

Aeronautical Data Quality

ICAO APAC AAITF/17
AIS Seminar - WGS-84 & Data Accuracy
All about not to loose the Accuracy

Monday, 20th June 2022

We are

EXPERIENCED, INDEPENDENT
PROFICIENT AND ENTHUSIASTIC.

- // Located at Lake Constance, the fresh water lake in the heart of Europe & in Switzerland
- // SME founded in 2016, management owned, independent
- // Focused on ICAO Aviation System Block Upgrades (ASBU)
- // AIS to AIM digitalisation & SWIM implementation
- // Aeronautical Chart Production



Image taken by Sentinel 1-A on 10th May 2014 at an altitude of 693km (© ESA)

Content / Discussion

// 01 Motivation

// 02 Accuracy & DQR

// 03 Aeronautical Data Process

// 04 Data Catalogue

// 05 Data Sets

// 06 Planning Aspects

// 07 Question & Answers



Courtesy of www.aim-tracking.org



// 01 Motivation

Trends unchanged

GANP, ASBU, AIM, IM

// ICAO A41 27.09.-07.10.2022

// GANP (Portal), v6a

// DAIM, FRTO, FICE, TBO

// Block 1 & 2 unchanged

// Therefore we need the required accuracy & other DQR for aeronautical data

// GANP (Portal) v7 in 2025

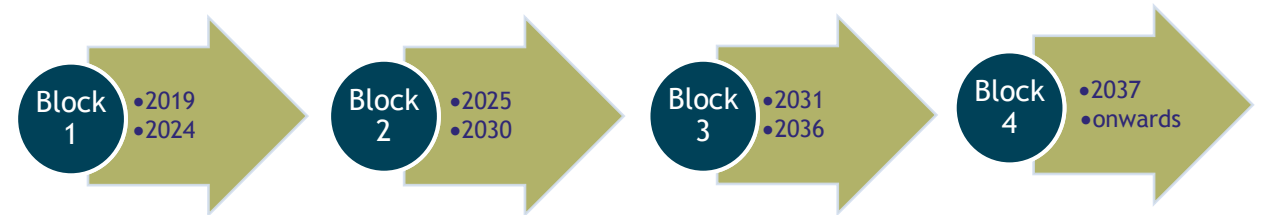
DAIM: Digital AIM

FRTO: Free Route Operations

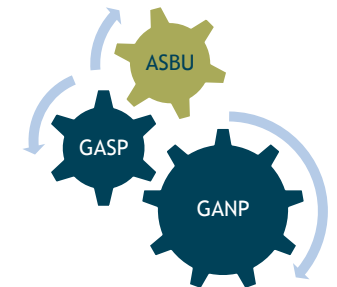
FICE: Flight and Flow Information for a Collaborative Environment

TBO: Trajectory-based operations Operational

Aviation System Block Upgrads (ASBU)



- GANP - Global Air Navigation Plan
- GASP - Global Aviation Safety Plan
- GANP ASBU Document





// 02 Accuracy & DQR

DQR Components

- **Data accuracy**

- A degree of conformance between the estimated or measured value and the true value.

- **Data integrity**

- (assurance level). A degree of assurance that an aeronautical data and its value has not been lost or altered since the origination or authorized amendment. Routine, Essential, Critical.

- **Data resolution**

- A number of units or digits to which a measured or calculated value is expressed and used.

- **Data timeliness**

- The degree of confidence that the data is applicable to the period of its intended use.

- **Data traceability**

- The degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the originator.

- **Data Completeness**

- The degree of confidence that all of the data needed to support the intended use is provided.

Origination Type

- calculated
- declared
- surveyed

Meta Data

- Collected for process & exchange points
- Provided with each data set
- ISO 19115

Format

- Discretion of State
- *Note: Commonly used data encoding formats*
- *Note: XML, GML, JSON*

Accuracy in Annex 15 Ed. 16

- Chapter 3.2 says, inter-alia:



- 3.2.1 Data Accuracy

The order of accuracy for aeronautical data shall be in accordance with its intended use.

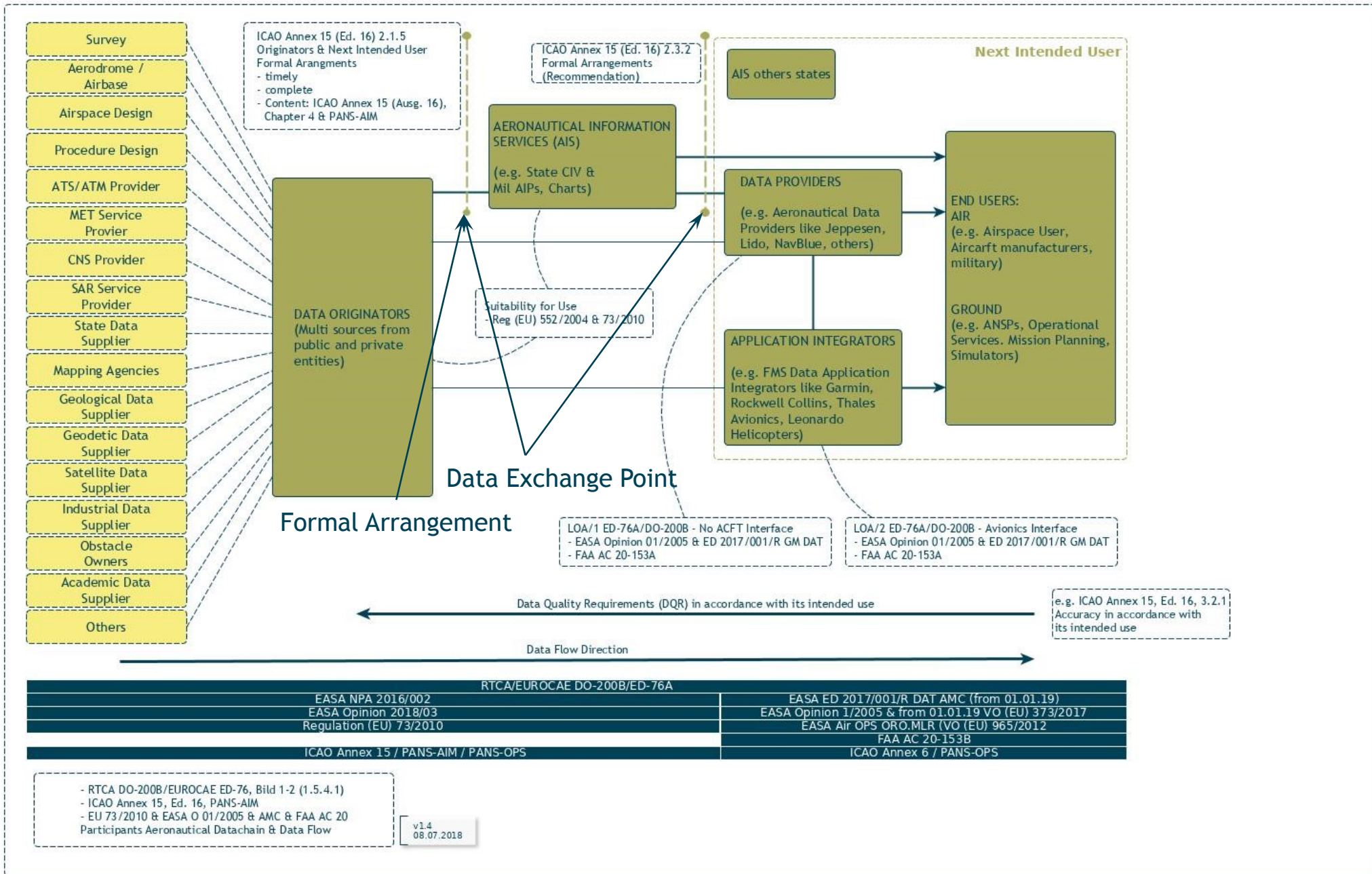
- This means, when the intended use of aeronautical data IS KNOWN, the accuracy can be higher or lower, depending on intended use.
- This brings flexibility in the system.



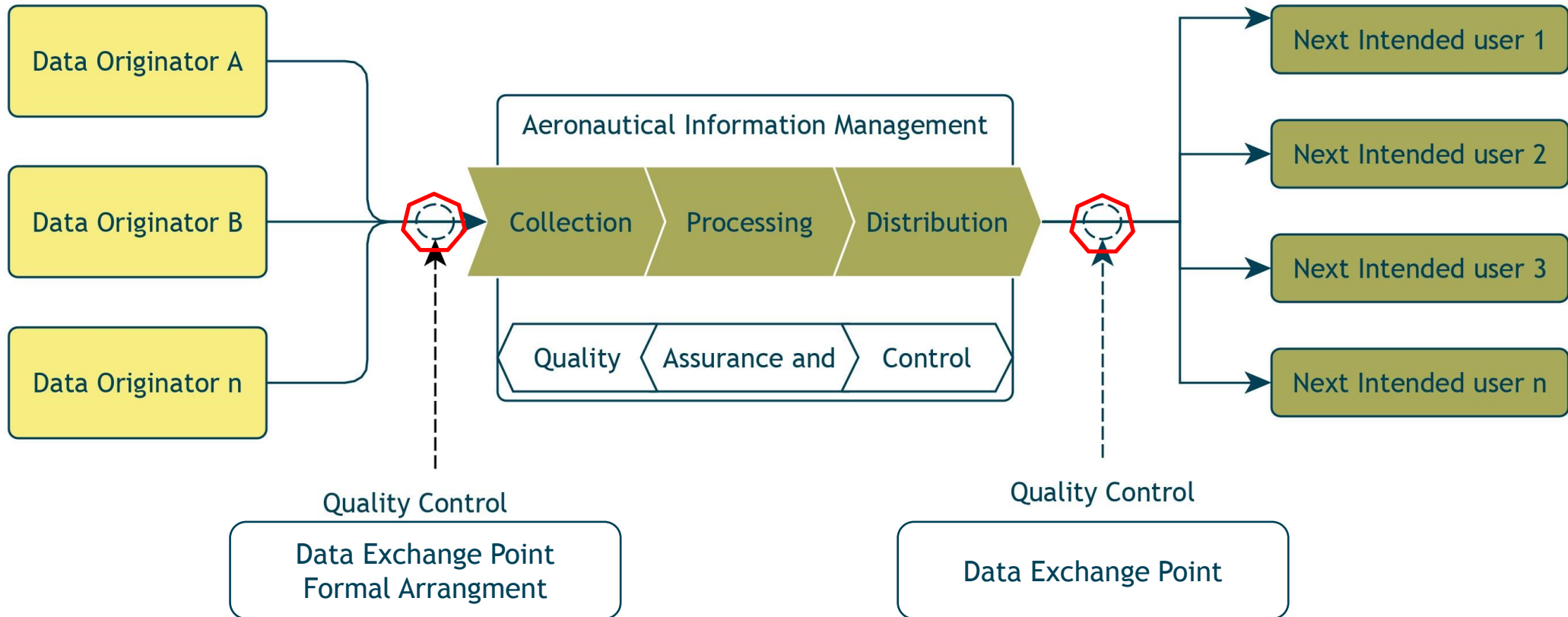
// 03 The Aeronautical Data Process

Helps maintaining the Accuracy

Focus:
Not to reduce
Accuracy at
Data Exchange
Points.



Aeronautical Information Management Process



Formal Arrangements

- **Between**
 - Originators & State AIS
 - *Also parties acting on behalf of states (recommendation)*
- **Use PANS-AIM Data Catalogue as appendix to a Formal Arrangement**
- **Minimum Content**
 - Regulatory framework
 - Data origination
 - Quality assurance
 - Metadata and quality reporting
 - Data delivery
 - Error handling

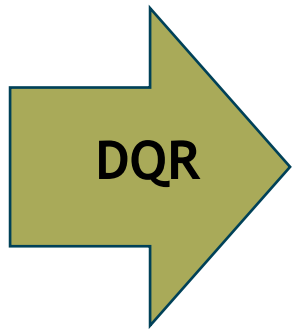


// 04 Data Catalogue

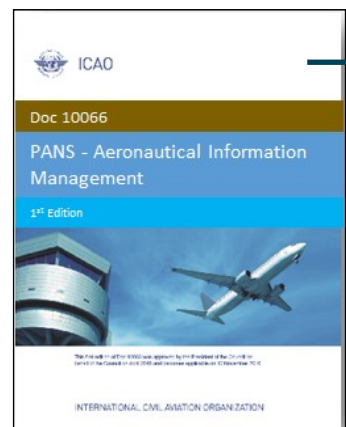
Data Quality Requirements (DQR)



Annex 4, 11, 14, 15, & PANS-OPS



PANS-AIM



Appendix 1

Doc No.	Title	Version	Effective Date	Superseded By	Superseded Date	Deleted	Deleted Date	Deleted Reason
Doc 10066	PANS - Aeronautical Information Management	1st Edition	2018-01-01					
Doc 10066	PANS - Aeronautical Information Management	1st Edition	2018-01-01	Doc 10066	2022-01-01			Superseded by Doc 10066-2

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution, integrity (or equivalent assurance level), traceability, timeliness, completeness and format.

ICAO Data Catalogue (DQR)

	Accuracy	Integrity	Orig Type	Pub. Res.	Chart Res.
	1 m	critical	surveyed	1 m or 1 ft	1 m
	1 m	essential	surveyed	1 m or 1 ft	1 m
Annex 4	1 m	critical	surveyed		
	0.25 m	critical	surveyed		
	0.5 m	essential	surveyed	1/100 sec	1 sec

Special care where needed

- Data Catalogue
 - 65 Subjects
 - 350 Properties
 - 500 Sub properties
- Not all require accuracy or have integrity requirements of “critical”, “essential” or “routine”
- Care for surveyed data
- May be re-survey when the Accuracy is **uncertain**
- Use Data Catalogue for differentiation and approach



// 05 Data Sets

Help maintaining the Accuracy

Data Sets in PANS-AIM

- Exchange between data providers and data users (*ISO 19100*)
- Based on a product specification (*ISO 19131*)
- Common encoding models (*UML, XML, GML, JSON*)
- Complemented by charts, maps & diagrams
- Metadata (*ISO 19115*)
- AIP data set
- Terrain data set
- Obstacle data set
- Aerodrome mapping data set (shall be supported by terrain & obstacle data for area 3)
- IFP data set
- Distribution
 - Different ways
 - SWIM

Data Sets Situation

- Part of ASBU DAIM Block 1
- 2019 - 2024
- Product Specifications under way in IMP WG-A FG-DDS, except DS-IFP
- Expected for AIS Manual (Doc 8126), Part IV
- EUROCONTROL works on specification for EUR (may be best practice)
 - AIP Data Set Encoding Guidelines (see EUROCONTROL website)
- FAA and others are also working on this.



// 06 Planning Aspects

Keep the big picture in mind

Source

- Annex 2, 3, 4, 5, 7, 9, 10v1, 10v2, 10v3, 10v5, 11, 12, 13, 14v1, 14v2, 15, 16v1, 16v2, 17, 18, 19
- PANS-OPS

 = Data Exchange Points

Rules

- Properties
- Parameters
- Models
- Features
- ..

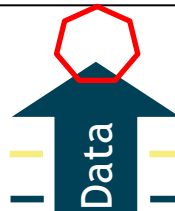
Products, Applications, Services

(y)



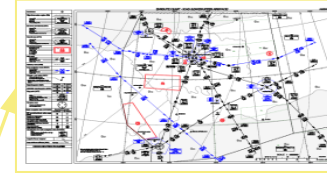
$F(x:y)$

(x)



Products

Annex 4 (Amd 61)



Paper Chart



Electronic Chart

Data Sub-sets
Tables

Data Sub-sets

Books
Text
(electronic form)

Text

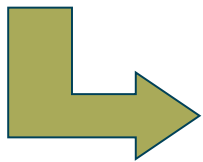
Thematic Data Sets (e.g. IFP)

Products

Next Intended User (SWIM)

Applicable
8. Nov 2018

Origination



Super Set

Data Management

Data Metadata

Annex 15 (Amd 42)
PANS-AIM
• Data catalogue

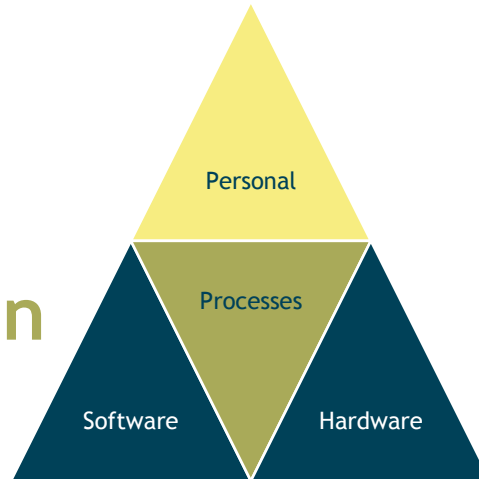
Data Sets

Next Steps (1 - 5 years)

- Still to understand information management requirements in PANS-AIM (para 2.1)

- Collection
- Processing
- Quality Control
- Distribution

- Assess impact on



- Make an implementation plan with firm dates for
 - Personal (training)
 - Processes (modelling, if not yet available)
 - Software (procurement)
 - Hardware (procurement)
- Publish the plan in AIP GEN 1.7 when knowledge of differences is important for the safety of air navigation



// 07 Question & Answers

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Happy &
smooth touch down!