

AIM/SAM/10, August 2017 Lima Peru

Lufthansa Systems

AIM from a navigation data house perspective



Lufthansa Systems

Agenda



- ▶ **The Company & Products**

- ▶ Electronic Terrain and Obstacle Data (eTOD)

- ▶ Transition from AIS to AIM

- ▶ Aeronautical Data Requirements and AIRAC Adherence



Lufthansa Systems



Covering all airline IT processes – not just Lufthansa

OPERATIONS
SOLUTIONS

FLIGHT
DECK
SOLUTIONS

IN-FLIGHT
ENTERTAINMENT

PROFESSIONAL
SERVICES AND
CONSULTING

COMMERCIAL
SOLUTIONS

FINANCE
SOLUTIONS

MOBILE CABIN
SOLUTIONS

Flight Deck Solutions

FLIGHT DECK
SOLUTIONS

Lido/FlightPlanning

Lido/Performance

Lido/Navigation

- Everything connected to navigation
- [YouTube](#) introduction

Strategic
& technical
Planning

Pre-
Flight

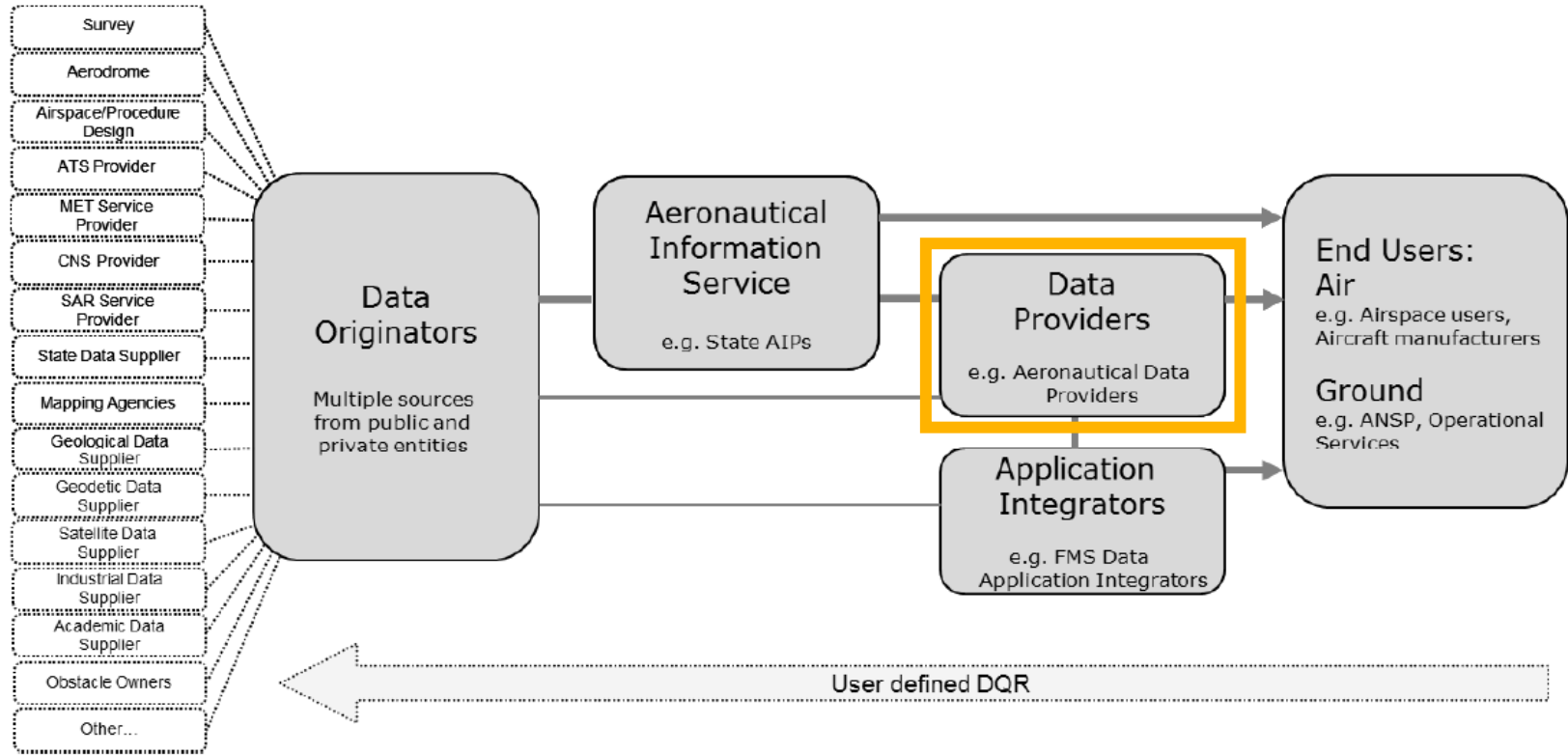
Briefing

In-
Flight

Post
Flight

Admin. &
Finance

Lido/Navigation in the Aeronautical Data Chain



Products

Lido/FMS

- Comprehensive worldwide navigation data base
- Certified by EASA: LoA Type I & DO-200 & DO-201 compliance, ARINC 424
- Based on authoritative state publications (AIP, NOTAMs etc.)
- High source data quality required to allow state of the art precision navigation



Products

Lido/mPilot and Lido/eRouteManual



Flexible & mobile:

- Paperless
- Active in-flight cockpit usage

All-in-one solution:

- Terminal Charts
- Dynamic Enroute
- Documents

- Working in a digital environment becomes more and more a reality
- Standardized and digital depiction of enriched state publications



Products

Lido/AMDB & Lido/AMM

- EASA certified Airport Mapping Data Base
- Used for navigation on the ground
- Support of Airbus OANS/ANF functions
 - Brake to vacate (BTV)
 - Runway overrun warning (ROW)
 - Runway overrun protection (ROP)
- Used in Boeing AMM systems as well
- **Besides high quality satellite images, also depending on state publication**



Products

Lido/SurfaceData

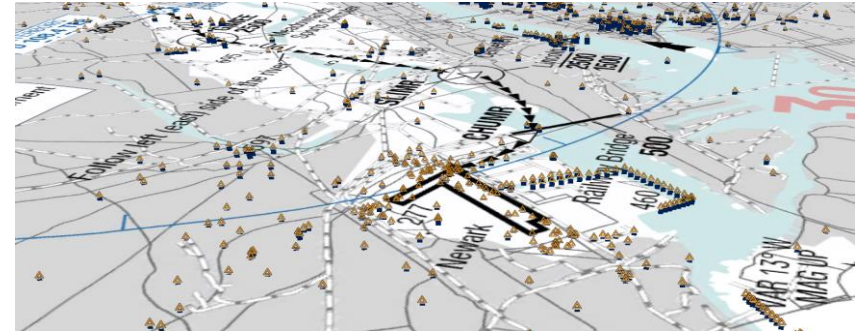
Lido/SurfaceData is a worldwide data base of:

- Obstacles
- Terrain
- Cultural Data (Lakes, City Patterns etc.)



Obstacles

- EASA LoA type 1 certified
- DO-200, DO-276 and DO-291 compliant
- More than 50 attributes describing each obstacle
- **Based on authoritative sources**
 - AIP (text and charts), NOTAMs, eTOD etc.



Lido/SurfaceData Obstacle Data Usages

- Calculation of minimum safe flight altitudes (MGA, Grid Mora etc.)
 - Indication of relevant obstacles on navigation charts
 - Take-Off performance calculations
 - Procedure design (i.e. Engine out procedure)
 - Drift down analysis
 - Enhanced Ground Proximity Warning Systems (EGPWS)
 - Synthetic Vision Systems (SVS)
 -
- eTOD is a key to reach sufficient coverage, integrity, efficiency (and data quality) to enable most of these usages in a reliable way



User requirements on eTOD (Obstacles)

- Realistic and step by step approach
- First **priority on Obstacles** (because for terrain there are alternative sources (e.g SRTM))
- The LSY requirements on eTOD are generally captured in the [eurocontrol eTOD manual](#)

Announcement of eTOD

- Announce eTOD availability in advance in AIP (e.g. Gen 3.1.6. / Enr 5.4 or AD 2.10) or by e-mail to LSY AIM
- Provide sample data
 - Tools and processes on user side can be adjusted
 - Data quality can be analyzed
 - Feedback may be given
- If you announce eTOD, make sure it is really available upon request

User requirements on eTOD (Obstacles)

Consistency

- Information in all obstacle publications shall be consistent (e.g AIP vs. eTOD (also within different eTOD files/formats))

Unique obstacle identifier throughout the entire obstacle life time

- Key requirement for tractability
- Helps to reach consistency and eases clarification

Timeliness

- Publish eTOD files way before their AIRAC effective dates, so they can be incorporated into the various aeronautical data chains
- Publish frequently in order to achieve an up-to-date and complete Obstacle DB

Format

- The eTOD format does not matter too much, as long as it is consistent within a state and stays the same over a longer time of period
- Description / documentation of the format certainly helps
- Announce format changes far in advance (similar to major AIP changes) to give the users time to adjust their tools
- LSY preferred formats: XML (AIXM), CSV, SHP...

User requirements on eTOD (Obstacles)

Completeness

- Try to include all obstacles that fulfill the publication criteria (if you have different criteria than the ones mentioned by ICAO, please let us know)
- Compare your obstacles to public available obstacle lists of your country (e.g. Wikipedia List of 100 tallest buildings) and make sure they are included in your DB
- Obstacles near procedures/airports are most important
- Describe all obstacle properties with attributes (e.g. according DO-276 / eurocontrol eTOD manual)
 - Most important attributes: Coordinates, Elevation, Unique ID, Height, Obstacle Type
- In case all obstacles of the AIP are published as eTOD as well such a statement is appreciated (avoidance of maintaining 2 sources)

Meta Data

- Provide meta data further describing the characteristics of the obstacles (e.g. horizontal and vertical accuracy, date of origination, data originator etc.)
- May be provided on the data set level and on the obstacle level
- Information about survey periodicity is also appreciated

User requirements on eTOD (Obstacles)

Disclaimer

- Avoid disclaimers like "not for operational use". That way there is no point in publishing eTOD

Data Quality

- High data quality (e.g. accuracy) is expected, but this is nothing unique to eTOD and applies to all forms of AI publications.

ICAO compliance

- Even if the obstacle data set may not be fully conform with all ICAO requirements, it usually already is worth publishing it (as long as certain minimum data quality requirements are fulfilled (e.g. accuracy) and it is stated somewhere that the data is not ICAO Annex 15 compliant yet
- According my personal assessment there is no country in the world really 100% ICAO annex 15 compliant yet (But some are already at a level where they add great value to the obstacle data chain!)

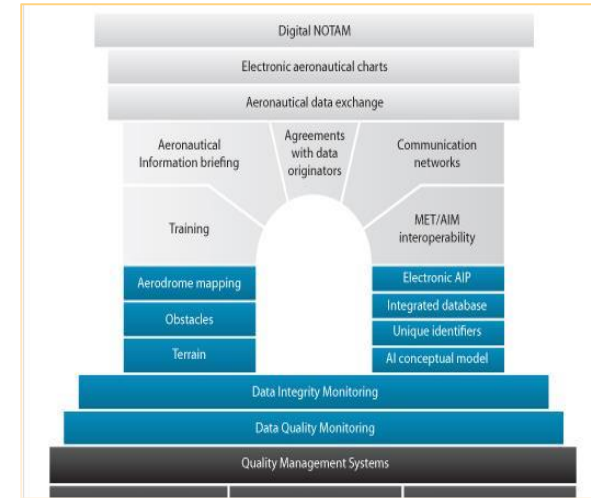
Communication

- Communicate any question regarding eTOD to LSY anytime (AIMZRH@lssystem.com or directly to michael.sauter@lufthansasystems.com)
- We have a lot of experience with eTOD from all over the world and are happy to share them with you

ICAO AIS to AIM Roadmap

New Product Formats and Distribution Methods

- LSY understands the challenging situation (Training, Human Resources, IT, Quality Monitoring, etc.)
- Progress and efforts to further improve very appreciated
- Challenging situation for LSY as well
 - Different implementation levels of different states
 - Quick and constant adaption to changing sources
- Some areas require improvements
 - provide Aeronautical Information in a timely manner
 - and with sufficient quality and integrity
 - Erroneous or late data can result in an incomplete FMS and other critical applications and end with a flight safety issue
 - Communication with the users
 - LSY is here to assist you whenever we can
 - **AIMZRH@lhsystems.com**



Data Processing Requirements

- AIRAC adherence
- QUALITY of data
- INTEGRITY and CONSISTENCY of data (discrepancies between different publication formats (e.g. paper vs electronic))
- VALIDITY and ACCURACY of publication
- RIGHT HANDLING of correction / replacement
- TIMELY and EXACT information about updates (update notification / indication)
- CLARIFICATION PROCESS

AIRAC adherence

Processing Cycle for Airborne Navigation Databases (DOC 8126)

- Airspace complexity and amount of published AI growing
- Adequate lead time needed to adjust data bases (ICAO guidance material)
- **Timeliness and accuracy** of aeronautical publication is **absolutely critical to safe operations**

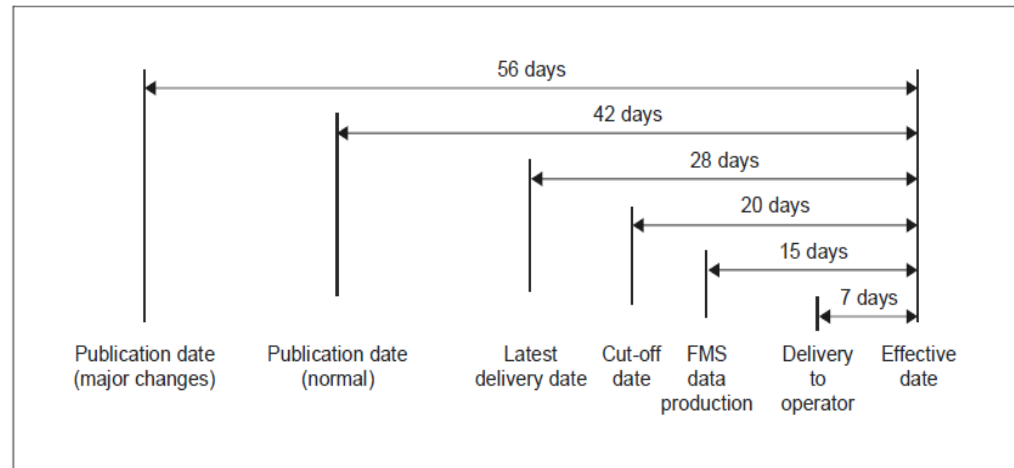


Figure 2-2. Processing cycle for airborne navigation databases

AIRAC adherence

Aeronautical Information Regulation and Control (AIRAC)

The processing cycle for airborne navigation databases requires:

the database to be delivered at least seven days before the effective date.

At least eight days are necessary to prepare the data in the database; therefore, the navigation data houses generally exercise a cut-off 20 days prior to the effective date in order to ensure that the subsequent milestones are met.

Data supplied after the 20-day cut-off will generally not be included in the database for the next cycle.

(ICAO DOC 8126 – Chapter 2, Paragraph 2.6.4)

- Information required at the earliest opportunity (The sooner the better)
- **If the effective date of a publication is postponed on a short notice, this creates a very critical situation. If the information received has already been coded into our database, it is not possible to “recall” or perform a “rollback” of the old information, consequently we would have to process the old information again which with a short notice is not possible anymore increasing the risk of flight safety.**

AIRAC adherence

Correct publication method – ICAO DOC 8126

2.6.2

b) **AIRAC effective dates** must be in accordance with the predetermined, internationally agreed schedule of effective dates based on an interval of 28 days.

c) **information so notified must not be changed further for at least another 28 days after the indicated effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.**

2.6.3 **Essentially, implementation dates other than AIRAC effective dates must not be used for pre-planned, operationally significant changes requiring cartographic work and/or updating of navigation databases.**

4.2.2 **AIP Amendments** are issued whenever new information necessitates a **permanent change or addition to the information already contained in the AIP.**

4.2.3 **Temporary changes of long duration (more than three months) or changes requiring the issuance of extensive text and/or graphics** which affect the contents of an AIP are published and distributed as **AIP Supplements.**

Source Procurement

Clear subscription renewal process needed

- Pre-Information per AIC or AIP GEN 3 part
- Valid payment details for bank transfer
- Acceptance of payment by credit card
- Provision of direct contact for financial issues
- Payment Reconfirmation
- Possibility for general payment procedure (e.g. BSP IATA)

ICAO DOC 8126, Paragraph 5.9.3 “It should be kept in mind, however, that the purpose of issuing amendments to the AIP is to keep the information up to date. An AIP that is not up to date can jeopardize the safety of air navigation.”

Correct and punctual data is in common interest. All parties in our industry depend on the quality and integrity of data.

Thank you

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