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AIXM Database Synchronization in SWIM Architecture

Challenges and Practical Approaches

ICAO SWIM Seminar 2026
Afar Allazov





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Why Synchronization Matters



Stakeholders replicate ANSP data

Consumers hold their own copy of the AIS picture — not a per-request lookup.



Backup database

The ANSP keeps a second database for redundancy and disaster recovery.



Cross-department sync

AIS data flows to flight planning and airspace design — separate databases.

*In each case the data lives locally — the question becomes **keeping it current.***



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Why a Live Copy Is Unavoidable — Today

On-demand SWIM access can't cover these constraints.



Performance

ATM systems work in real time;
no per-read network call.



Availability

Safety-critical ops can't depend
on a live link being up.



Scale

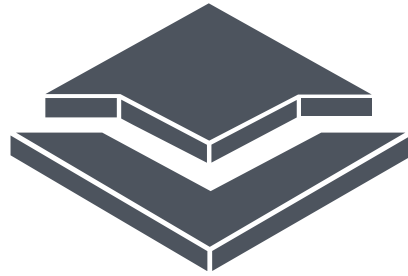
Holding many states' data —
can't re-pull everything.



Local processing

Design, validation and merging
need data in your own DB.

Copies are here to stay. The real problem isn't getting the data — it's knowing **what changed since the last sync**.



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>300 Employees

Founded in 1993

**Revenue in 2025:
\$53M**



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Air Navigation Experience

Active in the air navigation market since 2005



~30 Customers



In 20+ Countries



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Air Navigation Experience

Strong Expertise in

AIM

SWIM

PBN

FF-ICE

Solutions for



ANSPs



Civil Aviation
Authorities



Airports

Air Navigation Experience

Full Project Lifecycle

Consultancy

Implementation

Integration

Training

Support



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ICAO DOC 8126

A Level 3 AIM Environment — With SWIM Distribution

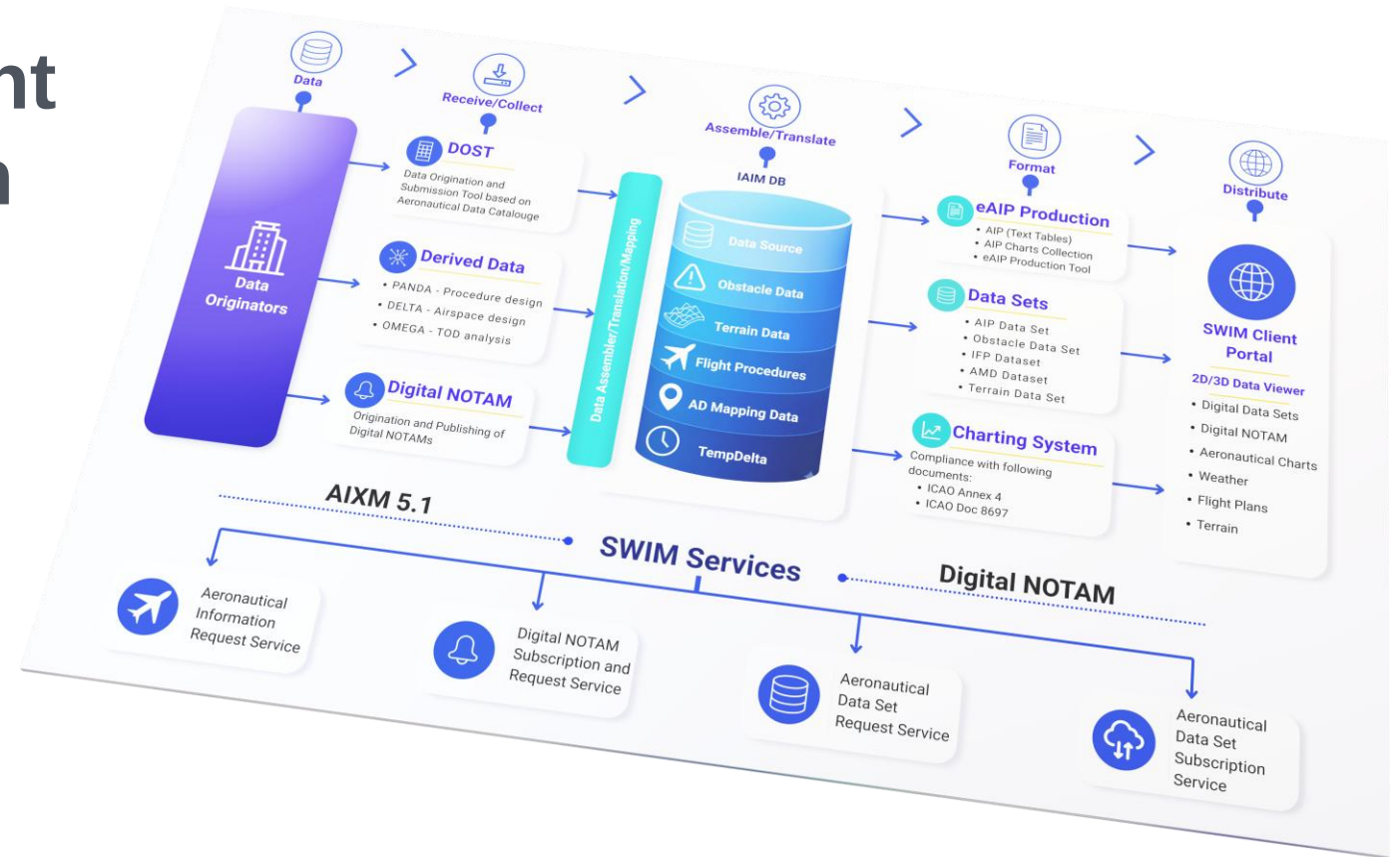
Level 0 · Manual

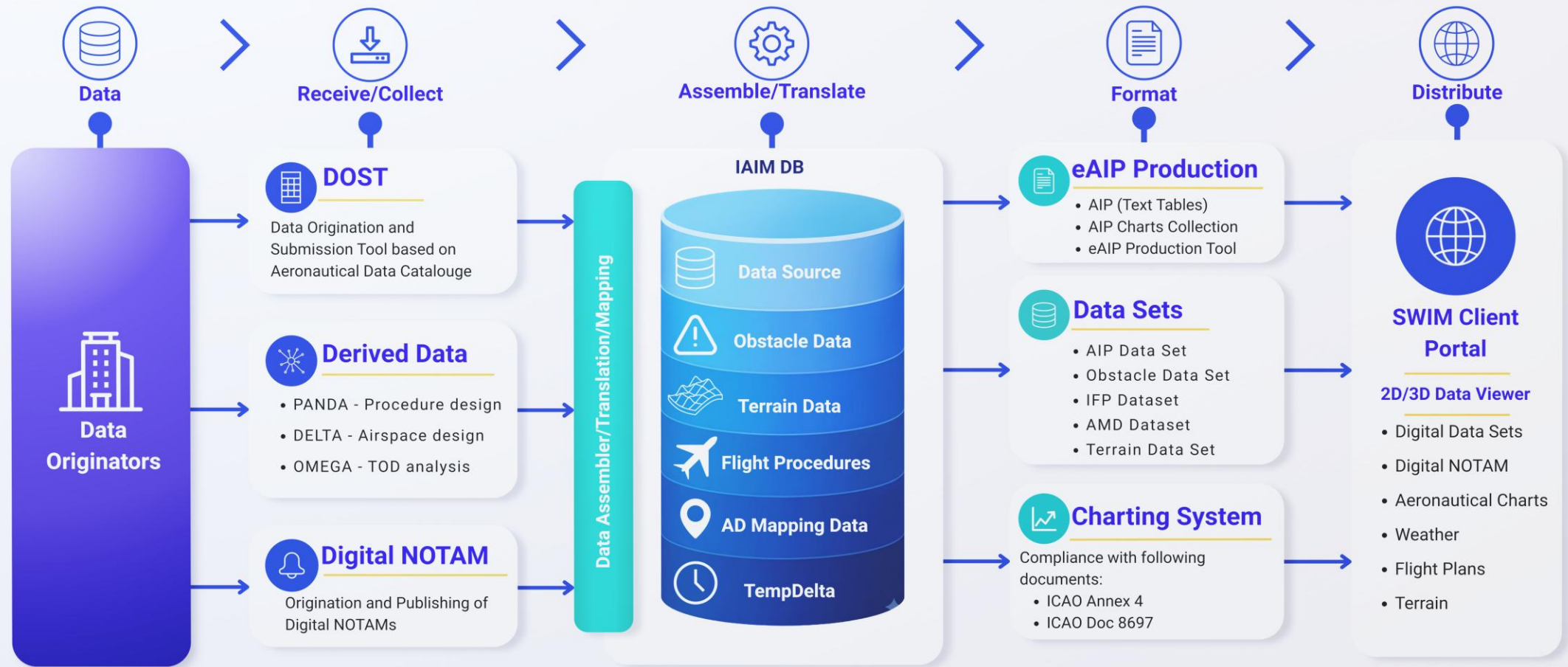
Level 1 · Data-centric

Level 2 · Automated workflow

Level 3 · Full AIM integration
our environment

+ SWIM

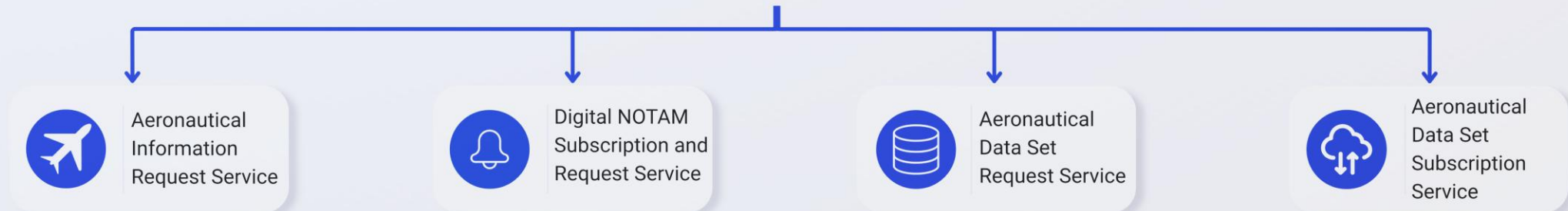




AIXM 5.1

SWIM Services

Digital NOTAM



31
DECEMBER
2025

ON TIME

LGS (Latvian ANSP) — Live on CP1 Deadline

- ✓ Digital NOTAM — origination & publication
- ✓ Aeronautical Information Request Service
- ✓ Digital NOTAM Subscription & Request Service
- ✓ SWIM-TI Yellow Profile integration

Regulation (EU) 2021/116 — Common Project 1

LGS made it, supported by R.I.S.K.





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The Synchronization Gap in AIRS

AIRS tells the consumer what the data is, but never what changed.



Forced
Polling

No push — client must
repeatedly query



100+ Feature
Types to Diff

No 'what changed' query —
client reconstructs the delta



Doesn't Scale

Cost grows with scope;
fails for ad-hoc changes



No Data-
Currency Cursor

No 'changes since
my last sync'



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AIRS Change Notification — The Solution

Push the list of changes, not the data. The client pulls only the delta.

1



Subscribe

Consumer subscribes to the AIRS change channel within their scope

2



Manifest

Provider publishes a change manifest — metadata, not data

3



Decide

Client decides whether the change is relevant to its scope.

4



Pull Delta

Targeted GetFeature for the changed features only



Anatomy of a Change Manifest



Feature UUID

Identifies the feature in the consumer's local copy.



AIXM feature type

Which type to fetch and where to store it.



sequenceNumber + correctionNumber

The change detector — compare against the local copy.



TimeSlice interpretation

How to apply the incoming version (replace baseline / overlay delta).

Feature	Airspace
UUID	a1b2...
Interpretation	PERMDelta
SequenceNumber	5
CorrectionNumber	0



Why Not Just Use Data Sets Services

Complementary, not competing — different architectural layers

	Data Set Services	Proposed AIRS Extension
Granularity	Entire dataset version	Per-feature, scoped to consumer's interest
Notification	"New version available" (availability signal)	"What changed in your scope" (decision-ready manifest)
Timing	Typically aligned with AIRAC	On-demand — any change, any time
Readiness	Full dataset stack needed	Reuses existing AIRS interface

AIRS is feature-agnostic — GetFeature delivers any AIXM data through the same interface, today.



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Two Paths Forward

The sync gap is real and solvable. The only question is how the community solves it.



Path A — each vendor on its own

Every provider builds its own non-standard extension.
Works — but incompatible across states.
Consumers integrate each one separately.

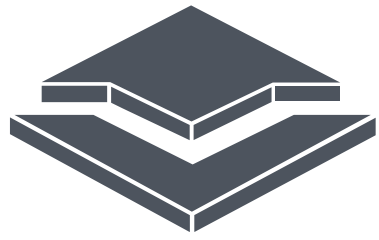
Where we are today



Path B — standardized together

One change-notification approach over AIRS.
Interoperable across providers and states.
Integrate once, works everywhere.

Worth pursuing as a community



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Thank you

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