model
- Continue the testing of Web service standards
  - REST architecture
- Start work on algorithms and open source code
  - structured SNOWTAM text to AIXM 5
  - AIXM 5.0 to SNOWTAM text

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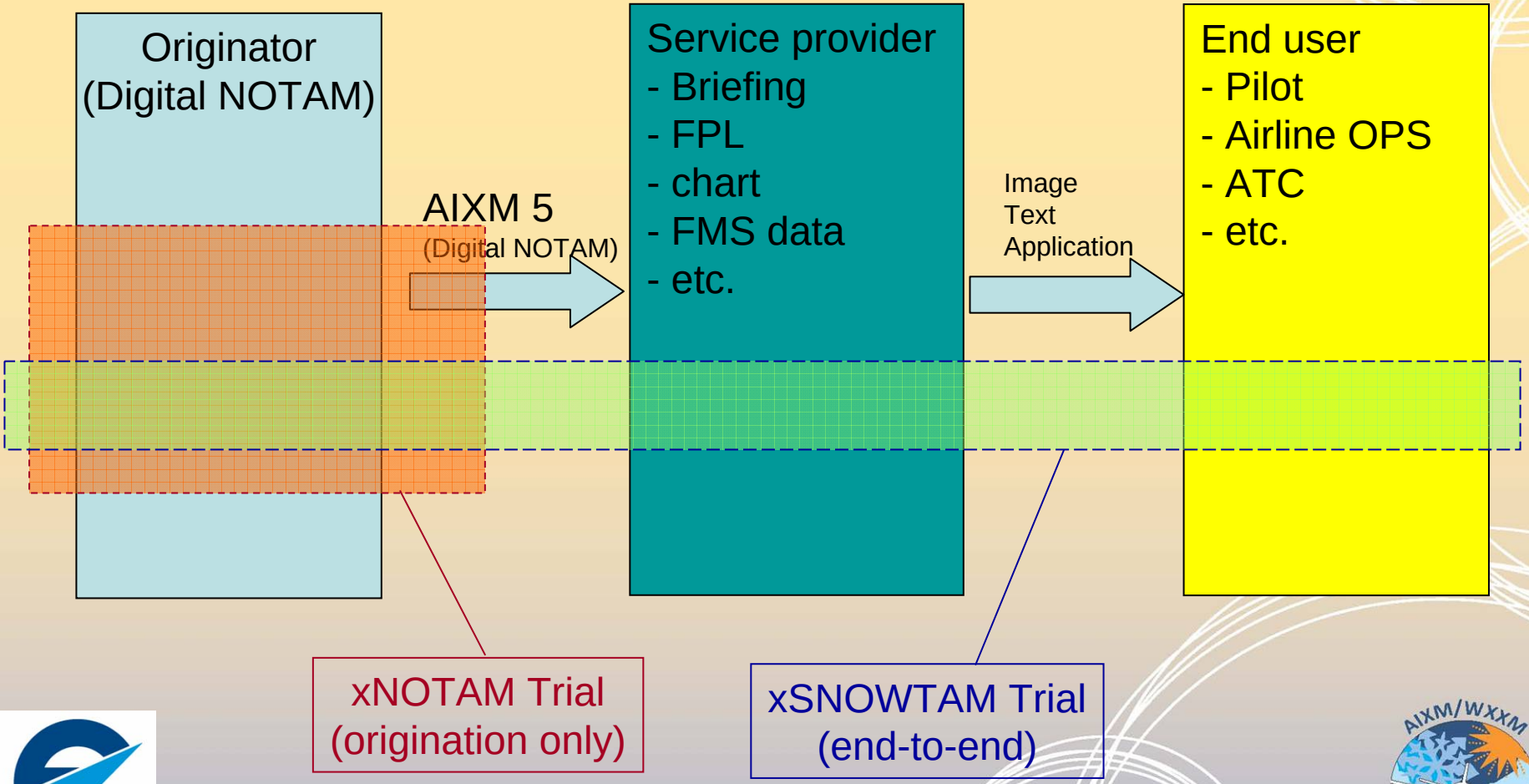
# Scope

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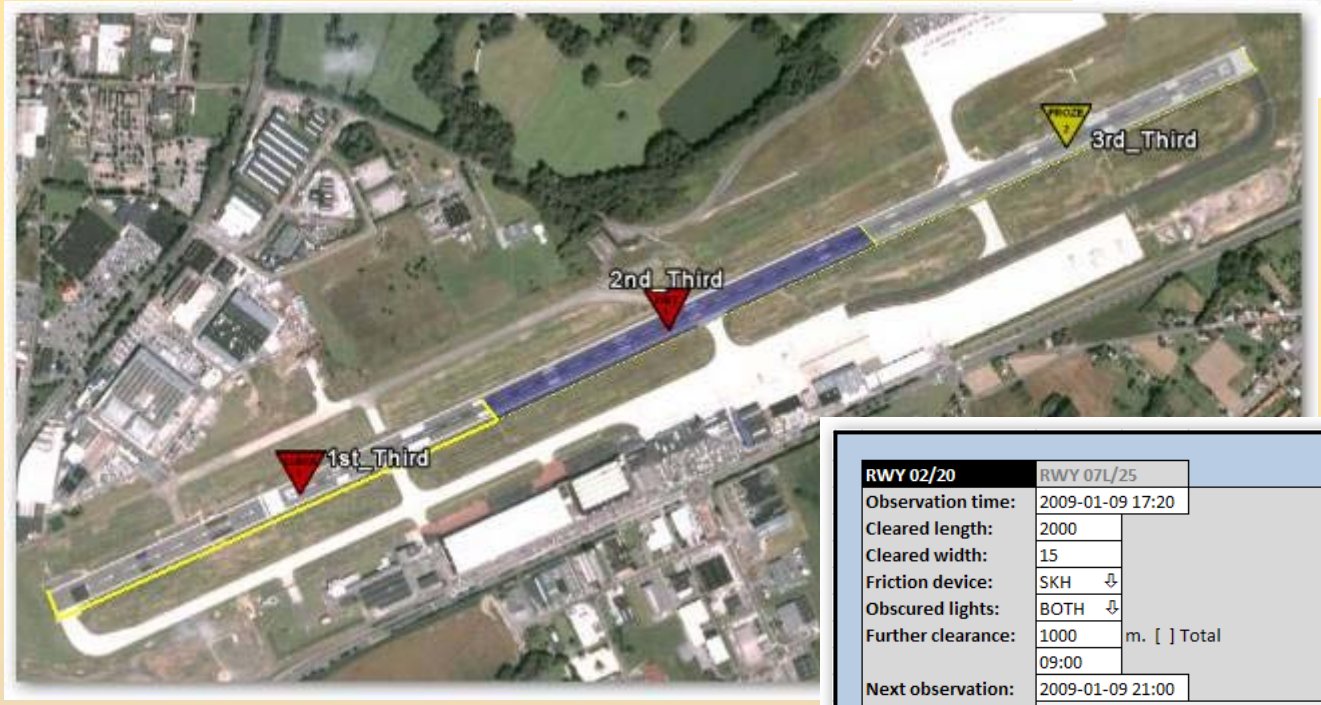
# Execution: Winter 2009-2010

DIGITAL SNOWTAM TRIAL




| | | | | | |
|---|---|---|---|---|---|
| **RWY 02/20** | RWY 07L/25 | | | | |
| **Observation time:** | 2009-01-09 17:20 | | | | |
| **Cleared length:** | 2000 | | [X] Ridge | | |
| **Cleared width:** | 15 | | **Side:** | BOTH | |
| **Friction device:** | SKH | | **Distance:** | 5 | m. |
| **Obscured lights:** | BOTH | | **Depth:** | 20 | cm. |
| **Further clearance:** | 1000 | m. [ ] Total | | | |
| | 09:00 | | | | |
| **Next observation:** | 2009-01-09 21:00 | | | | |
| **Remark:** | | | | | |

[X] By third [ ] Whole runway

| **1st Third** | | | **2nd Third** | | | **3rd Third** | | |
|---|---|---|---|---|---|---|---|---|
| **Deposits:** | DRY SNOW | | **Deposits:** | DRY SNOW | | **Deposits:** | ICE | |
| | ICE | | | [New layer] | | | [New layer] | |
| **Mean depth:** | 15 | cm. | **Mean depth:** | 10 | cm. | **Mean depth:** | 5 | cm. |
| **Friction coefficient:** | 0,38 | | **Friction coefficient:** | 5 | | **Friction coefficient:** | MEDIUM/POOR | |
| **Estimated:** | [ ] | | **Estimated:** | [X] | | **Estimated:** | [X] | |

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