

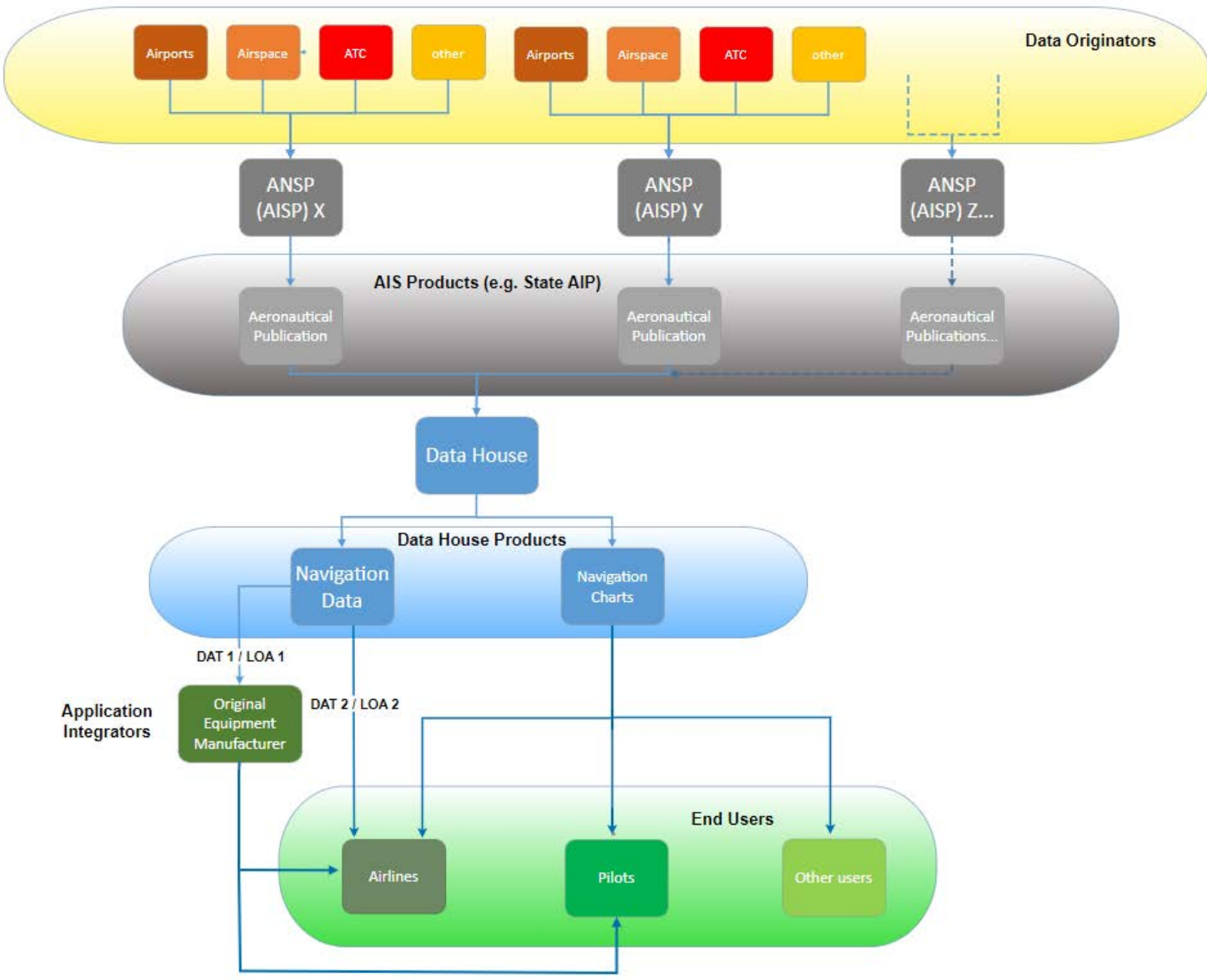


Data House AIXM SWIM DORIS

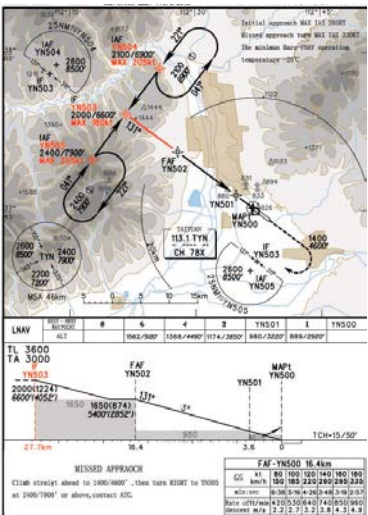
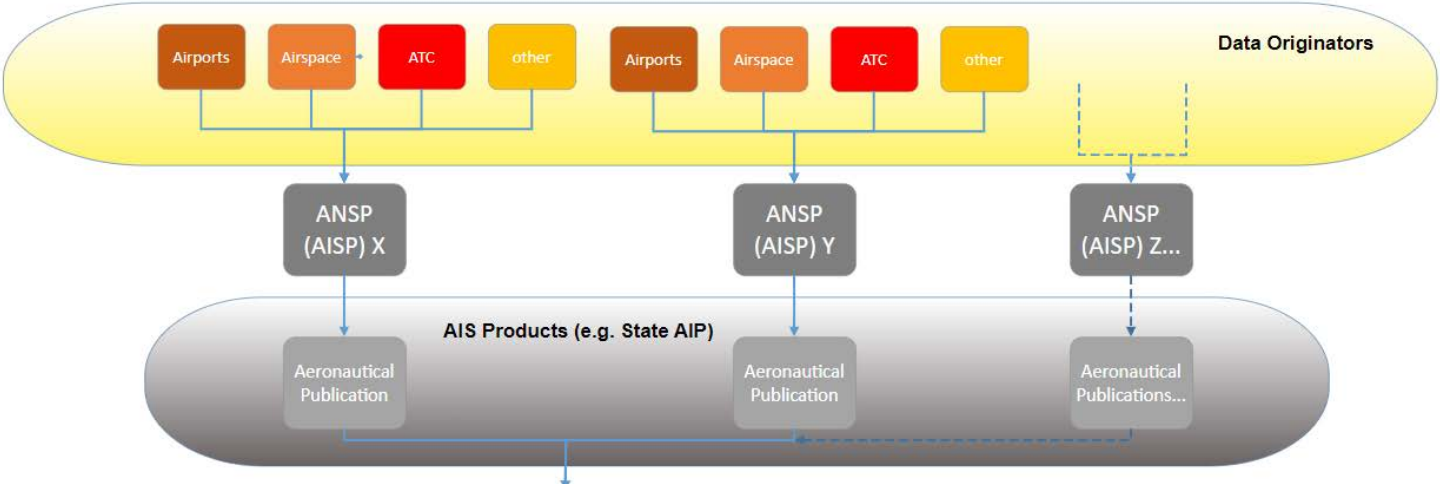
Tbilisi, Georgia
24-June-2026

Presenter: Marko Zoricic

Data House



Standardizing Aeronautical Information



06/04/2021 Order 8260.46H



TAKEOFF MINIMUMS AND OBSTACLE DEPARTURE PROCEDURES (TODP) TITLE 14 CFR PART 91.37. This document provides the minimums and obstacle departure procedures for various airports. It includes a table with columns for 'AIRPORT', 'TODP', 'TODP', 'TODP', and 'TODP'. The table lists various airports and their corresponding TODP values.

Aeronautical information products as standardized presentation

- AIP AIP AMDT AIP SUP
- Aeronautical Charts
- AIC
- NOTAM

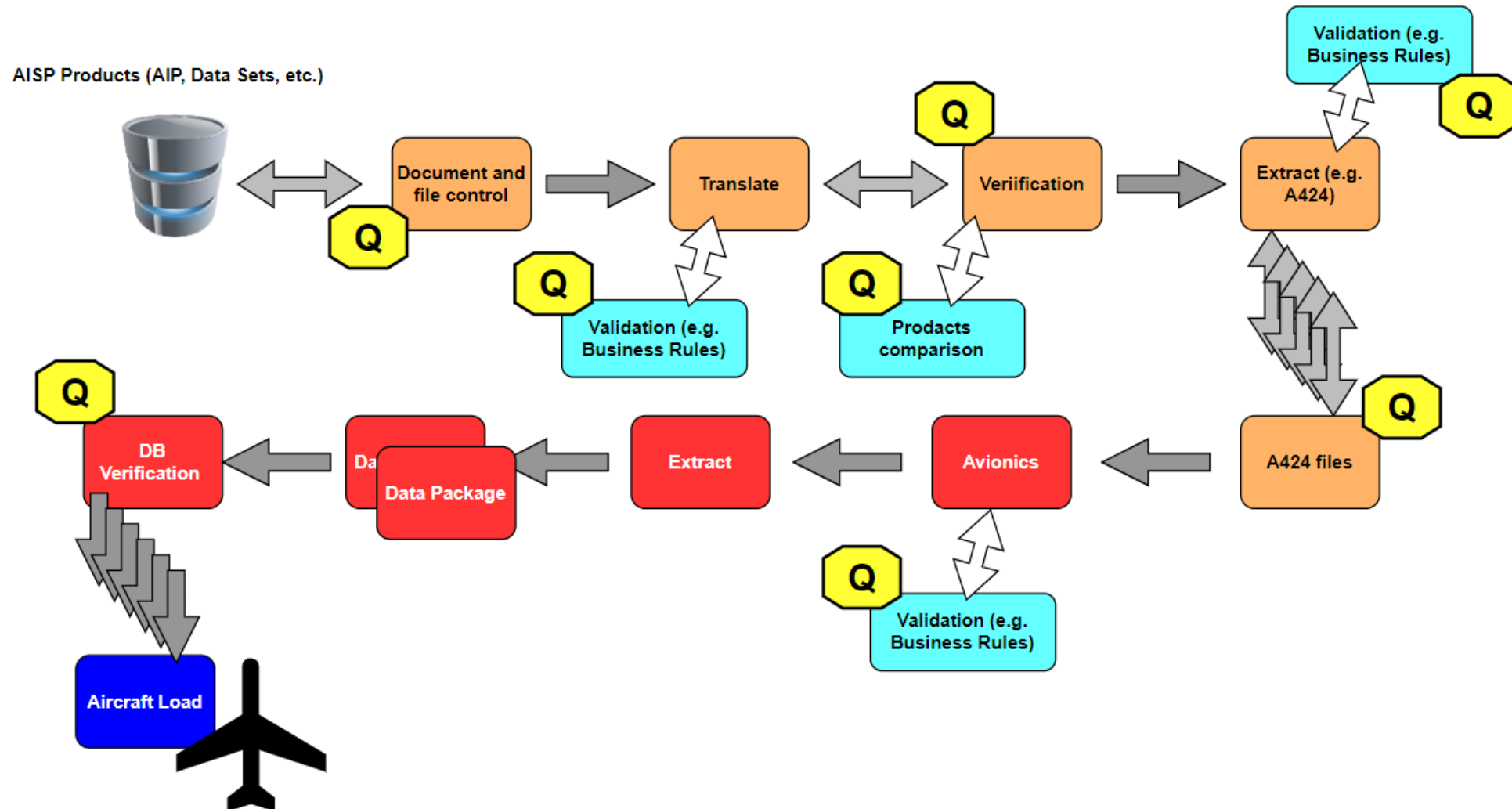


Digital Data Sets

- AIP
- Obstacle
- Aerodrome Mapping
- IFP
- Terrain

Not covered by AIXM

Downstream Data Process



Annex 15 – AIRAC Changes

6.2 Aeronautical Information Regulation and Control (AIRAC)

6.2.1 Information concerning the following circumstances **shall** be distributed under the regulated system (AIRAC) ...:

a) Limits (horizontal and vertical), regulations and procedures applicable to:

1) FIRs; 2) CTAs; 3) CTRs; 4) ADZs; 5) ATS Routes; 6) restrictive airspace ...

b) positions, frequencies, call signs, identifiers, known irregularities and maintenance periods of radio navigation aids, and communication and surveillance facilities;

c) Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.

d) Transition levels, transition altitudes and minimum sector altitudes.

...

f) runways and stopways;

...

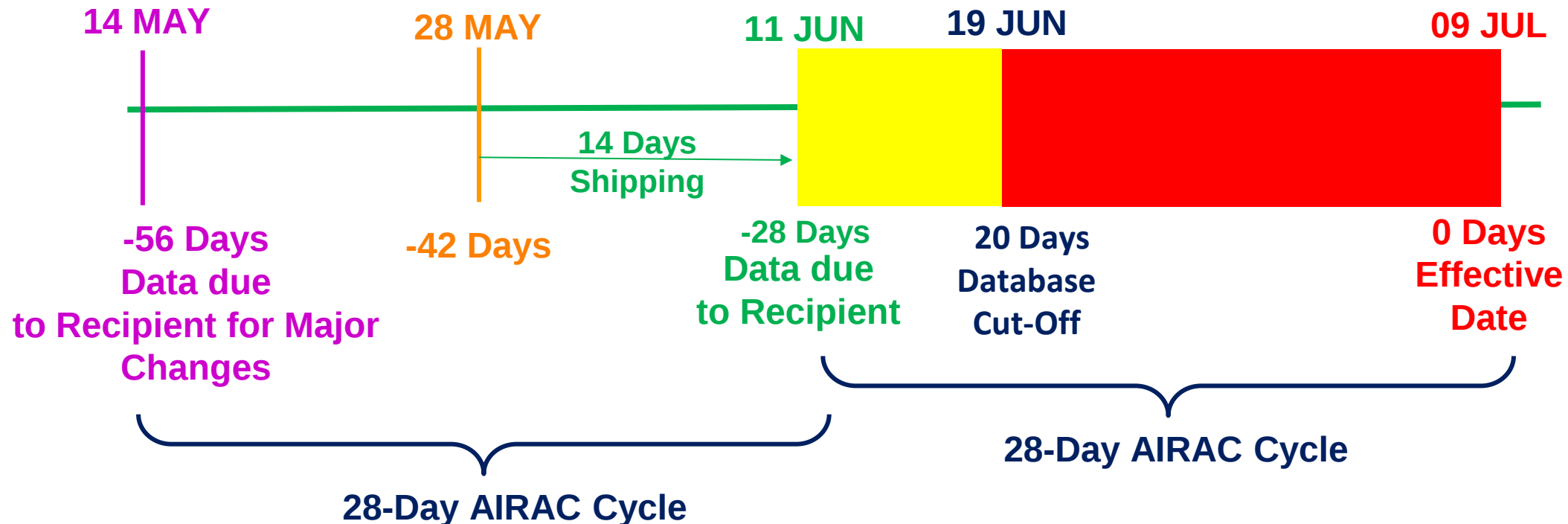
j) aerodrome operating minima if published by a State.



Annex 15 – AIRAC Changes

6.2.3 Information provided under the AIRAC system **shall** be made available by the aeronautical information service (AIS) so as to **reach recipients at least 28 days in advance** of the effective date.

Note.— AIRAC information is distributed by the AIS unit at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.



Why is Transition from upstream to downstream important?

RNP Approach requires highest quality data

Why is accuracy and resolution so critical in PBN, especially RNP?

Conventional Procedure

- **Truth is an ILS beam**
- The airplane flies a ground-based signal that is always in the same position relative to the runway

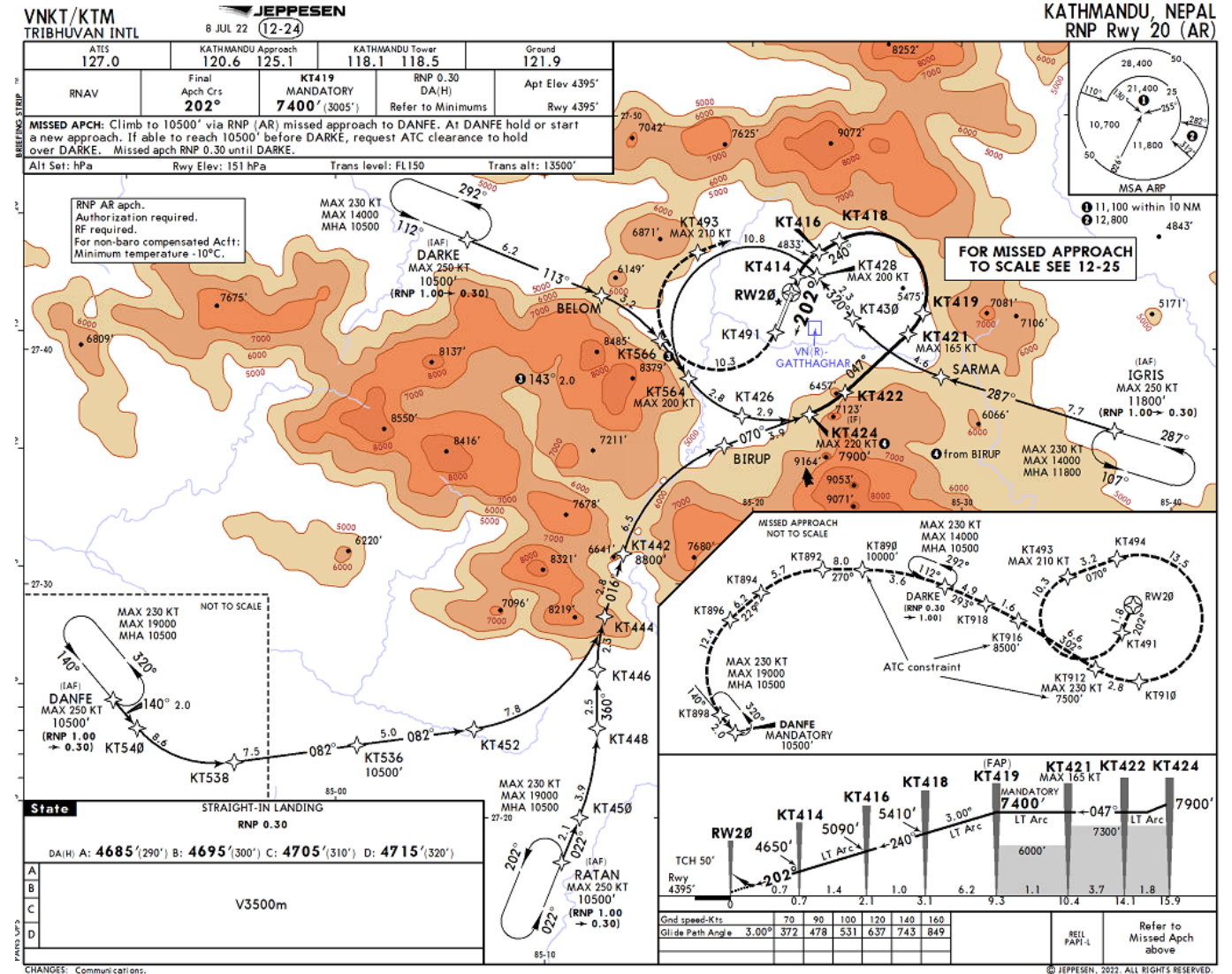
RNP Procedure

- **Truth is the database**
- The airplane flies to the waypoint in the database, right or wrong



Quality in PBN World

- Dependent on **accurate data**.
- Nav system provides guidance to **waypoints**.
- Wherever the **database** says they are!
- Data is **mission critical**.



ICAO Annex 15, Doc 10066 (PANS-AIM), Doc 8126



ICAO Annex 15 (SARPS)

- 1.1 Definitions
- 5.3 Digital data sets
- 6.3.3 Data set updates

ICAO DOC 10066 (PANS-AIM)

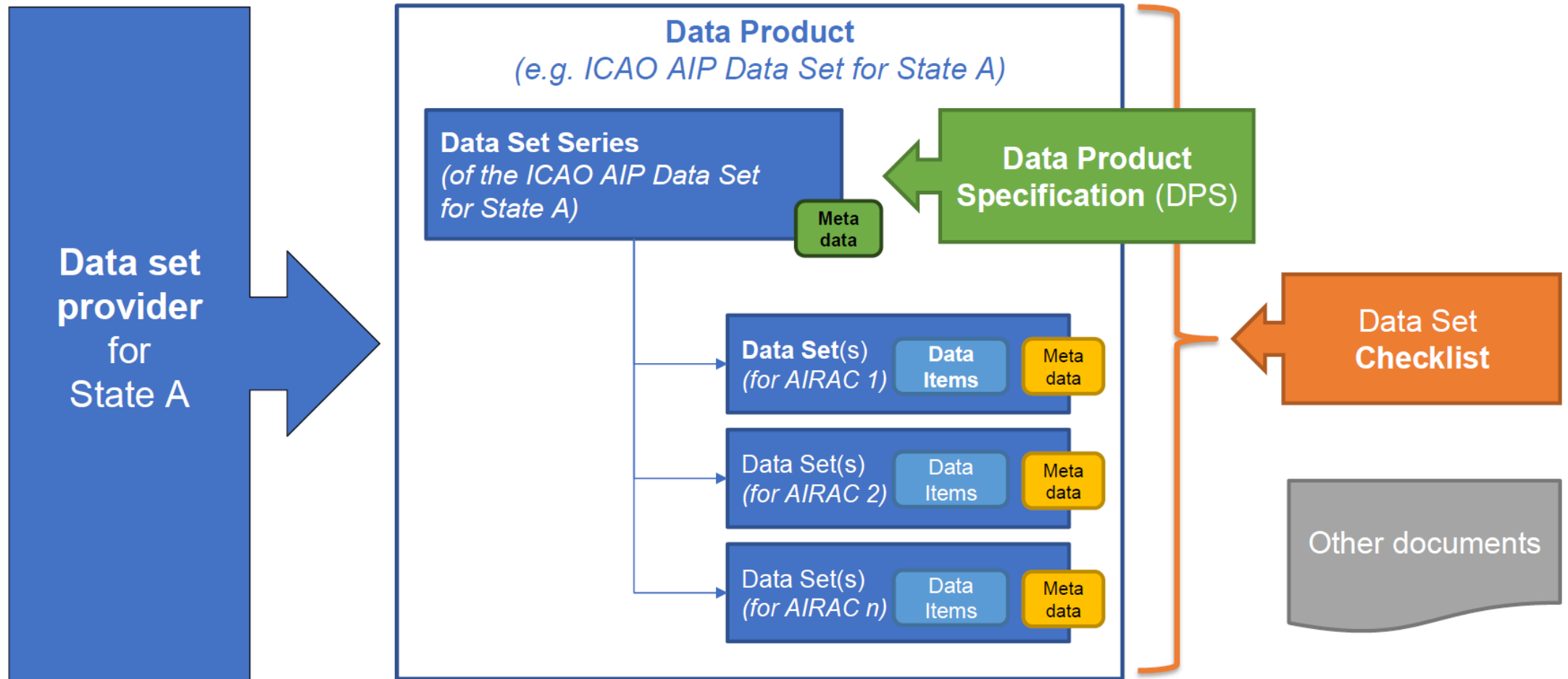
- 5.3 DIGITAL DATA
(General provisions, Metadata, Types of Data Set, etc.)
- 5.4 DISTRIBUTION SERVICES
(SWIM Concept, Checklist)
- 6.1 AERONAUTICAL INFORMATION PRODUCT UPDATES
 - 6.1.5 Specifications for digital data updates
- GEN 3.1.6 Digital data sets

ICAO DOC 8126 (AIS Guidelines)

→ ...



ICAO – Data Products and its Artifacts



The Transition from AIS to AIM

ICAO PANS-AIM: *"When the AIP Data Set is provided, **the following sections of the AIP may be omitted** [...]."*

- a) GEN 2.5 List of radio navigation aids;
- b) ENR 2.1 FIR, UIR, TMA and CTA;
- c) ENR 3.1 Lower ATS routes;
- d) ENR 3.2 Upper ATS routes;
- e) ENR 3.3 Area navigation routes;
- f) ENR 3.4 Helicopter routes;
- g) ENR 3.5 Other routes;
- h) ENR 3.6 En-route holding;
- i) ENR 4.1 Radio navigation aids — en-route;
- j) ENR 4.2 Special navigation systems;
- k) ENR 4.4 Name-code designators for significant points;
- l) ENR 4.5 Aeronautical ground lights – en-route;
- m) ENR 5.1 Prohibited, restricted and danger areas;
- n) ENR 5.2 Military exercise and training areas and air defence identification zone (ADIZ);
- o) ENR 5.3.1 Other activities of a dangerous nature;
- p) ENR 5.3.2 Other potential hazards;
- q) ENR 5.5 Aerial sporting and recreational activities;
- r) **** AD 2.17 Air traffic services airspace;
- s) **** AD 2.19 Radio navigation and landing aids;
- t) **** AD 3.16 Air traffic services airspace; and
- u) **** AD 3.18 Radio navigation and landing aids.



AIXM – EUROCONTROL GUID 172

- EUROCONTROL Guidelines for harmonised AIP publication and data set provision
 - The purpose of these EUROCONTROL Guidelines is to provide harmonising guidance for the publication of aeronautical information in AIPs and on data set provision, serving as a reference document for ECAC States on agreed solutions complementing current ICAO AIS provisions.
 - **ANNEX A – Data set provision checklist**
 - **Step 1** – checkpoints to be considered before releasing a **new digital AIS data set** as AIS Product:
 - Does a common specification (e.g. EUROCONTROL Specification) exist for the data set and is the data set in compliance with this specification?
 - Is the data set accompanied by a Data Product Specification (DPS)?
 - Was the information about the future availability of new data set(s) timely published by means of an Aeronautical Information Circular (AIC)?
 - Were complete samples of the new data set made available to AIS users for testing purposes over an adequate period (e.g. 4-6 update cycles)
 - 5 more
 - **Step 2** – checkpoints before **removing the AIP tables**:
 - Does the list of tables considered for removal fully match the relevant list of eligible tables of PANS-AIM?
 - Will the AIP tables be removed altogether and is the information provided in these tables fully reflected in the equivalent digital data set?
 - Was the equivalent data set provided as an official AIS product for at least 13 update cycles (but no longer than 18 months)?
 - Were external AIS users, including at least one DATP, able to use/ingest the equivalent data set repeatedly, without any blocking issues, for an adequate period (e.g. for the last six update cycles)?
 - 4 more



AIXM – EUROCONTROL GUID 172

- **Step 3** – checkpoint to be considered **before releasing an updated digital AIS** data set (as part of continuous AIS product maintenance):
 - Where the previous steps considered when providing an update to the structure of an existing digital AIS data set?
Rationale: To support the continuous seamless provision and usage, as well as facilitate the necessary adaptations of the data sets, any changes to the structure of the data set should follow the same checkpoints as any “new” digital AIS data set, with the exception of checkpoint 1.3 (provision of the AIC)

EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION



**EUROCONTROL Guidelines for
harmonised AIP publication and
data set provision**

DOCUMENT IDENTIFIER: EUROCONTROL GUID-172



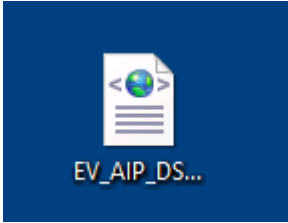
PROPRIETARY & CONFIDENTIAL

AIXM – Experience - Latvia

Name Lateral limits Vertical limits Class of airspace	Unit provid- ing service	Call sign Languages Area and con- ditions of use Hours of service	Frequency/ Purpose	Remarks
1	2	3	4	5
RIGA FIR 582448N 0203834E - 580700N 0212900E - 575342N 0213648E - 575124N 0213848E - 574712N 0214300E - 574547N 0215034E - 574458N 0215458E - 574645N 0220836E - 574930N 0221644E - 575539N 0223501E - 575627N 0224227E - 574650N 0225428E - 574208N 0225957E - 573511N 0231051E - 573538N 0232422E - 574011N 0233456E - 574658N 0233855E - 575357N 0233604E - 575357N 0241234E - 575502N 0241540E - 575228N 0242123E - Along the common Latvian/Estonian State boundary to 575112N 0255552E - Along the common Latvian/Estonian State boundary to 573103N 0272105E - Along the common Latvian/Russian exist- ing administrative boundary to 564508N 0275400E - Along the common Latvian/Rus- sian existing administrative boundary to 562843N 0280833E - Along the common Latvian/Russian existing administrative boundary to 561024N 0280848E - Along the common Latvian/Belarus exist- ing administrative boundary to 554050N 0263750E - Along the common Latvian/Lithuanian State boundary to 555908N 0255651E - Along the common Latvian/Lithuanian State bound- ary to 562208N 0243749E - Along the com- mon Latvian/Lithuanian State boundary to 562217N 0234520E - Along the com- mon Latvian/Lithuanian State boundary to 562216N 0231222E - Along the com- mon Latvian/Lithuanian State boundary to 560426N 0210537E - 560409N 0210352E - 560402N 0204452E - 560400N 0204000E - 560846N 0200456E - 561752N 0185354E - 562043N 0183023E - 565217N 0193400E - 570000N 0195000E - 571800N 0200000E - 581816N 0203443E - 582448N 0203834E UNL/GND Class of airspace: C - FL 660 / FL 095 G - FL 095 / GND and UNL / FL 660	Riga ACC	RIGA CONTROL English H24		

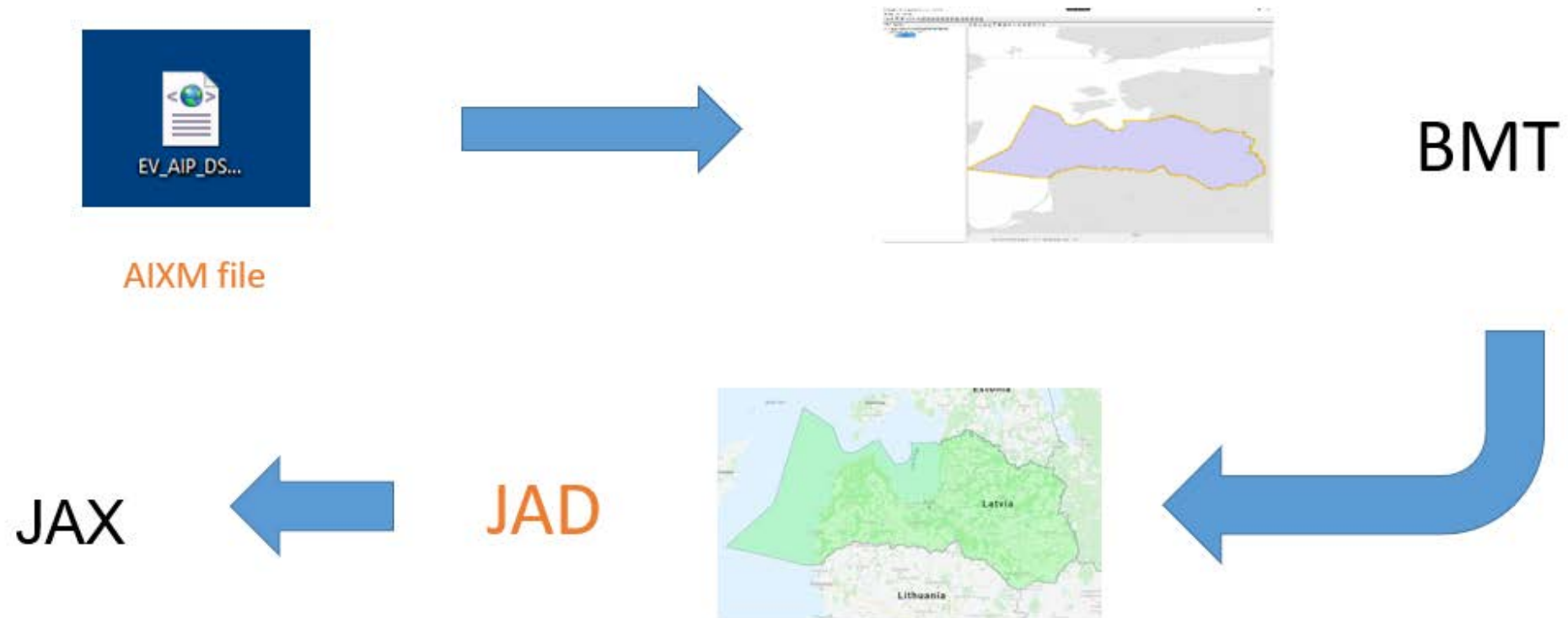
VS

Name Lateral limits Vertical limits Class of airspace	Unit provid- ing service	Call sign Languages Area and con- ditions of use Hours of service	Frequency/ Purpose	Remarks
1	2	3	4	5
FLIGHT INFORMATION REGION				
RIGA FIR Lateral limits are available in the AIP Data set, feature ID: e58add- fb-f5d4-40a6-9e45-00dd15148bc1 UNL/GND Class of airspace: C - FL 660 / FL 095 G - FL 095 / GND and UNL / FL 660	RIGA ACC	RIGA CONTROL English H24		



AIXM file

AIXM – Experience – Latvia – Processing AIP Data Set

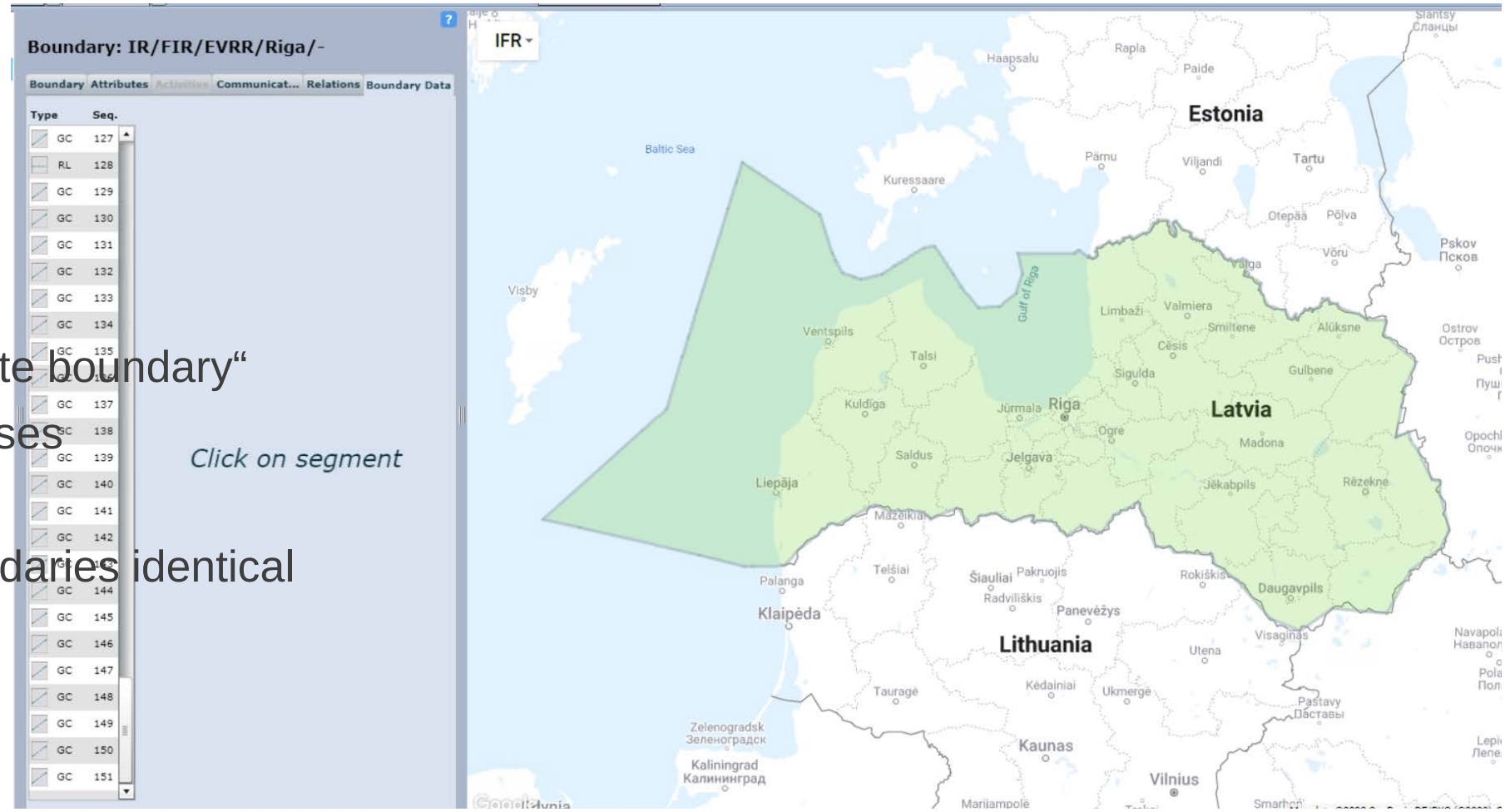


AIXM – Experience – Latvia –Processing AIP Data Set

Riga FIR

from AIP Latvia

- 221 datapoints
- „then along the state boundary“
- Coded by datahouses
- With a tolerance
- Adjacent FIR boundaries identical

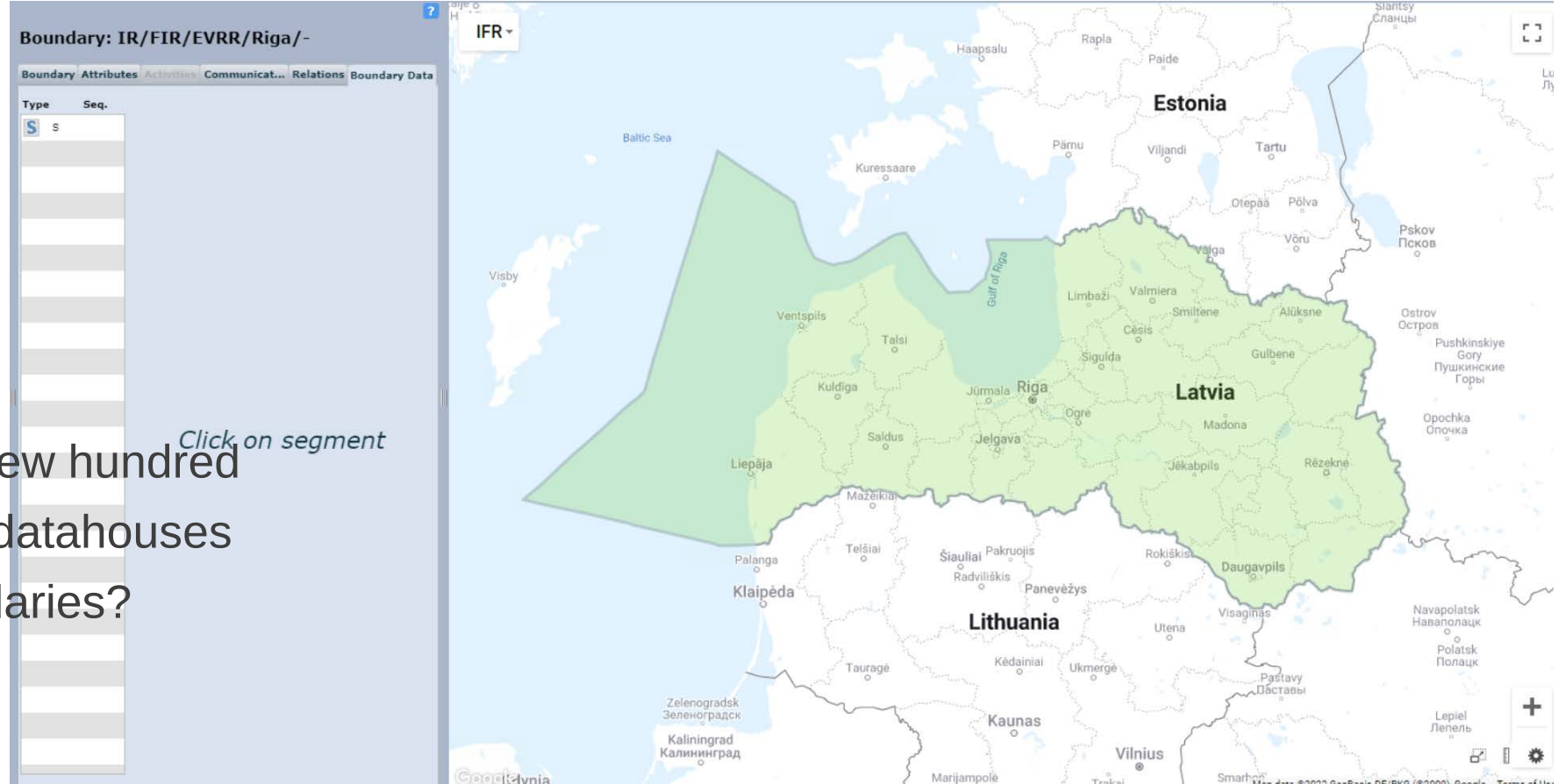


AIXM – Experience – Latvia –Processing AIP Data Set

Riga FIR

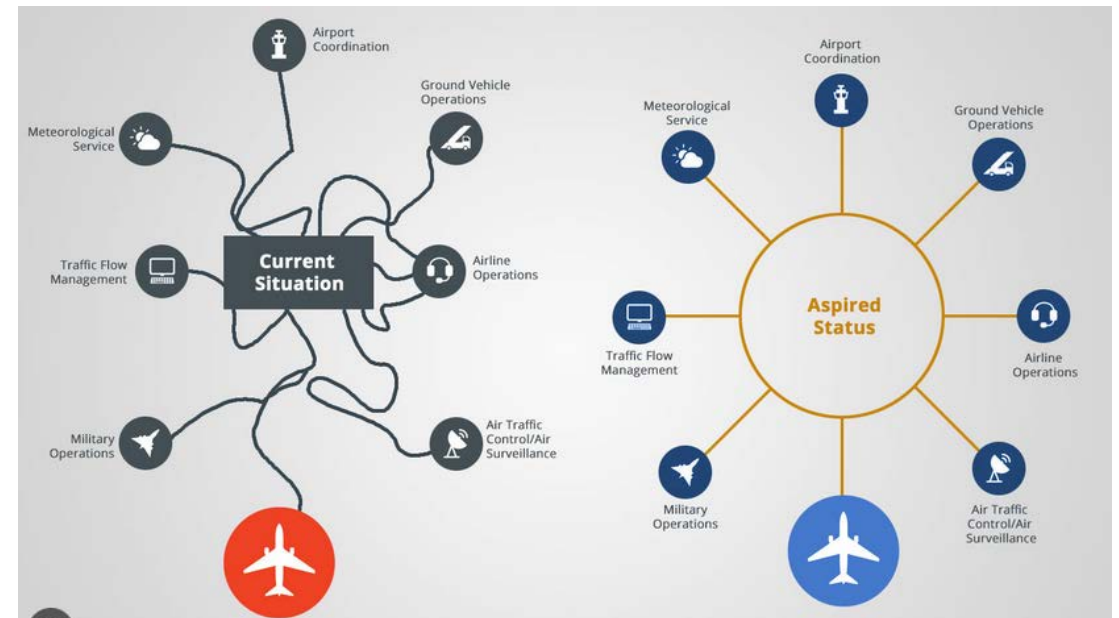
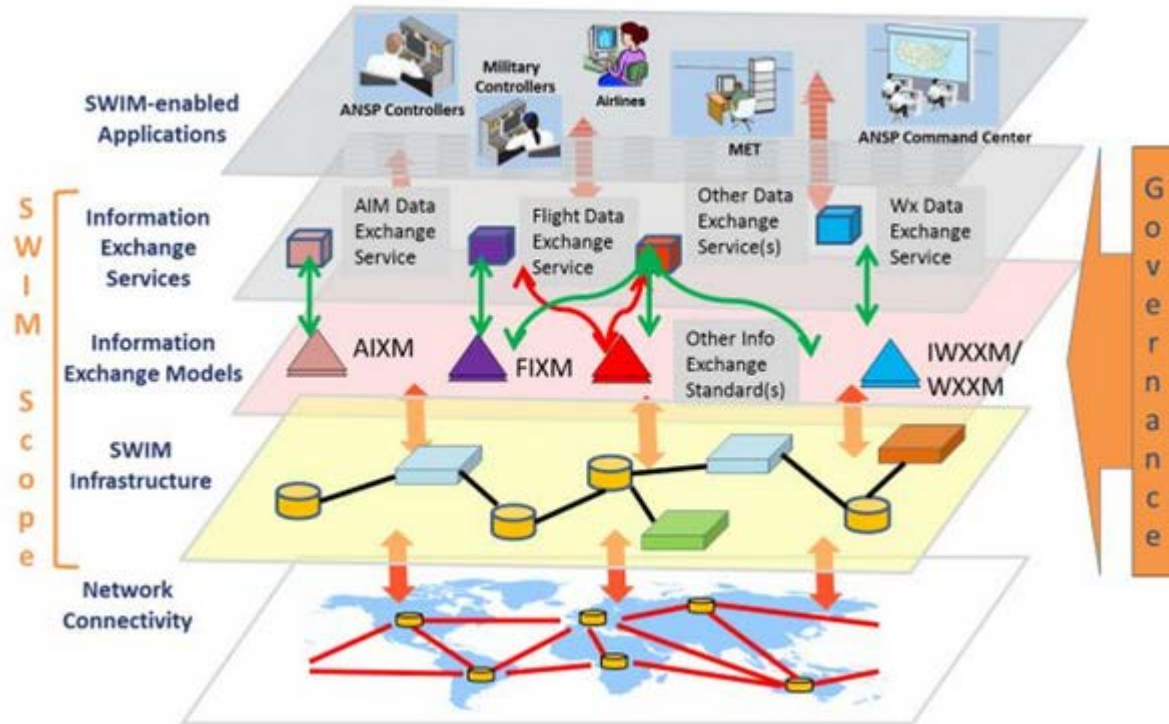
from AIP Dataset

- 44,000 datapoints
- FMS can handle a few hundred
- To be formatted by datahouses
- Adjacent FIR boundaries?



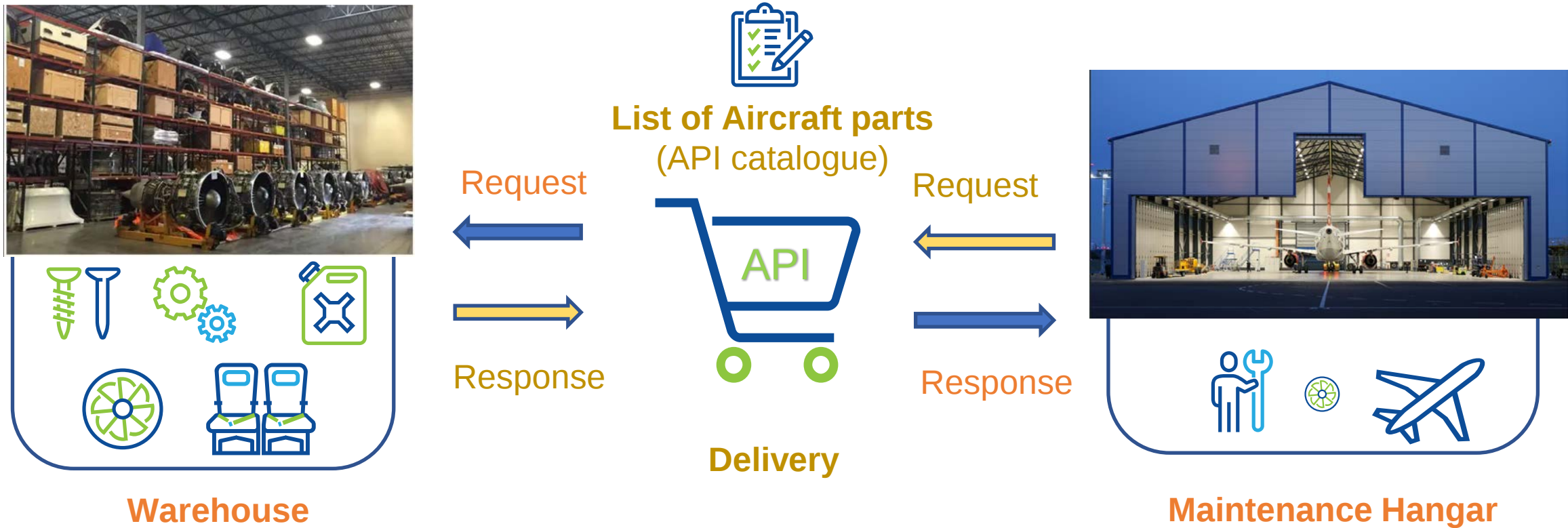
SWIM – Concept

- The System Wide Information Management (SWIM) concept consists of standards, infrastructure and governance enabling the management of ATM related information and its exchange between qualified parties via interoperable services (ICAO Doc.10039).

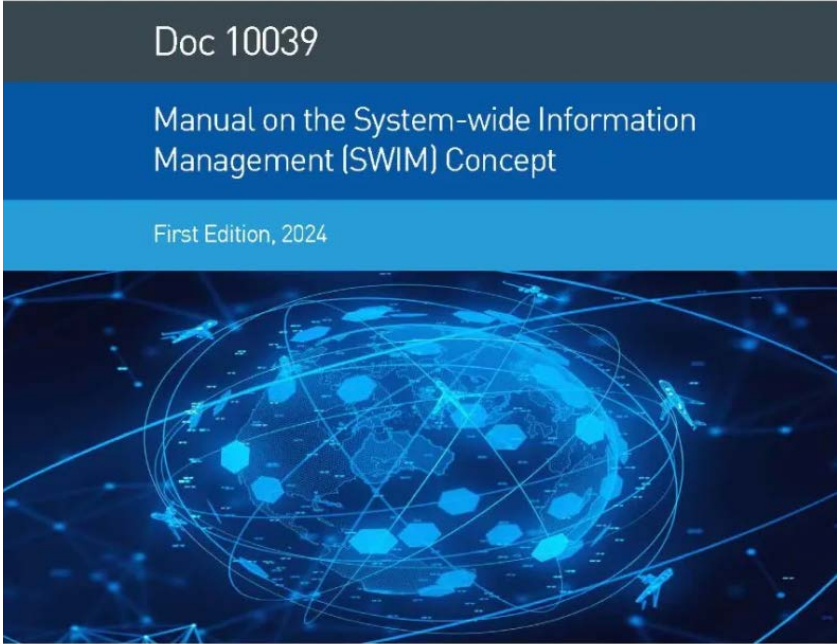


API (Application Programming Interface)

“is a way for two or more computer programs to communicate with each other. It is a type of software interface, offering a service to other pieces of software” (Martin Reddy, 2011)

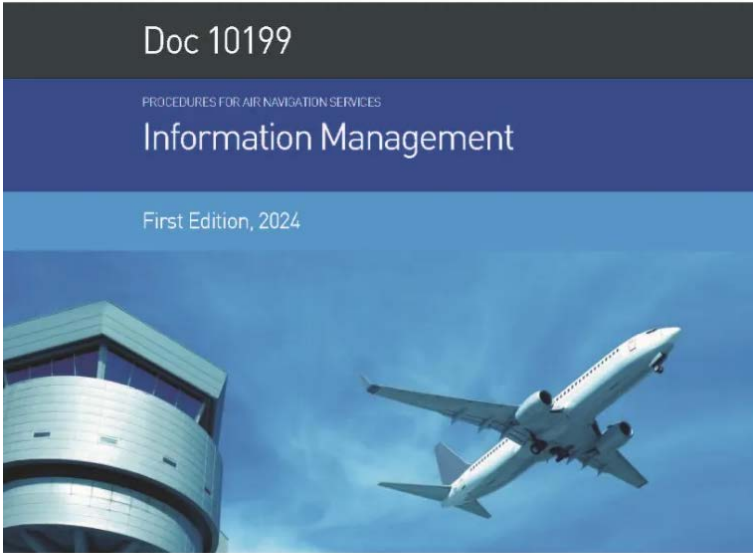


Doc 10039 concept, Doc 10199 (PANS-IM), Doc 10203



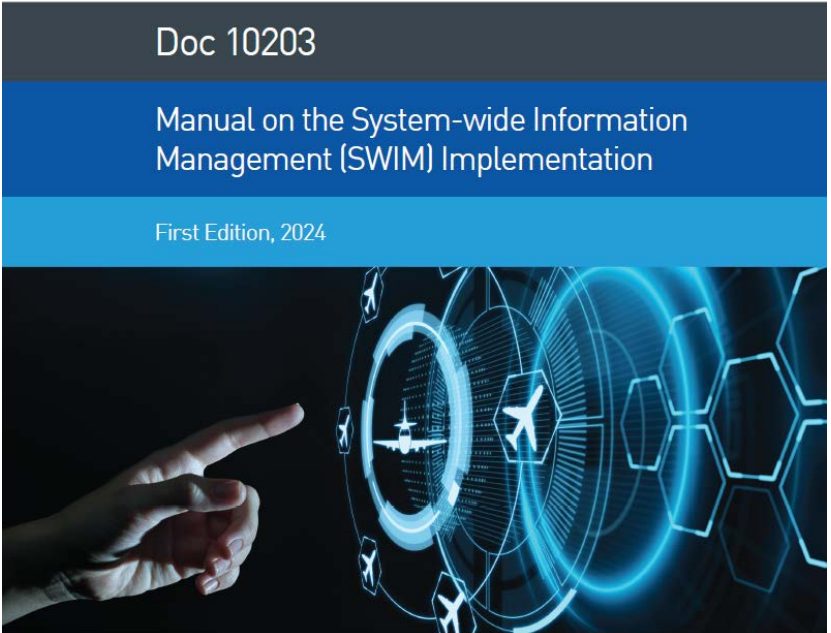
Approved by and published under the authority of the Secretary General.

INTERNATIONAL CIVIL AVIATION ORGANIZATION



This first edition of Doc 10199 was approved by the Council on 18 March 2024 and becomes applicable on 28 November 2024.

INTERNATIONAL CIVIL AVIATION ORGANIZATION



Approved by and published under the authority of the Secretary General.

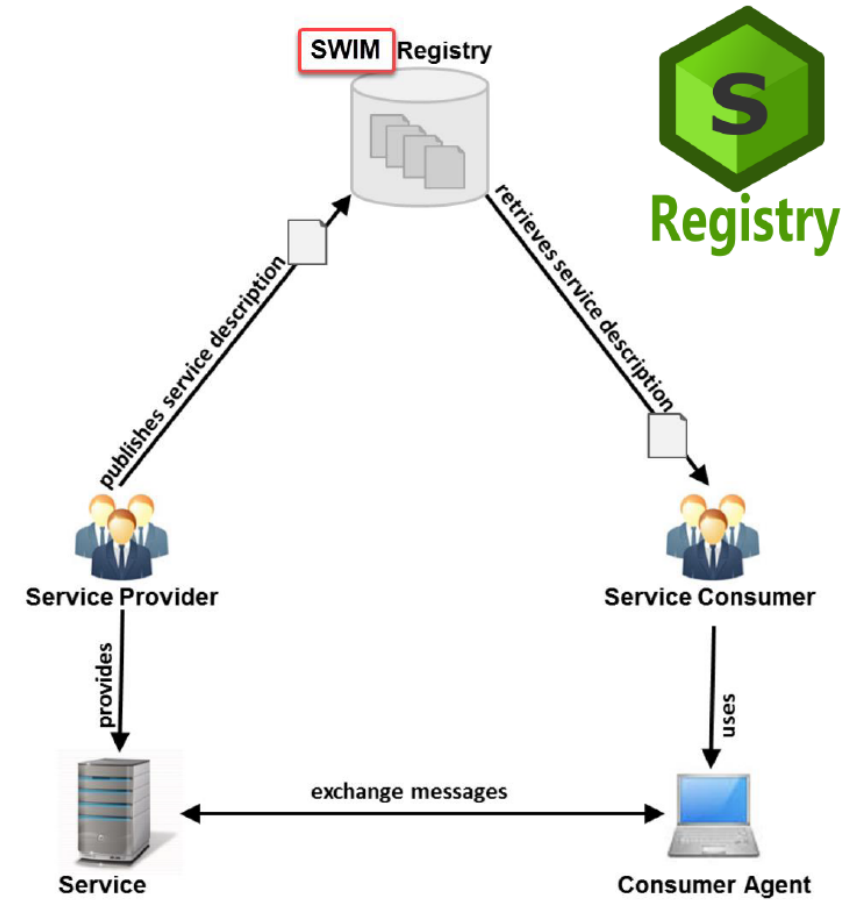
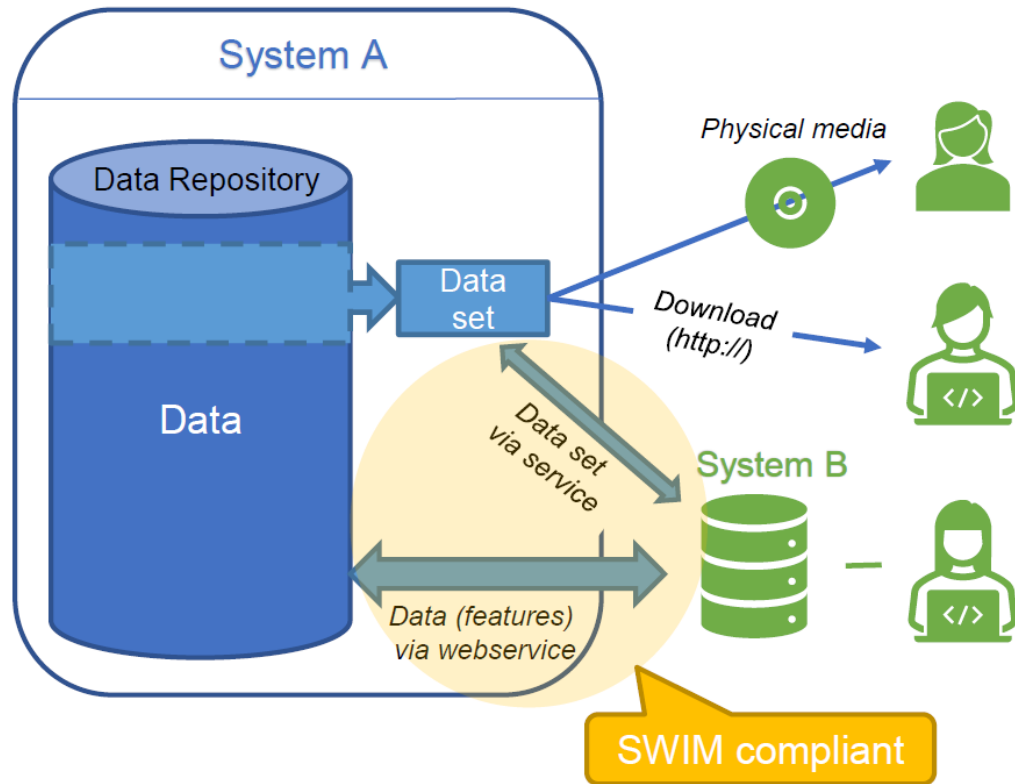
INTERNATIONAL CIVIL AVIATION ORGANIZATION



PROPRIETARY & CONFIDENTIAL

SWIM

- technical methods to deliver a digital data set



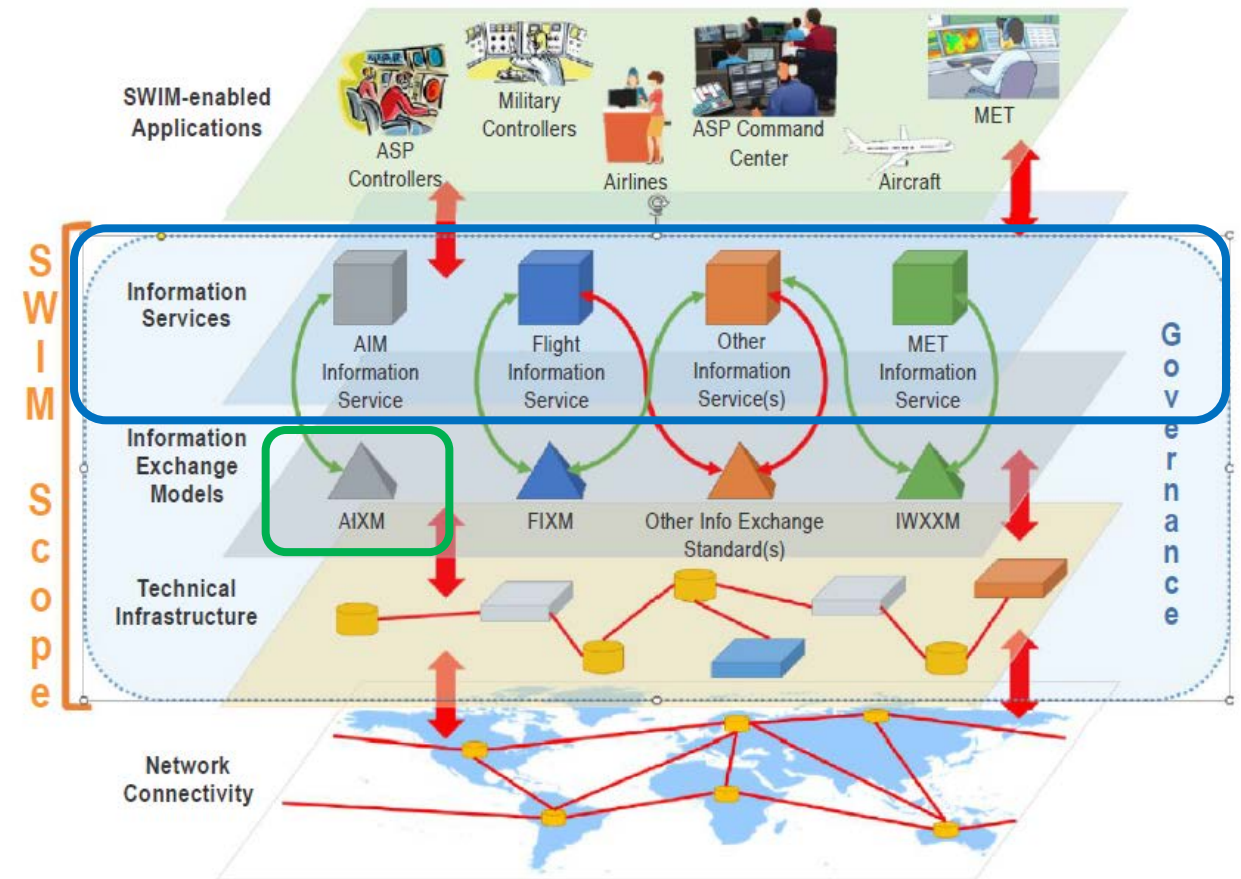
<https://eur-registry.swim.aero/home>



DORIS - Digital Operational Reporting Information Service

Overview

- DORIS is an ICAO-conceived SWIM **information service** that **replaces legacy NOTAM and AIP Supplements** with structured, machine-readable digital data, improving safety, usability, and efficiency across the aeronautical information chain.
- It builds on **Digital NOTAM** concepts and **AIXM-based** data models, enabling tailored retrieval, filtering, visualization, and automated integration into end-user systems.



Why Change

- Legacy NOTAM and related products are text-heavy, high-volume, and difficult to filter, sort, and interpret—leading to safety risks and operational inefficiencies.
- The current system is not optimized for digital data flows, machine processing, or graphical portrayal, and often requires manual extraction/re-entry of information.

Q) ZZZZ/QXXXX/IV/NBO/A/000/999/0000N00000E

A) DNLN (DONLON)

B) 2510270001 C) 2511302359

D) 2200-0600 NIGHTLY

E) STAND CLOSURES AND GATE RESTRICTIONS DUE TERMINAL WORKS:

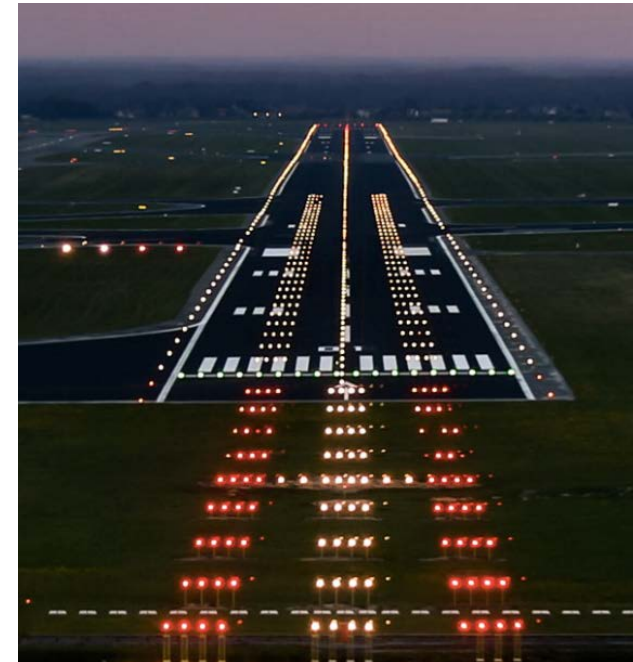
- STANDS 4-8 CLSD. PUSHBACK FROM STANDS 1-3 VIA TWY C ONLY.
- JETWAY U/S AT STAND 10, MANUAL BOARDING VIA STAIRS. APU USE RESTRICTED 2300-0600, GPU MANDATORY.
- TAXI RESTR: TWY C BTN C1 AND C3 LIMITED TO ACFT WINGSPAN <= 36M. TWY D ONE-WAY WESTBOUND 2200-0600. SLOT CTL IN FORCE. PPR FOR WIDE-BODY > CODE D MIN 90 MIN. COORDINATION VIA AOCC. PILOTS EXER CTN DUE CHANGED LEAD-IN LGT PATTERNS.
- CREATED: 2510201305



DORIS vs Legacy

Situation:

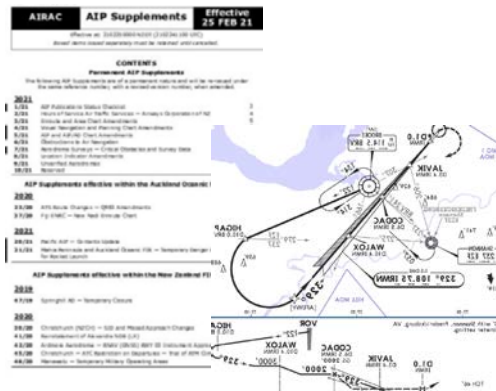
- Because a new crane has been erected and construction is underway near Runway 09L, the airport should publish an information service to timely inform stakeholders affected by the temp change.



DORIS vs Legacy: Legacy – NOTAM and SUP

Today:

- AISP will publish NOTAM to advise:
 - New TORA and LDA values
 - Displaced threshold
 - Taxiway A closed
 - Portion of Taxiway B between TWY B and TWY C closed
 - ILS procedure suspended
 - New obstacle (crane)
- Additionally, the AIP SUP will publish the LOC-only procedure chart with the revised OCA(H).



D) NAV MAINT
E) NEW TORA AND LDA PUBLISHED: RWY 09L TORA <NEW_TORA_M> LDA <NEW_LDA_M>.
F) REF AIP SUP <SUP_REF>.

D) RWY <RWY> CLOSED THR
E) RUNWAY 09L THRESHOLD DISPLACED BY <DIST_M>M. NEW LANDING DISTANCE AVAILABLE AS LDA <NEW_LDA_M>. F) REF AIP SUP <SUP_REF>.

D) TWY A CLOSED
E) TAXIWAY A (TWY A) CLOSED. FOLLOW GROUND HANDLING INSTRUCTIONS.
F) CONTACT: <OPS CONTACT>.

D) TWY B PART CLOSED
E) PORTION OF TAXIWAY B BETWEEN TWY A AND TWY C CLOSED. ALTERNATE ROUTES PUBLISHED IN AIP SUP.
F) CONTACT: <OPS CONTACT>.

D) ILS PROCEDURE SUSPENDED
E) ILS RWY 09L PROCEDURE TEMPORARILY SUSPENDED UNTIL FURTHER NOTICE. USE LOC-ONLY PROCEDURE.
F) REF AIP SUP <SUP_REF>.

D) AIP SUP PUBLISHED
E) AIP SUP <SUP_REF> PUBLISHES LOC-ONLY APPROACH PROCEDURE TO RWY 09L WITH REVISED OCA(H)
F) EFFECTIVE <YYYYMMDDHHMM> UNTIL <YYYYMMDDHHMM>

D) OBSTACLE CRANE E) NEW CRANE LOCATED 200M NORTH OF RWY 09L CENTRELINE, POSITION APPROX. <LAT/LON IF AVAILABLE>. MAXIMUM EXTENT TO HEIGHT <HEIGHT_M>M AMSL (OR ABOVE AERODROME LEVEL IF PREFERRED). ALL AIRCRAFT ADVISED OF OBSTACLE, EXERCISE CAUTION ON CIRCLING, VISUAL APPROACHES AND GROUND OPERATIONS. F) CONTACT: <OPS CONTACT> / REF AIP SUP <SUP_REF>..



DORIS vs Legacy: Legacy – NOTAM and SUP

Today:

- Pilots will be provided (before flight) with the NOTAM package and any relevant AIP Supplement via the PIB. Note: AIP Supplements are issued only when applicable.



“Not only is reading text like this not very user-friendly, it also brings the risk of misinterpretation and can even lead to dangerous situations.”



DORIS vs Legacy: DORIS

“Tomorrow”:

- AISP will publish the DORIS information (payload) package using their own modern tools and information service:



- New TORA and LDA values →
- Displaced threshold →
- Taxiway A closed →
- Portion of Taxiway B between TWY B and TWY C closed →
- ILS procedure suspended →
- New obstacle (crane) →
- IFP →

DORIS payload:



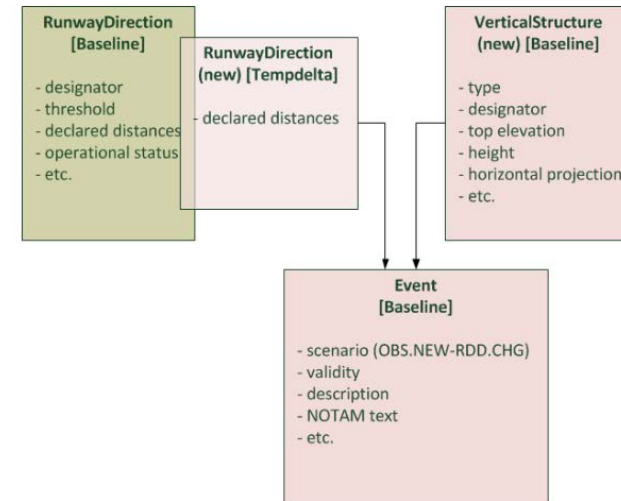
and/or



DORIS vs Legacy: DORIS

AIXM Event

The purpose of the Event Extension is to enable the digital encoding of the aeronautical data that concerns identifiable operational situations, which result in the temporary or permanent alteration of one or more aeronautical information features or of their properties.



- In this example the temporary obstacle also impacts the values of the declared distances of a closely situated runway. Therefore, both the VerticalStructure BASELINE and the RunwayDirection TEMPDELTA are associated with the Event. The scenario coding rules are practically an aggregation of the coding rules of the two sub-scenarios (new obstacle and runway declared distance changes).



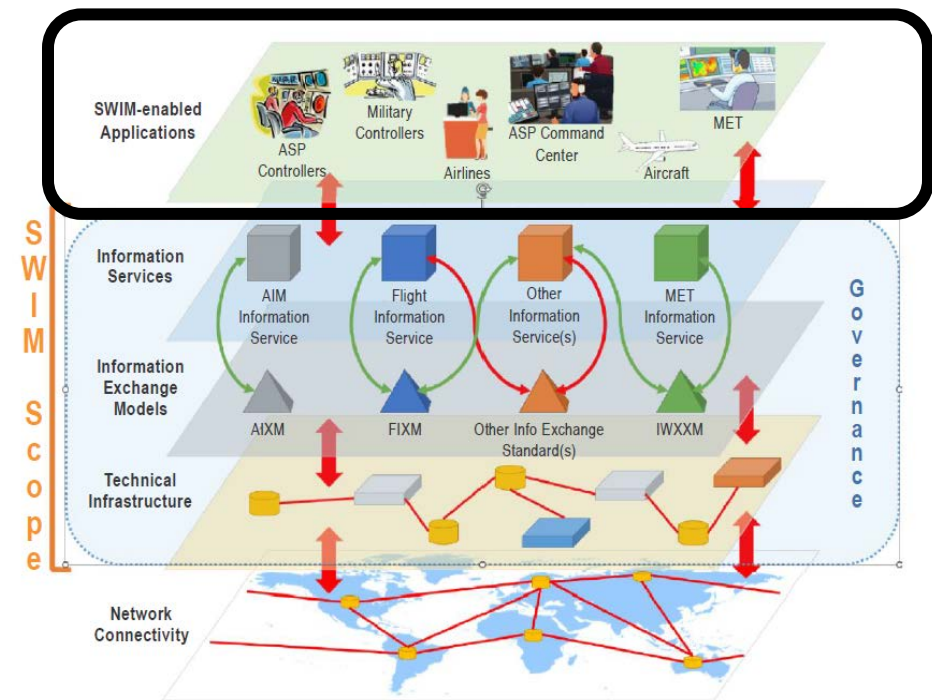
DORIS vs Legacy: DORIS

“Tomorrow”:

- Pilots and other airspace user will receive DORIS payload on their SWIM enabled applications



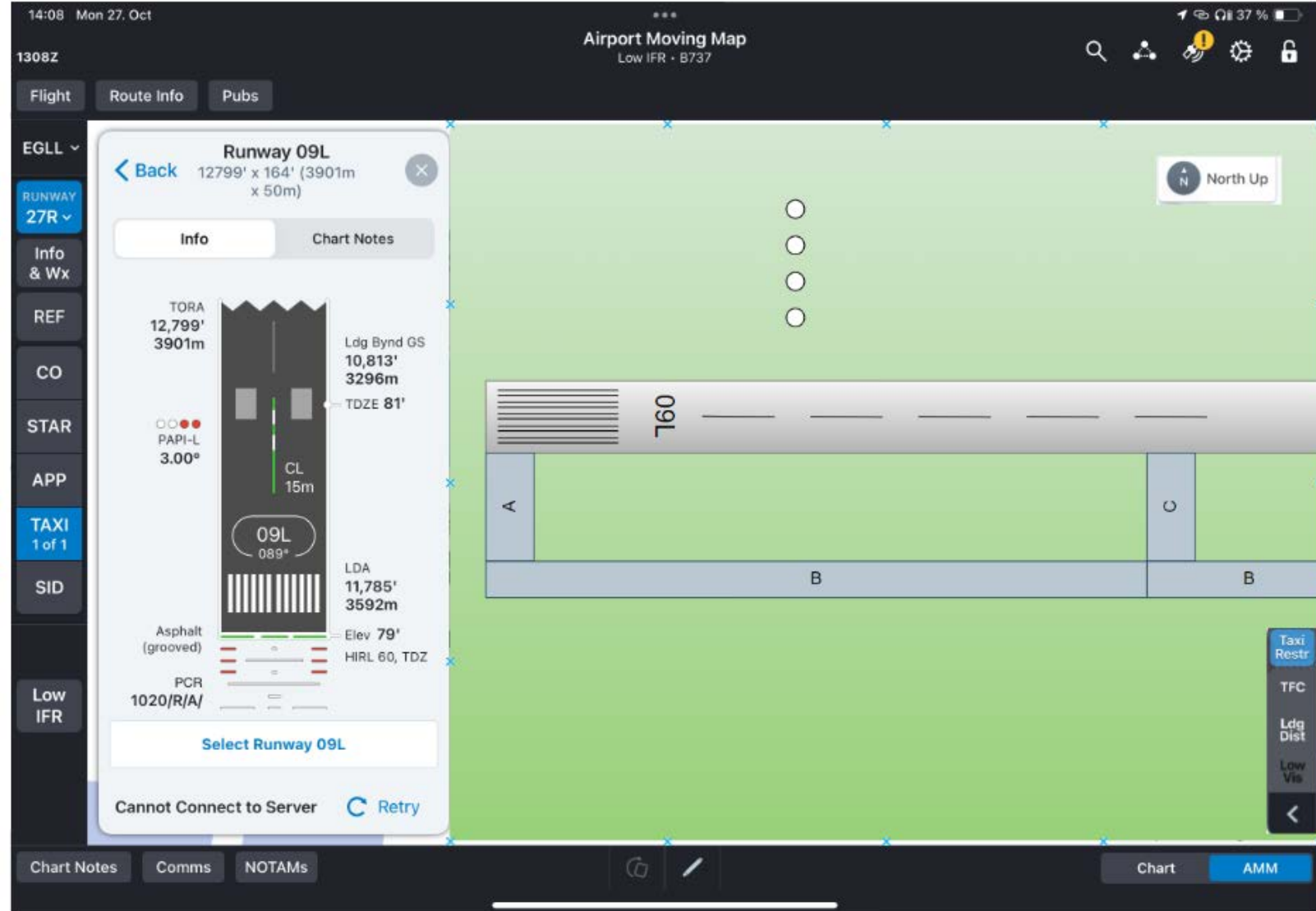
e.g., EFB: SWIM-enabled Application



DORIS vs Legacy: DORIS

“Tomorrow”:

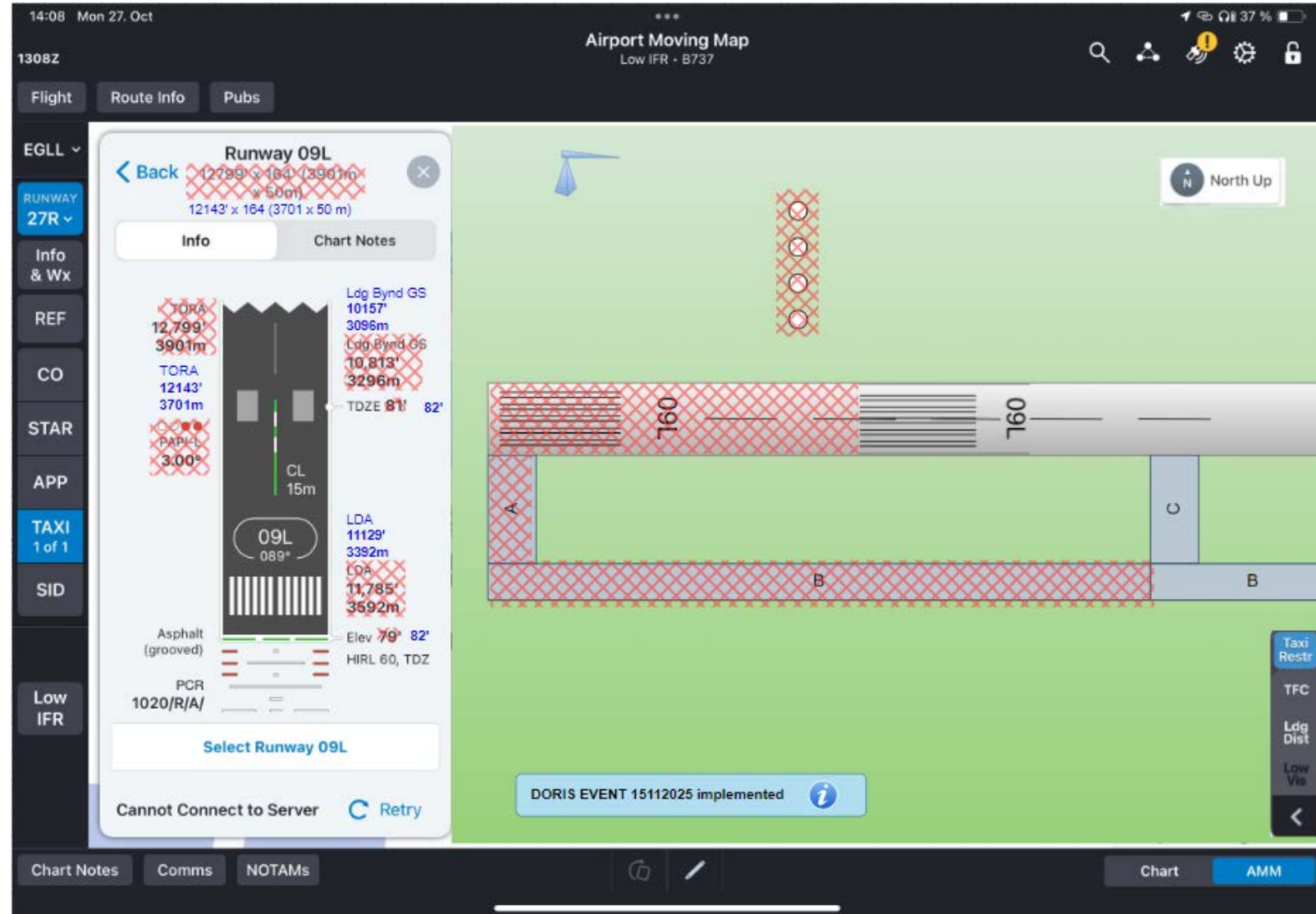
- EFB
Before
effectivity
of NOTAM



DORIS vs Legacy: DORIS

“Tomorrow”:

- EFB
After
effectivity of
NOTAM



“Tomorrow”:

- [illegible]



Summary

- Purpose: DORIS is a SWIM-based digital replacement for NOTAM/AIP Supplements that delivers machine-readable, scenario-coded temporary aeronautical updates to improve timeliness, usability and safety.
- How it works: digital events are coded, verified and published via information services (publish/subscribe and query/retrieve), enabling automated ingestion by downstream systems and tailored, graphical user products.
- Key benefits: better filtering/sorting, fewer ambiguous texts, graphical visualization, faster delivery to end-systems (EFBs, flight planning, FMS), and reduced manual processing and human error.
- Transition approach: incremental — DORIS will coexist with legacy NOTAM/AIP SUP during roll-out, with autogenerated NOTAMs for the transition; full decommissioning requires global coordination and digital data set readiness.
- Requirements & constraints: depends on AIXM-based digital data sets, common coding scenarios, data quality controls, updated AIS/AIM skills and SWIM infrastructure; avoids over-digitization by coding only where useful.



Thank you

Contact us to learn more about the products and services offered by Jeppesen Foreflight.

 JeppesenForeFlight.com

 marko.zoricic@jepp.com



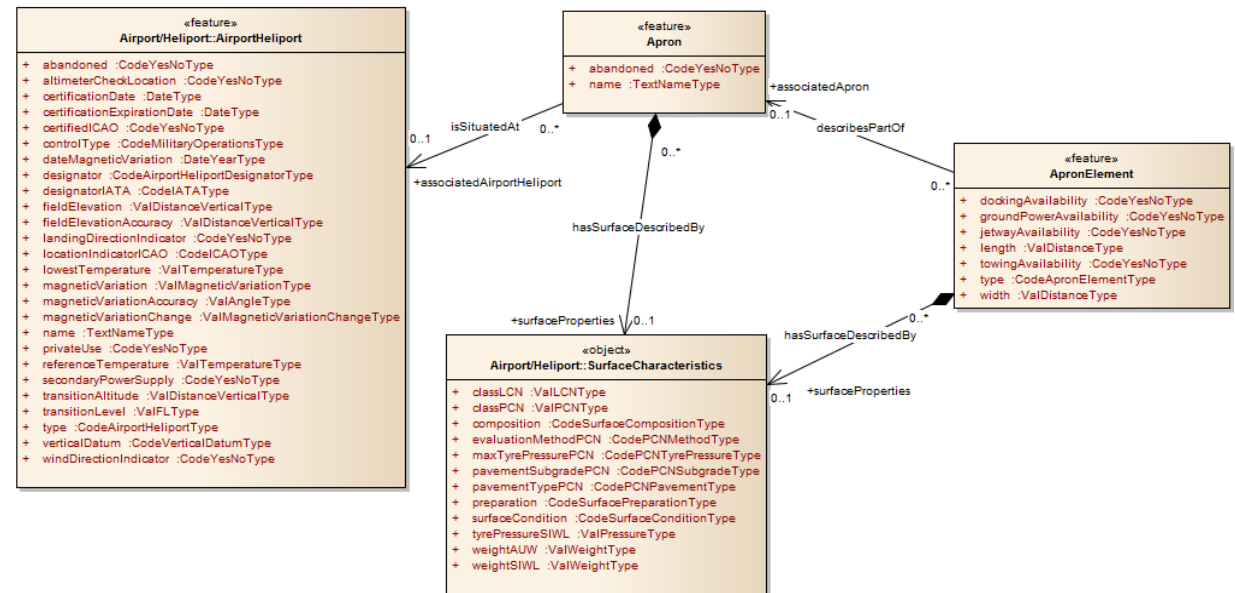
PROPRIETARY & CONFIDENTIAL

AIXM - UML

- The AIXM Data Model describes the features, its attributes and relationships of the aeronautical information domain(plus).
- The AIXM Data Model is specified using a subset of the Unified Modelling Language (UML).
 - a modelling language for visualising the design of a system (->diagrams)



UML



ICAO – Digital Data Sets

- Digital data shall be in the form of the following data sets:



AIP Data Set



Obstacle Data Set



Instrument Flight Procedure Data Set



Aerodrome Mapping Data Set



Terrain Data Set

Not covered by AIXM. !



SWIM – EUROCONTROL Services



ServicesService DefinitionsDocumentsContact

Find what you need...  Log in

Home / Service Descriptions

Filter by

Service Provider Name

- Any -

Service Type

- Any -

Lifecycle Stage

- Any -

Version

Sort by

Changed date Desc

Apply

Service Descriptions

MET OFFICE



4D-Trajectory

version: 1.0.0

Met Office 4D-Tra...

The Met Office 4D Trajectory API service supplies global meteorological data for tailored flight tra...



3D RADAR Service (GRIB2)

version: 1.0.0

3D RADAR Service ...

The Pan-European 3D RADAR Service aims to provide a SWIM Compliant access point to high resolution R...



Harmonised Turbulence Service

version: 1.0.0

Harmonised Turbul...

The Harmonised Turbulence Service aims to provide a SWIM Compliant access point to harmonised turbul...



3D RADAR Service (HDF5)

version: 1.0.0

3D RADAR Service ...

The Pan-European 3D RADAR Service aims to provide a SWIM Compliant access point to high resolution R...

DWD



NowCast-Mix Aviation

THUNDERSTORM / HEAVY RAIN

version: 1.0

NowCast-SAT Aviation icon" data-bbox="345 820 415 910"/>

NowCast-SAT Aviation

VIA WFS

version: 1.0

Icing Intensity Harmonized icon" data-bbox="510 820 580 910"/>

Icing Intensity Harmonized

VIA AMQP

version: 1.0

OPMET icon" data-bbox="675 820 745 910"/>

OPMET

VIA WFS

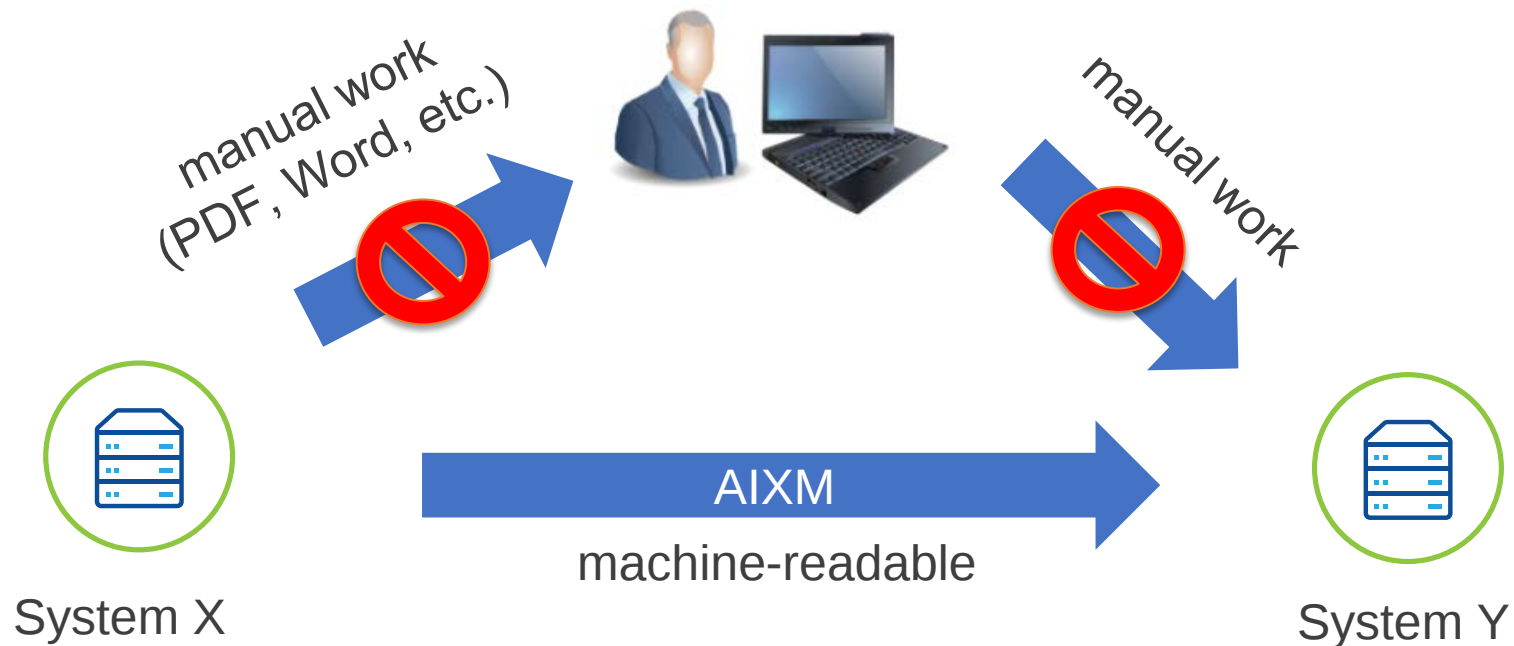
METAR-TAF-SIGMET

version: 1.0

 PROPRIETARY & CONFIDENTIAL

AIXM

- AIXM enables transition from AIS to AIM
- The objective of the Aeronautical Information Exchange Model (AIXM) is to enable the provision of Aeronautical Information Services (AIS) data in digital format (AIP & NOTAM)



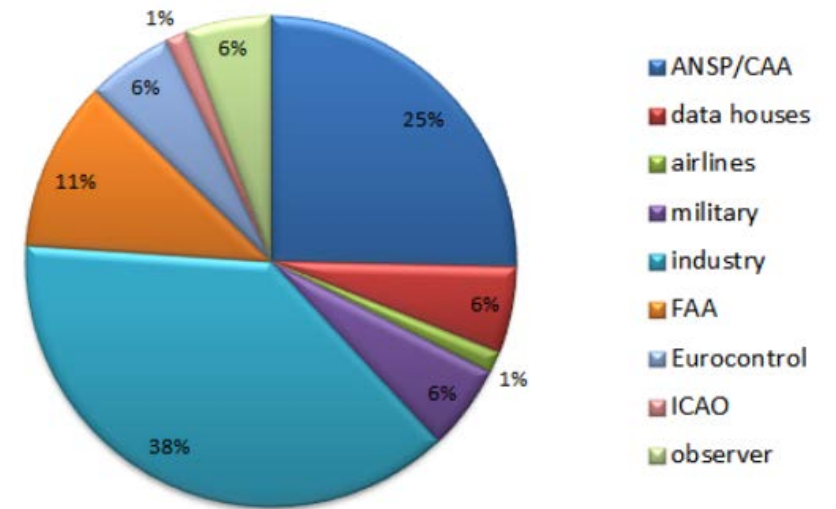
AIXM - Change Control Board

Objective

- The objective of the AIXM Change Control Board (CCB) is to maintain and to evolve the AIXM Specification as necessary for enabling States to comply with the ICAO global and regional requirements for the provision of aeronautical information, in the context of the evolution towards digital AIM and System Wide Information Management (SWIM).

Membership

- The members of the AIXM CCB represent a wide range of stakeholder organisations from many parts of the World. They act under the provisions of the Change Management Charter (“Charter”), which also defines the change management processes



AIXM – evolution

AIXM 3.3 (2002)

- First operational version (EAD)
- Not used anymore



AIXM 4.5 (2005)

- European AIS Database (EAD)
- Several national systems world-wide
- “Non-GML”

AIXM 5.0 (2008)

- First GML based version
- FAA (SAA Data AIXM 5 + extensions)



AIXM 5.1 (2010)

- FAA
- EAD (partially)
- Several national systems world-wide

AIXM 5.1.1 (2016)

- Minor & editorial changes
- Most current version



AIXM 5.2 (2025)

- GLS
- PBN
- Minima



The Transition from AIS to AIM

The PANS-AIM contains provisions in support of the transition from **product-based AIS** to **data-centric AIM**. This edition includes detailed requirements for the collection, management and provision of aeronautical data and aeronautical information as well as aeronautical information products and services specifications.

Aeronautical information service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

Aeronautical information management (AIM). The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

