



ICAO MID NCLB AIM Workshop

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Data Quality – What Has Changed?

- **Definition has expanded to include new requirements**
- **Requirements are easier to meet using digital data sets**
- **PANS AIM**
- **State importance in the data processing chain**
- **ICAO Aviation System Block Upgrades**
- **Why does it matter?**

Annex 15 – Data Quality Definition

- ***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.

Annex 15 – Data Quality

- 2.1.4 Each Contracting State **shall** ensure that the aeronautical data and aeronautical information provided are complete, timely and of required quality in accordance with 3.2

- **3.2 Data quality specifications**
 - 3.2.1 Data Accuracy
 - 3.2.2 Data Resolution
 - 3.2.3 Data Integrity
 - 3.2.4 Data **Traceability**
 - 3.2.5 Data **Timeliness**
 - 3.2.6 Data **Completeness**
 - 3.2.7 Data **Format**

Annex 15 – Data Accuracy

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

- **3.2.1 Data Accuracy**
- The order of accuracy for aeronautical data **shall** be in accordance with its intended use.
- *Note.— Specifications concerning the order of accuracy (including confidence level) for aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.*

Annex 15 – Data Resolution

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

- **3.2.2 Data Resolution**
- The order of resolution of aeronautical data **shall** be commensurate with the actual data accuracy.
- *Note 1.— Specifications concerning the resolution of aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.*
- *Note 2.— The resolution of the data contained in the database may be the same or finer than the publication resolution.*

Annex 15 – Data Integrity

- ***Data integrity (assurance level)***. A degree of assurance that aeronautical data and its value has not been lost or altered since the origination or authorized amendment.

- **3.2.3 Data Integrity**
- 3.2.3.1 The integrity of aeronautical data **shall** be maintained throughout the data process from origination to distribution to the next intended user.
- *Note.— Specifications concerning the integrity classification related to aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1*

Annex 15 – Data Traceability

- **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.
- **3.2.4 Data Traceability**
 - 3.2.4.1 Traceability of aeronautical data **shall** be ensured and retained as long as the data is in use.
- **5.3 Digital Data Sets**
 - 5.3.1.2 Each data set **shall** be provided to the next intended user together with a minimum set of metadata that ensures data traceability from the end-user to the originator.

Annex 15 – Data Timeliness

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

- **3.2.5 Data Timeliness**
- 3.2.5.1 Timeliness **shall** be ensured by including limits on the effective period of the data elements.

Note 1.— These limits may be associated with individual data elements or data sets.

Annex 15 – Data Completeness

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

- **3.2.6 Data Completeness**
- 3.2.6.1 Completeness of the aeronautical data **shall** be ensured in order to support the intended use.

Annex 15 – Data Format

- ***Data format.*** A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

- **3.2 Data Format**
- 3.2.7.1 The format of delivered data **shall** be adequate to ensure that the data is interpreted in a manner that is consistent with its intended use.

Annex 15 – Use of Automation

- Annex 15, **Edition 15**
- 3.6.1 Automation **shall** be **introduced with the objective of improving** the timeliness, quality, efficiency and cost effectiveness of aeronautical information services.

- Annex 15, **Edition 16**
- 3.5.1 Automation **shall** be **applied in order to ensure** the timeliness, quality, efficiency and cost-effectiveness of aeronautical information services.

Annex 15 – Data Set Updates

- **6.3.3 Data set updates**
- 6.3.3.2 Permanent changes and temporary changes of long duration (three months or longer) made available as digital data **shall** be issued in the form of a complete data set or a sub-set that includes only the differences from the previously issued complete data set.
- 6.3.3.3 **Recommendation.** – When made available as a completely re-issued data set, the differences from the previously issued complete data set **should** be indicated.

PANS AIM – Appendix 1 Specs

- **2.1 Information management requirements**
- 2.1.1.6 Appendix 1 shall be considered as a reference for aeronautical data and aeronautical information origination and publication requirements.
- *Note 1.— Appendix 1 presents the scope of data and information that can be collected and maintained by the AIS.*
- *Note 2.— Appendix 1 provides a common language that can be used by data originators and the AIS.*
- *Note 1.— Appendix 1 contains aeronautical data attributes, metadata, and accuracy requirements.*

PANS AIM – Quality Control

- 2.1.3. Quality control
- 2.1.3.2 When the same data is duplicated in different Aeronautical Information Products, coherency checks **should** be undertaken.

PANS AIM – QMS

- **3.1 Quality management system**
- 3.1.3 In the framework of the quality management system, a user feedback system **shall** be defined and implemented.
- *Note 3.— Formal arrangements concerning data quality between originator and distributor and between distributor and next intended user **may** be used to manage the aeronautical information data chain.*

PANS AIM – Data Origination

- 4.1 Data Origination Requirements
 - 4.1.1 Data **shall** be collected and transmitted to the AIS in accordance with the accuracy requirements and integrity classification specified in Appendix 1.

PANS AIM – Metadata

- **4.2 Metadata Requirements**
- 4.2.1 The metadata to be collected **shall** include, as a minimum:
 - a) the name of the organizations or entities performing any action of originating, transmitting or manipulating the data;
 - b) the action performed; and
 - c) the date and time the action was performed.

PANS AIM – Paper vs Data Set

- **5.2.1 Aeronautical Information Publication (AIP)**
- 5.2.1.1.3 When the AIP Data Set (as specified in 5.3.3.1) is provided, the following sections of the AIP **may** be left blank and a reference to the data set availability **shall** be provided:
- 5.2.1.1.4 When the Obstacle Data Set (as specified in 5.3.3.2.2) is provided, the following sections of the AIP **may** be left blank and a reference to the data set availability **shall** be provided:

PANS AIM – Printed AIP Changes

- **5.2.3.1 Printed AIP**
- 5.2.3.1.5 New or revised information **shall** be identified by an annotation against it in the margin. A thick black vertical line or, where the change incorporated covers one line only or a part of a line, a thick black horizontal arrow, is sufficient to identify the change.

PANS AIM – eAIP Changes

- **5.2.4 Electronic AIP (eAIP)**
- 5.2.4.2 New or revised information **shall** be identified either by an annotation against it in the margin or by a mechanism that allows comparing the new/revised information with the previous one.

PANS AIM – Digital Data Exchange

- **5.3 Digital Data**
- 5.3.1.1 The ISO 19100 series of standards for geographic information **shall** be used as a reference framework.
- *Note.— This is intended to facilitate and support the use and exchange of digital data sets between data providers and data users.*
- 5.3.1.5 The aeronautical data exchange model used **should**:
- *Note 1.— The intent of using a commonly used data encoding format is to ensure interoperability of aeronautical data exchange between agencies and organizations involved in the data processing chain.*

PANS AIM – Data Set Duplicates

- **5.3.3 Data sets**
- *Note.— A data subject may appear in multiple data sets.*

PANS AIM – Data Set Distribution

- **5.4 Distribution Services**
- *Note.— Further guidance on digital data set distribution can be found in the Manual on System Wide Information Management (SWIM) Concept (Doc 10039).*

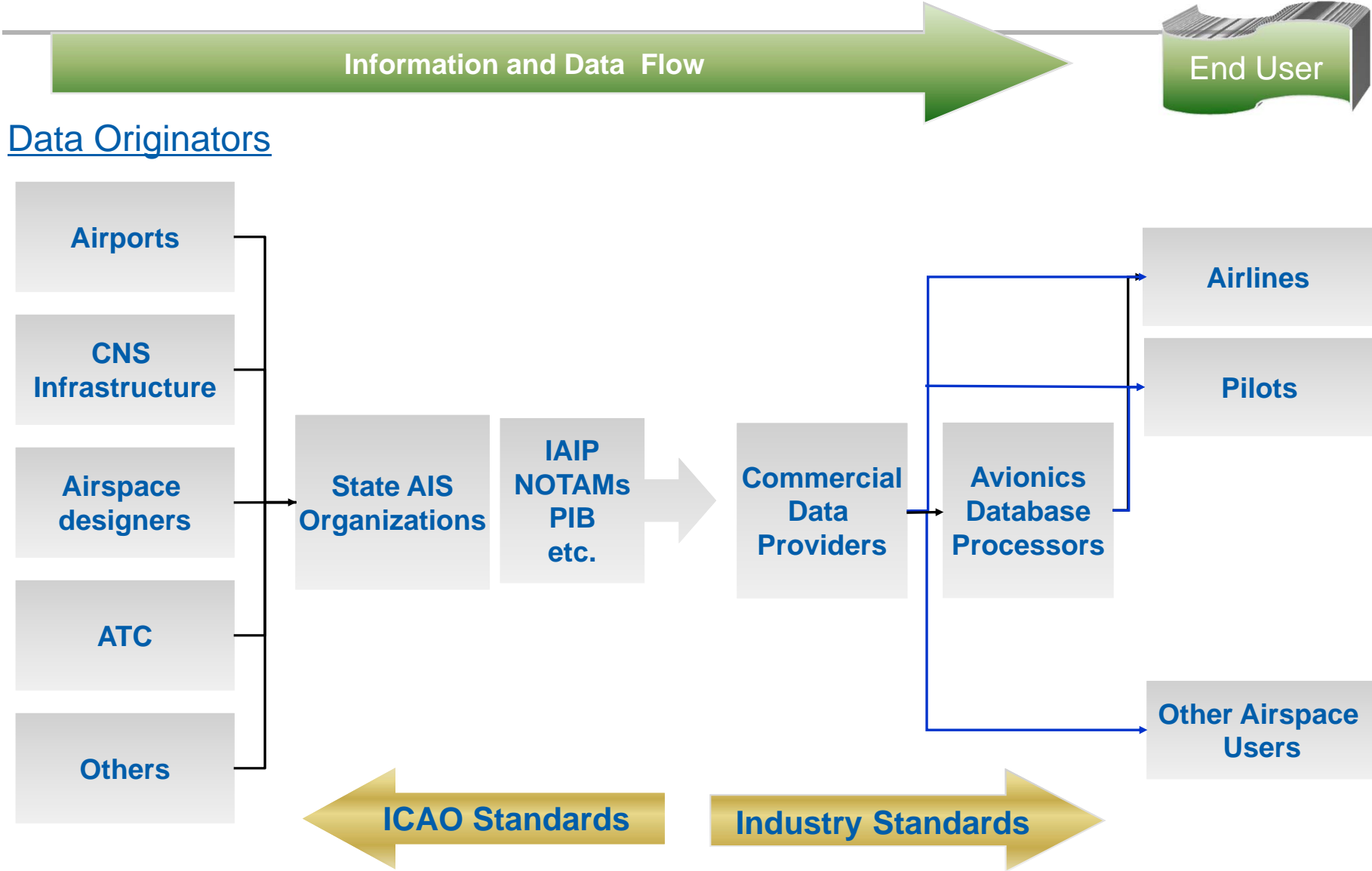
PANS AIM – Data Set Update Cycle

- **6.1 Aeronautical Information Product updates**
- 6.1.1 The same update cycle **shall** be applied to the AIP Amendments, the AIP data set and the Instrument Flight Procedures data set in order to ensure the coherence of the data items that appear in multiple Aeronautical Information Products.

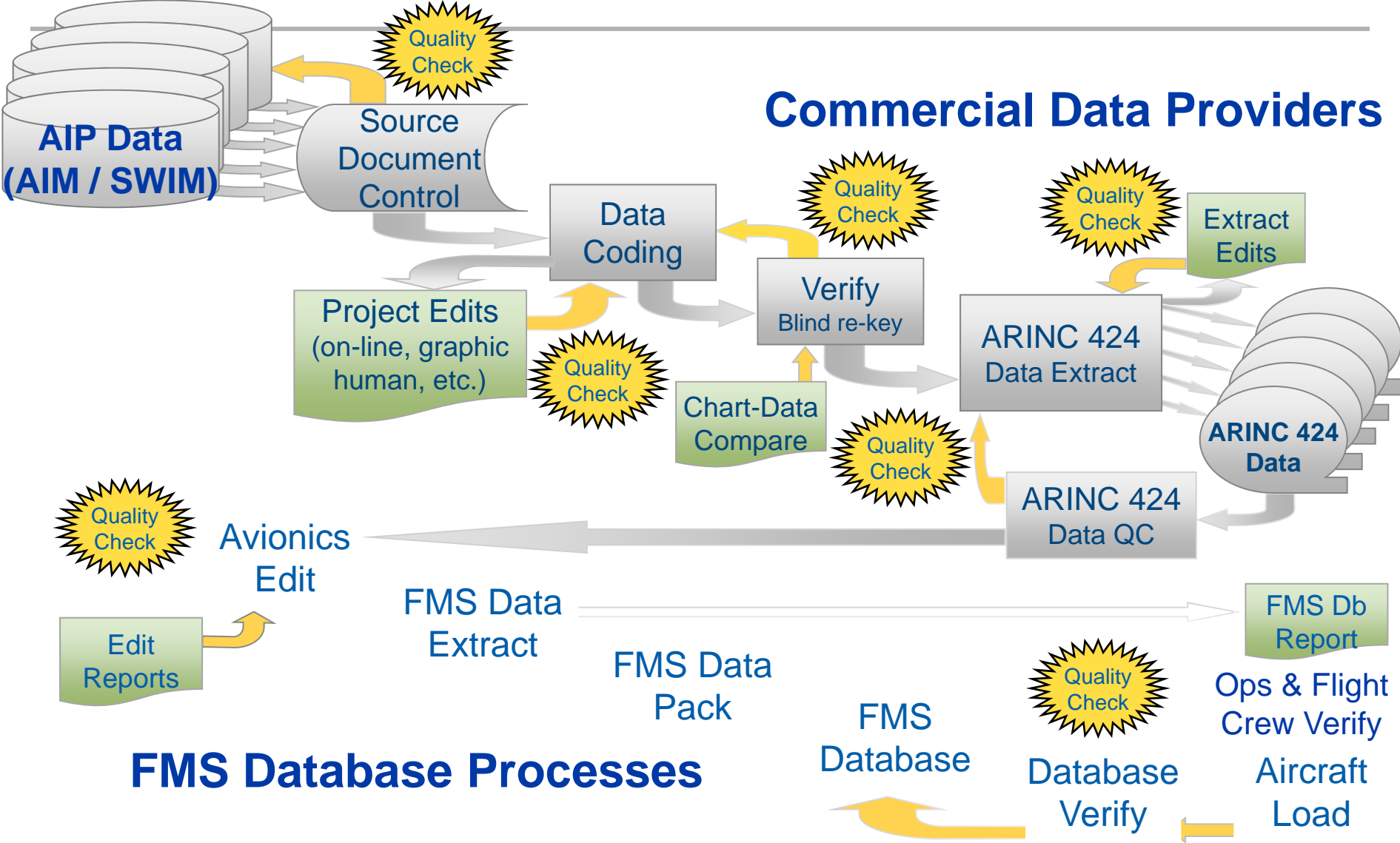
PANS AIM – Digital Data Updates

- **6.1.5 Specifications for digital data updates**
- 6.1.5.1 The update interval for the AIP data set and Instrument Flight Procedures data sets **shall** be specified in data product specification.
- 6.1.5.2 Data sets that have been made available in advance (according to the AIRAC cycle) **shall** be updated with the non-AIRAC changes that occurred in between the publication and the effective date.

Aeronautical Data Supply Chain

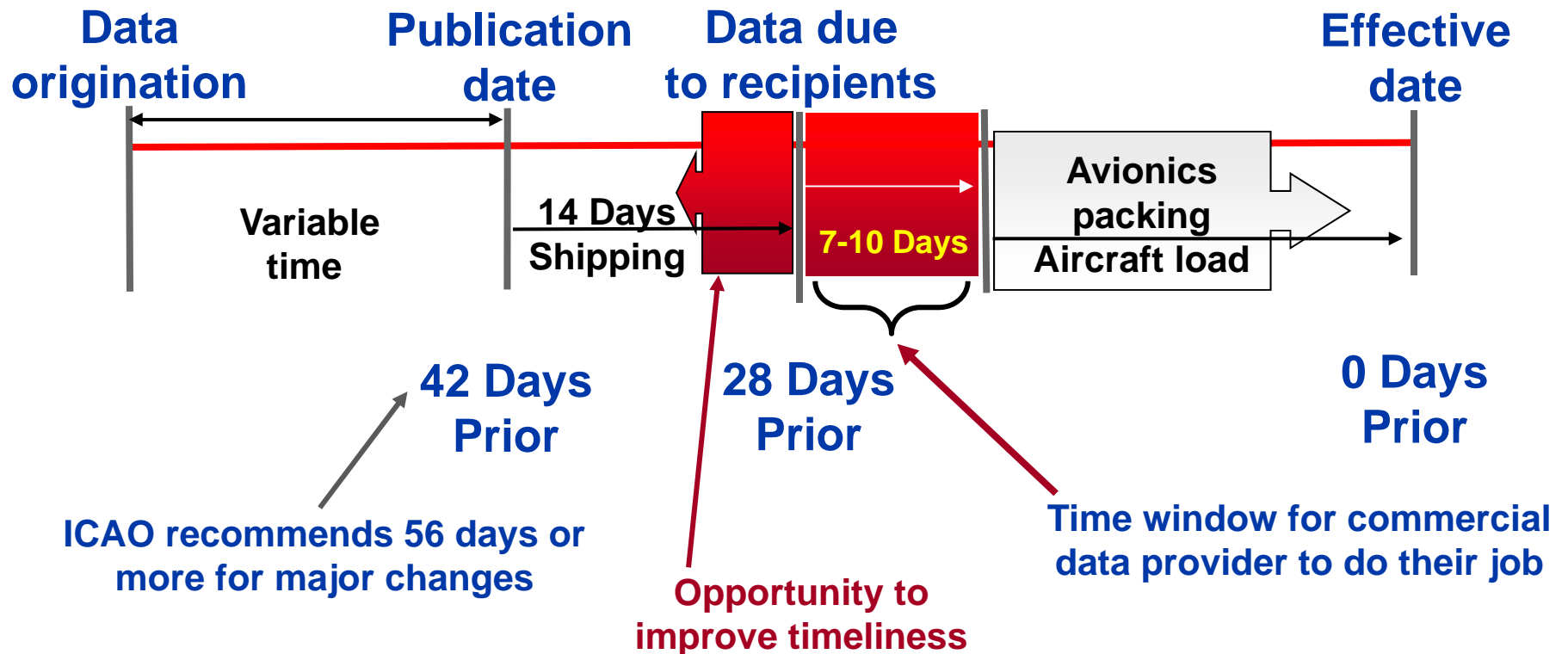


Aeronautical Data Process

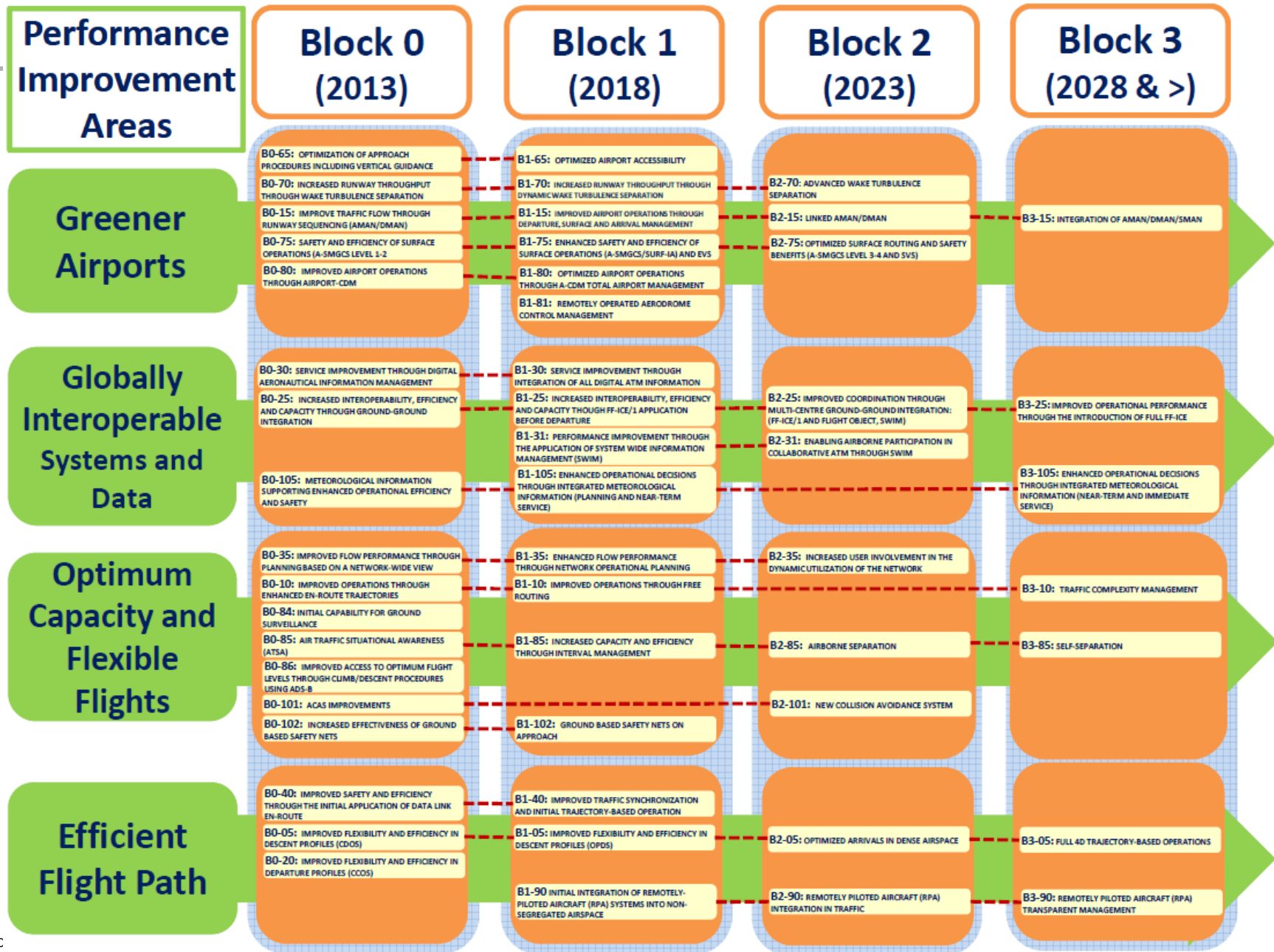


Timeline for Data Processing

Aeronautical Information Regulation and Control (AIRAC) Cycle




ICAO Aviation System Block Upgrades (ASBUs)




ICAO ASBU Performance Improvement Area (PIA) Aeronautical Information

Block 0 – 2013

	B0-30	Globally Interoperable Systems and Data	Service Improvement through Digital Aeronautical Information Management	The initial introduction of digital processing and management of information, through aeronautical information service (AIS)/aeronautical information management (AIM) implementation, use of aeronautical information exchange model (AIXM), migration to electronic aeronautical information publication (AIP) and better quality and availability of data.
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Block 1 – 2018

	B1-31	Globally Interoperable Systems and Data	Performance Improvement through the application of System-Wide Information Management (SWIM)	Implementation of system-wide information management (SWIM) services (applications and infrastructure) creating the aviation intranet based on standard data models, and internet-based protocols to maximize interoperability.
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Aeronautical Data Quality Matters

- Aircraft are becoming database driven and their operation requires access to aeronautical information of a significantly higher quality than is currently available.
- The role and importance of aeronautical information changed significantly with the implementation of RNAV, RNP and more precise airborne computer systems.
- Efforts of States should be aimed at improving their AIM systems to assure that aeronautical data will be available in the right quality, the right form and at the right time.
- Aeronautical data of insufficient quality may compromise the safety of air traffic operations, which can lead to an airspace user hazard resulting in an incident or accident.