





# ADQ Implementation Workshop – Event Book

## Part 1

### 1. General

EUROCONTROL had been invited by Air Navigation Services of the Czech Republic (ANS CR) to facilitate the 3<sup>rd</sup> INEA Aeronautical Data Quality (ADQ) Implementation Workshop which was held 4-6 September 2018 at ANS CR Headquarters (IATCC), Jeneč.

The main aim behind this EU co-funded approach was to increase the stakeholder outreach in order to ensure consistent understanding and application of the regulatory provisions concerning the Commission Regulation (EU) No 73/2010<sup>1</sup>, called in short ADQ.

The objectives of the workshop (WS) were to:

- Facilitate a common understanding of Regulation (EU) 73/2010 by addressing identified implementation challenges
- Outline main differences between current ADQ requirements and upcoming changes, based on draft EASA Regulation 2017/373 (Part-AIS) including consequential changes to ADR Regulation 139/2014.

The workshop was facilitated by Mr. Manfred Unterreiner (Eurocontrol, DECMA/ACS/STAN) with the support of Mr. Rudolf Schneeberger (ITV), Mr. Wolfgang Scheucher (Solitec) and Mr. Alexandre Petrovsky (Eurocontrol DECMA/RTD/DAI). The organiser interface was Mr. Radek Hodač, Quality Manager (ANS/AIM).

The program can be found in [Annex A](#), for list of participants see [Annex B](#).

### 2. CZ's main current concerns/issues ref. ADQ implementation

#### 2.1 General

The current situation in the Czech Republic regarding the implementation of the ADQ IR is promising, however, there is still a lack of a consistent approach amongst all regulated parties which leads to misunderstandings in implementation. This causes reluctance to adjust processes, procedures or systems and generates uncertainty in implementation. Compliance with the ADQ IR is quite complex and demanding since the number of regulated parties is substantial. Most parties who are affected by the regulation do not have the opportunity to attend international workshops, courses or meetings at EUROCONTROL.

Therefore, such kind of on-site event offers all involved Czech parties a unique opportunity to obtain the right information to achieve consistent insight and understanding of the ADQ requirements. Furthermore, such workshop allows sharing good practices and examples on how other parties/states address implementation challenges.

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<sup>1</sup> as amended by Commission Implementing Regulation (EU) No 1029/2014



## 2.2 Data Origination

Data originators are key players in the data supply chain. The awareness of these specialists/experts about ADQ is very low. Main issues are Data Origination Requirements, Validation and Verification or different global Coordinate Systems. Furthermore, also other parties should become aware of the main data origination requirements to be able to assist and to interact with their suppliers/originators.

## 2.3. Data set and Data exchange

Dataset and Data exchange format are crucial parts for ensuring the quality of the data and information. All involved parties should be aware of those requirements. However, the current situation is not as consistent as it should be.

Data Originators lack especially process knowledge and a number of them, particularly private companies, have limited resources and their core business is driven by different types of services (e.g. aerodromes) or their main business rests mostly outside the aviation domain (e.g. surveyors).

The ADQ requirements incl. supporting material are therefore not easy to be applied and it is difficult to motivate those parties to comply with ADQ. The main challenges in this context are: quality processes, compliance with data quality requirements and the provision of digital data.

The new EASA regulation will bring more changes such as the Aeronautical Data Catalogue or digital data set requirements. Some of the involved parties are already familiarised with the main changes, but most Data Originators have never heard about these requirements.

## 2.4 Differences between ADQ and the upcoming EASA rules.

There is a need for consistent awareness of the main differences between ADQ and the new EASA Regulation 2017/373 (Part AIS) complemented by the most recent changes stemming from ICAO Annex 15 and the new PANS-AIM.

## 2.5 Metadata

The subject of metadata appeared many years ago with the development of the ADQ IR. Since then many discussions at national and international level led to quite different implementation views. Not all regulated parties are aware of the common understandings stemming from the ADQ Working Groups and consistent awareness would greatly help all parties.

## 2.6 Terrain & Obstacle Data

The current status of the national policy related to TOD in the Czech Republic is not sufficiently progressed. The status in Europe based on ESSIP and some practical examples from other States are considered beneficial since this would help finalising the national TOD policy.

## 2.7 Formal Arrangements



Formal Arrangements are a fundamental tool for ADQ enabling discussion, definition and mutual agreement for the exchange of required data and information. An introduction of the Template and explanation of the underlying process would help regulated parties to remove a “perceived mystery” behind them and enable to apply those critical elements.

## 2.8 Specific side-outcome of this workshop

As a side outcome of this workshop, the State authorities of the Czech Republic agreed to organise an ADQ interdepartmental meeting within the next six months, for all relevant national stakeholders to ensure widest subject awareness and to increase consistent implementation of the regulatory provisions.

Note: All of the above items have been driving the construction of the workshop programme.

## 3. Main Points in Overview

Attendance covered overall 44 participants, most being Data Originators which are currently considered to be on the “critical path” to achieve compliance with ADQ provisions. Representatives (*Annex B*) came from across CR: Ministry of Transport, CAA, ANS CR (AIM and Procedure Design), numerous representatives from aerodromes and Industry representing also survey, procedure design and geodetic expertise.

Key focus was on ADQ by recalling the underlying needs and drivers, to ensure consistent understanding of the key provisions with particular focus on Data Origination and (digital) Data Exchange/Datasets.

The WS highlighted good practices and examples on how other states address some of the key issues. A wide selection of available means like Eurocontrol Specifications and Guidance were put into perspective. It was fully recognised that Formal Arrangements are on the critical path to achieve compliance since they address essential interfaces ranging from common understanding over specific DQRs up to data exchange. The existence of FA will tremendously help to unlock a number of procedural, operational and technical issues.

Outlining the overall European progress based on “European ATM Masterplan Level 3 Report 2017” and comparing it with the current status achieved in Czech Republic acted as reality check.

Recognising that ADQ is entering into a transition stage towards new EASA rules being at Opinion level, this workshop applied an innovative methodology, namely to contrast existing ADQ provisions with the new draft EASA Part-AIS rules (incl. relevant AMC/GM) including consequential changes to the Aerodrome Regulation (139/2014). This approach, being even more demanding than addressing just one rule in isolation, was highly appreciated by the participants since it allowed first-hand awareness on the next stages to come.

It became particularly clear to the participants that “an optimum level” of ADQ compliance would provide a much better starting point for the implementation of future EASA rules which will ultimately result in certification with a more stringent oversight role by the relevant authorities.



The presentations, discussions and interactions, particularly the quiz, were most appreciated by all participants and workshop unanimously commended the excellent level of information exchange and thanked Eurocontrol and ANS CR for their huge effort to provide this workshop.

## 4. Focus topic Data Origination

Data Origination was focus topic and the following highlights most essential points discussed and provides generic recommendations for consideration.

A topic summary is provided at [Annex C](#).

### 4.1. Resolution

EASA Opinion 02/2018, Annex I defines data resolution as “a number of units or digits to which a measured or calculated value is expressed and used”. The requirement for data resolution is further addressed in Annex VI Part-AIS:

*AIS.TR.200 General (b) The resolution of aeronautical data shall be commensurate with the actual data accuracy.*

The publication and chart resolution for geographical position data (latitude and longitude) as defined in the data catalogue and the harmonised list are applicable to coordinates formatted in degrees, minutes, seconds.

When a different format is used (such as degrees with decimals for digital data sets) and when the data is stored in a database or when the location is significantly further to the North/South, the resolution needs to be commensurate with the accuracy requirements.

Stating that resolution needs to be commensurate with the accuracy means that digital data needs to have sufficient resolution to maintain accuracy. Typically, if an accuracy of .1 units is needed, then a resolution of 0.01 or .001 units would enable a data chain to preserve the accuracy without issue (GM1 AIS.TR.200(b) General).

*Recommendation #1: Data having a better accuracy than specified in the data catalogue can also be published in the AIP or on charts with a higher resolution. However, as the user often interprets the resolution with accuracy, it is important that the publication resolution doesn't exceed the actual accuracy.*

*On the other hand, the resolution in the database and for a digital data set should always be higher than the value derived from the accuracy. The actual accuracy of the data (geographical position, elevation, distance etc.) should be encoded as an attribute of the feature or in the metadata.*

### 4.2. Coordinate reference system

ICAO SARPS and European law (73/2010 as well as draft rules of EASA Opinion 02/2018) require geographic aeronautical data and information to be provided with reference to WGS-84 and mean sea level based on the EGM-96 gravity model. WGS-84 specifies the reference ellipsoid and an abstract coordinate system that needs to be realised (i.e. fixed by a set of reference points which uniquely locate and orient the coordinate system). There are different realisations in use: ITRF and ETRF.



ITRF, the International Terrestrial Reference Frame, is a world fixed realisation and can be considered identical to WGS-84 realisations whereas ETRF, the European Terrestrial Reference Frame, is a realisation fixed to the Eurasian tectonic plate. As the Eurasian tectonic plate is moving 2-3 cm per year to the North-East, the ITRF or WGS-84 coordinates of points in Europe (e.g. Threshold points) change by 2-3 cm per year compared to ETRF coordinates which do not change over time. Therefore, we recognise today a difference of approx. 50 cm between coordinates referenced to ETRF89 versus WGS-84/ITRF2008.

*Recommendation #2: Coordinates should be properly transformed to ITRF2008 (equivalent to the latest realisation of WGS-84(G1762)) before publication in the AIP or provision in data sets. Information about the transformation should be added to the metadata.*

## 5. Focus topic Data Exchange/Dataset/Metadata

Data Exchange/Dataset/Metadata were second focus topic and the following highlights most essential points discussed and provides generic recommendations for consideration.

A topic summary is provided at [Annex D](#).

### 5.1 Data Exchange Format for Terrain Data Sets

Regulation 73/2010 (ADQ) provides strict requirements regarding the exchange format for terrain data (see *Annex II, Part B, Point 1*). Basically, it requires that the exchange format complies with several standards of the ISO 19100 series.

As currently none of the commonly used formats for terrain data satisfy all the requirements defined in these ISO standards, the ADQ Regulators Working Group (ARWG) issued a corresponding Common Understanding (*CU 04/2010*) which acknowledges this situation. CU 04/2010 recommends using data exchange formats which are commonly accepted and applied by industry and end users.

EASA Opinion 02/2018 adopts the appraisal made in the CU providing corresponding GM (see *GM1 AIS.OR.210(a)*).

*Recommendation #3: Following CU 08/2010 and EASA Opinion 02/2018, GeoTIFF with Metadata is the recommended exchange format for terrain data. This format is reported by the end users as the preferred one. However, also other state of the art exchange formats such as shape files are considered adequate for terrain data, depending on the specific needs of the parties involved in the exchange process.*

*Note: None of the current AIXM versions can be used for the exchange of terrain data since AIXM was not designed for that purpose.*

### 5.2. Usage of AIXM 5.1 for Data Exchange

Misconception may exist that Regulation 73/2010 (ADQ) explicitly requires AIXM 5.1 for data exchange, whereas the draft regulation on Part AIS covered in EASA Opinion 02/2018 does not. Fact is that Regulation 73/2010 (ADQ) does not use the term AIXM at all. 73/2010 lays down strict requirements for ANSPs regarding data exchange (Article 5, point 2 & 4(c) and Annex II, Part A). One of them requires that the exchange format used for geographical





information shall comply with GML (Geography Mark-up Language). AIXM 5.1 is based on GML and hence considered as acceptable means of compliance. Older AIXM versions such as AIXM 4.5 are not GML based and have their own proprietary format. However, this does not prevent to use another format that fulfils all the requirements for data exchange including the one for GML.

Reference: EUROCONTROL AIX specification and the “EUROCONTROL Guidelines - Use of AIXM 5.1 in relation to the AIX Specification” in the argumentation of AIXM 5.1’s compliance with ADQ.

EASA Opinion 02/2018 explicitly mentions that the AIS provider shall use a format for aeronautical data which is based on an aeronautical information exchange model designed to be globally interoperable (AIS.OR.210). At AMC level the AIXM is explicitly named as such an aeronautical information exchange model (AMC1 AIS.OR.210(a)). Finally, a GM explicitly acknowledges AIXM version 5.1. as the minimum baseline for the exchange of aeronautical data and aeronautical information (GM1 AIS.OR.210(a)). Furthermore, Opinion 02/2018 contains additional requirements and AMCs for the exchange format that is not fully covered by older AIXM versions, for example Meta data, temporality, extensibility, etc. (AIS.TR.210 and AMC&GM AIS.TR.210).

*Recommendation #4: Following Regulation 73/2010 and EASA Opinion 02/2018, AIXM 5.1 is considered an acceptable means of compliance for the data exchange format requirements defined in both documents.*

*Even if an earlier AIXM version might be acceptable as data exchange format according to the upcoming regulation, the following main opportunities of AIXM 5.1 and the risks coming along by using an older AIXM version shall be considered:*

- *The European AIS Data Base (EAD) with Release R12 will be fully AIXM 5.1 compliant. Once AIXM 5.1 is upgraded to the next version, the version 4.5 will very likely not be supported anymore. In any case, a successor of EAD, such as the eEAD, will make use of the latest AIXM version.*
- *Older AIXM versions may not be supported (anymore) by industry solutions.*
- *The majority of ANSPs and other stakeholders in the aeronautical data chain including main downstream parties are aiming at AIXM 5.1.*
- *If system decisions are due to be taken now they should select AIXM 5.1. Due to the essential differences in the design concepts a later move from AIXM 4.5. to 5.1 is much more complex and costlier (e.g. system upgrades, process updates, migration, certification, audits, etc.) than between the subversions of AIXM 5, as only the latter guarantees full forward and backward compatibility.*
- *Older AIXM versions do not support the latest design concepts (e.g. UML) and coding capabilities introduced by version 5.1 for meta data, temporality, extensibility, digital NOTAM, airport mapping data, PBN, obstacle geometries, annotations, NIL reasons, etc. Some of these concepts such as UML, meta data and temporality are also stipulated by Opinion 02/2018.*
- *Supporting material such as coding guidelines for (ICAO) Digital Data Sets are only provided for AIXM 5 but not the previous versions.*



## 6. Further Recommendations derived from Discussions

Following main point was raised as recommendation for consideration:

### 6.1. National TOD policy

The development of the national TOD policy defining clear roles and responsibility of all TOD stakeholders is the cornerstone of the successful implementation of the TOD requirements.

*Recommendation #5: The State regulator is strongly recommended to initiate the development of the Czech TOD policy in close coordination with the ANSP, relevant AD operators and National Geodetic Agency.*

### 6.2. Transition to new EASA rules

It was highlighted that recent statements by EASA and Commission representatives indicated, that even if ADQ will be repealed in the future, that continued focus with top priority on implementing ADQ is an unchanged requirement for all regulated parties. It is of utmost importance to understand that an optimum implementation of ADQ will be the best starting point for new the EASA rule AIS/AIM Providers which would bring stringent transition arrangements and tightened oversight.

*Recommendation #6: Management at all levels should allocate top priority to ADQ implementation and commit that the required resources are made available.*

## 7. Presentation content

The event presentations will be provided as part of ADQ WS#3 Book - Part 2.

## 8. Overall Workshop Conclusions

ANS CR and all Participants highly appreciated the outcome of this WS. The following main points were jointly highlighted:

- Workshop Objectives have clearly been met
- Multi stakeholder attendance covering essential regulated parties helped greatly
- Enabled good interactions and discussions amongst participants
- Achieved enhanced common understanding on drivers and needs behind ADQ
- Shared the ADQ Implementation progress noting key achievements
- Took very close look at Data Origination, Data Exchange and TOD requirements
- Shared some good practices & examples from other states
- Outlined a range of MoC/GM that are currently available
- With ADQ still being the legal baseline, explained upcoming EASA Part AIS (Op. 02/18)
- Agreed that continuous effort/interaction is required by all regulated parties





- Emphasised that an optimum level of ADQ compliance will be basis for future Certification considering a potentially demanding/short transition phase
- Confirmed that Management support is essential to ensure priorities are correctly established with regards to key drivers like Safety, Capacity, Quality, Interoperability, User expectations etc.

## 9. Deliverable

The Event Book will be published in two parts:

- Part 1: written report providing an overview on the main implementation issues, key topics discussed including recommendations and a summary of the outcome.
- Part 2: All slides presented to be shared with participants via the host.



## Annex A - Program

# Aeronautical Data Quality - Implementation Workshop ANS CR

Venue: ANS CR, Headquarters, Conference room  
04-06 September 2018

Programme Ed. 1.2

### Day 1, Tuesday 4 Sep 2018

Time	Duration	Topic	Speaker
13:00	10min	Welcome	Jan Klas, General Director, ANS CR
13:10	20	Introduction: Objectives, Program	Eurocontrol, Manfred Unterreiner (MJU)
13:30	60	Data quality drivers and latest developments <ul style="list-style-type: none"> <li>Why is Data Quality important?</li> <li>Global and regional aspects</li> </ul>	Eurocontrol, MJU
14:30	25	Break	
14:55	65	ADQ key provisions and means – overview	Eurocontrol, MJU
16:00	30	ADQ status based on ESSIP / LSSIP <ul style="list-style-type: none"> <li>European view</li> <li>LSSIP status in CR</li> </ul>	Eurocontrol, MJU CAA, Lukas Vaněk
16:30	30	Main conceptual differences between ADQ and the new EASA Part-AIS incl. consequential amendments to 139/2014 (ADR Regulation)	Eurocontrol, MJU
17:00		Closing day 1	

### Day 2, Wednesday 5 Sep 2018

Time	Duration	Topic	Speaker
09:00	5min	Introduction	Eurocontrol, MJU
09:05	145	Data Origination <ul style="list-style-type: none"> <li>Data Scope</li> <li>Request for Data Origination</li> <li>Data Origination Requirements</li> <li>Validation and Verification</li> <li>Other data originators (survey, procedure design etc.)</li> </ul> <p><i>Note 25 min break ca. 10h30</i></p>	ITV, Rudolf Schneeberger (RS) <i>on behalf of Eurocontrol</i>
11:30	45	Q & A on Data Origination	Participants
12:15	60	Lunch	
13:15	60	Data exchange <ul style="list-style-type: none"> <li>Differences ADQ vs. Part-AIS &amp; ADR Reg.</li> </ul>	Solitec, Wolfgang Scheucher (WS)



		<ul style="list-style-type: none"> <li>Main Requirements</li> </ul>	<i>on behalf of Eurocontrol</i>
14:15	40	Data-set: <ul style="list-style-type: none"> <li>Part I - Aeronautical Data Catalogue</li> </ul>	Solitec, WS
14:55	25	Break	
15:20	60	Data-set: <ul style="list-style-type: none"> <li>Part II - Digital Data Sets</li> </ul>	Solitec, WS
16:20	30	Metadata <ul style="list-style-type: none"> <li>Differences ADQ vs. Part-AIS &amp; ADR Reg.</li> <li>Main Requirements</li> </ul>	Solitec, WS
16:50	10	Q & A	Participants
17:00		Closing day 2	

### Day 3, Thursday 6 Sep 2018

Time	Duration	Topic	Speaker
09:00	5min	Introduction	Eurocontrol, MJU
09:05	115	Terrain & Obstacle Data <ul style="list-style-type: none"> <li>Requirements</li> <li>Status in Europe based on ESSIP</li> <li>TOD Policy</li> <li>Q &amp; A</li> </ul>	Eurocontrol, Alexandre Petrovsky (APE)
11:00	25	Break	
11:25	35	Formal Arrangements <ul style="list-style-type: none"> <li>Reminder on needs, process and practices</li> </ul>	Eurocontrol, MJU
12:00	30	Event evaluation (round table) WS Summary	Eurocontrol, MJU
12:30	30	Closing remarks	ANS CR
13:00		Closing of WS	



## Annex B – Attendance

External participants					
No.	Name	Surname	Name of subject	Type of subject	Position
1	Lukáš	Vaněk	CAA	CAA	Inspector
2	Lukáš	Kolín	CAA	CAA	Inspector
3	Martin	Vyhnal	AERO Vodochody Aerospace	Vodochody Airport (LKVO)	OPS Manager
4	Martin	Kačur	Letiště Vodochody, a.s.	Vodochody Airport (LKVO)	Gen. Director
5	Daniel	Nogol	Letiště Ostrava, a.s.	Ostrava Airport (LKMT)	Head of IT section
6	Jan	Vachek	TOWER VL s.r.o.	Aviation Consultancy Company	Director
7	Marie	Koukalová	TOWER VL s.r.o.	Aviation Consultancy Company	Quality Specialist
8	Petr	Navrátil	TOPGIS Brno	Surveying company	Sales Director
9	Martin	Krejčík	Geodézie-TOPOS Dobruška	Surveying company	Survey Manager
10	Ondřej	Veverka	Geodézie-TOPOS Dobruška	Surveying company	Data Processing Manager
11	Václav	Mišák	Geodézie-TOPOS Dobruška	Surveying company	Director
12	Vladislav	Vaniček	OCL MD	Ministry of Transport	Head of Aerodrome Infrastructure Division
13	Tereza	Topková	OCL MD	Ministry of Transport	Division of Air Operation Technology and Development office
14	Tomáš	Ptáček	VTÚ, s.p.	Military Technical Institute	Researcher
15	Roman	Janeček	Letiště Praha	Prague Airport (LKPR)	Survey Manager
16	Miroslav	Špák	Letiště Praha	Prague Airport (LKPR)	Airport Engineer
17	Aleš	Charvát	Letiště Brno, a.s.	Brno Airport (LKTB)	Airport Operations Manager
18	Pavel	Možný	Letiště Brno, a.s.	Brno Airport (LKTB)	IT Manager
19	Petr	Dulava	Letiště Karlovy Vary	Karlovy Vary Airport (LKKV)	SQM Manager
20	Tereza	Zahradníková	EAST Bohemia Airport, a.s.	Pardubice Airport (LKPD)	Safety and Security Referent
21	Vít	Málek	EAST Bohemia Airport, a.s.	Pardubice Airport (LKPD)	Safety and Security Manager
22	Rudolph	Schneeberger	ITV Consult	ITV Consult	Director
23	Wolfgang	Scheucher	Solítec	Solítec	Trainer
24	Alexander	Petrovsky	EUROCONTROL	EUROCONTROL	AIS Expert
25	Manfred	Unterreiner	EUROCONTROL	EUROCONTROL	ADQ Activity Manager
26	Matúš	Murcko	Aircraft Industries	Kunovice Airport (LKKU)	ATCO



Internal participants					
No.	Name	Surname	Name of subject	Type of subject	Position
1	Libor	Jílek	ANS CR	ANS Provider	Head of IT Department in AIM
2	Ladislava	Štefková	ANS CR	ANS Provider	NOTAM/OPMET Administrator
3	Jiří	Hautke	ANS CR	ANS Provider	Head of Constructions Control Department
4	Lumír	Hovančík	ANS CR	ANS Provider	ANS Development Department - Methodologist
5	Kateřina	Dean	ANS CR	ANS Provider	ANS Development Department - Methodologist
6	Radka	Prádlová	ANS CR	ANS Provider	Head of Legal office
7	Tomáš	Duka	ANS CR	ANS Provider	Procedure Designer
8	Pavel	Kraus	ANS CR	ANS Provider	Procedure Designer
9	Jiří	Sova	ANS CR	ANS Provider	AIM Administrator
10	Ondřej	Páleš	ANS CR	ANS Provider	AIM Administrator
11	Zdeněk	Hrázský	ANS CR	ANS Provider	Head of AIM section
12	Lukáš	Čuřík	ANS CR	ANS Provider	Head of AIS
13	Radek	Hodač	ANS CR	ANS Provider	Quality Manager AIM
14	Miroslav	Hrubec	ANS CR	ANS Provider	AIM Administrator
15	Karel	Tesárek	ANS CR	ANS Provider	Head of Department Aeronautical Publications
16	Michal	Ekart	ANS CR	ANS Provider	Head of Cartography Department
17	Jiří	Latiok	ANS CR	ANS Provider	AIM Methodologist
18	Michal	Puřr	ANS CR	ANS Provider	Head of NOF



## Annex C – Summary Data Origination

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### Introduction

Data origination is the first link in the aeronautical data chain and is establishing the quality of the data. In a typical configuration there are different parties involved in data origination:

- Aerodrome (AD), the party responsible for data origination
- Surveyor, a third party subcontracted by the AD to actually originate the data
- Aeronautical Information Service (AIS), the party receiving the data for publication

The critical subjects for data origination are:

- Request for data origination as an addition to the formal arrangements
- Data origination according to the data quality requirements
- Collection and provision of metadata to enable traceability and validation of the originated data
- Validation and verification of the originated data

Commission Regulation (EU) 73/2010 (ADQ) as well as the draft version of the new Commission Implementing Regulation (EU) 2017/373 (ATM/ANS) and the amendments to the Commission Regulation (EU) 139/2014 (ADR), which will replace ADQ define requirements for data origination. As the new regulations ATM/ANS and ADR have a different structure and take a different approach than ADQ, a comparison of the data origination requirements in the different regulations is given in the appendix.

### Data scope

The scope of aeronautical data to be collected by an airport is defined in the formal arrangement between the airport and AIS and a request for data origination. The regulatory framework is defined by ADQ and ADR. The civil aviation authority defines the responsibilities for data origination and authorization. The data catalogue will be the appropriate tool for this definition.

### Request for data origination

In addition to the formal arrangements ADQ defines the instructions for a request for data origination:

- Description of the data to be originated
- Entity to which the data are to be provided
- Date and time by which the data are to be provided
- Data origination report format

Together with the formal arrangements these instructions should assure that the party originating the data who might have a different domain knowledge, e.g. a surveyor, understands what has to be originated.





## Description of the data to be originated

The description of the data to be created, modified or deleted must be unambiguous and in case of a survey, clearly identify the details of the features to be surveyed. The EUROCONTROL Specifications for the Origination of Aeronautical Data (DO Specifications), Volume II provides the necessary guidance.

A comprehensive data product specification (DPS) according to the ISO Standard 19131 covers most of the requirements for formal arrangement and request for data origination. Therefore it is an ideal means to instruct the data originator on the deliverables and to avoid misunderstandings due to the different domain knowledge.

## Geodetic reference system

While geodetic data has to be published with reference to WGS-84, aerodrome surveys are often carried out with reference to different coordinate reference system (CRS). If CRS-transformations are not considered in the aeronautical data chain, critical errors are introduced to the data set. In Europe national coordinate systems are often based on the European Terrestrial Reference Frame ETRF89. It is important to understand that due to the movement of the European continent WGS-84/ITRF2008 coordinates of surveyed points change at a rate of about 2-3cm per year. Therefore, surveyed data has to be transformed from a local CRS or ETRF89 to WGS-84/ITRF2008 and information about the CRS and the transformation has to be documented in the metadata.

## Metadata

Metadata is crucial for data validation and for assuring traceability. The data origination report (survey report) is a means to document the data origination metadata:

- Reference Systems, units;
- Data processing;
- Lineage information (processing and validation actions performed on the data);
- Data quality evaluation.

## Data origination requirements and DO specification

ADQ defines specific requirements for surveying and surveyed data in Annex IV Part D. The DO Specifications, in two volumes, provide detailed specifications and guidance for such surveys. Volume 1 contains the compliance material while volume 2 contains the guidance material and comprehensive requirements. The DO Specifications help to bridge the gap between the aviation community and the surveyors and/or other data originators. Aerodromes, when contracting surveys, refer to these specifications in the formal arrangements and requests for data origination.

## Validation and verification

Validation and verification are requirements in the aeronautical data chain. The two techniques need to be established by the aviation community as well as on the surveyor's side. Therefore, the involved parties have to understand the differences between the two techniques and possible methods of implementation.



The purpose of validation and verification is to ensure the quality requirements of aeronautical data. Compared to ADQ IR, Regulation (EU) 2017/373 introduces a more complete set of data quality requirements which is composed of accuracy, resolution, assurance (integrity), traceability, timeliness, completeness and format. Each data quality requirement is defined along with means of ensuring them through varied validation and/or verification techniques.

## Survey as data origination

The data origination carried out by a surveyor is not a single “press one button” task. There are different methods for surveying aerodrome and obstacles. The party requesting the survey defines the requirements and the surveyor will choose the method best suited for the task. The DO specification provides guidance for the surveyor on the aviation specific aspects of surveying and suitable validation and/or verification methods required to produce correct data from the beginning of the aeronautical data chain process.

## Flight procedure design as data origination

The DO Specification includes requirements for a flight procedure designer about ways of handling data sources, the validation and verification of data sources, the process of developing a flight procedure design, documentation, digital handling of data and validation of the final result.

The flight procedure designer has the obligation to validate and verify source data not received from authorized source. The design of the procedures has to be undertaken by a qualified designer according to ICAO provisions.

Validation techniques for flight procedure design are ground validation and if necessary flight validation. The purpose of validation is to determine the correctness of the design, to verify the navigation data and to determine the flyability of the procedure.

Appendix: Comparison ADQ – ATM/ANS – ADR Regulations (*provided as separate file*)

Reference Material: EUROCONTROL Specification for the Origination of Aeronautical Data, Volume 2: Guidance Material, Ed. 1.0, 04.02.2013 (EUROCONTROL-SPEC-154)

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## Annex D – Summary Data Exchange/Dataset/Metadata

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Summary of proposals in EASA Opinion 02/2018 compared to Regulation (EU) 73/2010.

Colour code used in the following paragraphs:

**Green:** New requirements or AMC/GM introduced with the EASA Opinion 02/2018

**Red:** Requirements of the Regulation (EU) 73/2010 not transposed into the EASA Opinion.

The regulated party affected is indicated at the beginning of each statement in round brackets.

### GENERAL

1. (all regulated parties) The concept of **aeronautical data catalogue** is introduced. The aeronautical data catalogue in Appendix 1 to Annex III (ATM/ANS.OR) is transposed from the ICAO one. (all regulated parties)
2. (Part-AIS) The concept of **digital data sets** is introduced. Based on ICAO Annex 15 AMDT 40 & the new PANS-AIM five data sets are defined: **AIP data set, IFP data set, Obstacle data set, terrain data set and aerodrome mapping data set**. Including requirements for the update of digital data sets.
3. (Part-AIS) The concept of **data product specification** is introduced, in context with the digital data sets (based on ICAO Annex 15 AMDT 40 & the new PANS-AIM). 'A description of each available data set shall be provided in the form of a data product specification.'

### DEFINITIONS

4. Four additional criteria and its definitions added for Data Quality, as per amendment 40 to ICAO Annex 15:  
'data quality' means a degree or level of confidence that the provided data meets the user's data requirements in terms of accuracy, resolution, integrity (or equivalent assurance level), **traceability, timeliness, completeness, and format**;
5. IAIP vs. Aeronautical Information Product  
'**integrated aeronautical information package**' being replaced by '**aeronautical information product**', as per amendment 40 to ICAO Annex 15, including for the first-time '**Digital data sets**'.
6. Definitions for '**data set**', '**data set series**' and '**data product specification**' added
7. Definitions for '**feature**', '**feature attribute**' and '**feature type**' added
8. Definition for '**metadata**' added
9. Term '**survey data**' is not used anymore.
10. Term '**digital NOTAM**' is not used anymore

### DATA SET SPECIFICATION

11. (all regulated parties) Data set specification vs. Aeronautical data catalogue  
The opinion text introduces the **aeronautical data catalogue**, which partially covers the **data set specifications** foreseen in Article 4 of Regulation 73/2010.



The data set specifications are identified throughout the data quality requirements in Part-AIS.

12. (Part-AIS) Documentation  
UML or Feature Cataloguing is not required at rule level anymore, but UML is defined as AMC for the exchange model in Part-AIS.  
Feature Catalogue and **application schema** is required for Aerodrome mapping data sets.
13. (all regulated parties) Description of geometrical elements  
**ISO 19107** is no requirement anymore.  
The data catalogue defines 3 basic geometrical elements i.e. Point, Line, Polygon.  
An AMC recommends that a standard for geographic information should be used as a reference framework.  
A GM refers to the ISO 19100 series in general, but not to ISO 19107 in particular.

## DATA EXCHANGE

14. (all regulated parties) Electronic Connection  
Term '**direct electronic connection**' is replaced by '**electronic means**'. The new definitions still requires: "avoiding the need of manual interaction with the data" but removes the requirement for a "**digital connection between computer systems**".
15. (Part-AIS) Exchange format – General  
The Opinion requires that 'the format of aeronautical data is based on **an aeronautical information exchange model** designed to be globally interoperable' (whereas 73/2010 lists the specific requirement for the format to be used in ANNEX II).  
AMC recommends '**the AIXM**' as exchange format, without mentioning a version.  
GM states that '**AIXM 5.1**' is considered as being the minimum baseline for the exchange of aeronautical data and aeronautical information'.  
NOTE: in 73/2010 the term AIXM is not mentioned in any form (but AIXM 5.1. design components such as XML, XML schema, GML are mentioned, see below).
16. (Part-AIS) Exchange format - Terrain data  
For terrain data a GM states that the **GeoTIFF format with metadata is preferred**.
17. (Part-AIS) Exchange Format – **Extension mechanism**  
The opinion recommends as AMC 'an extension mechanism by which groups of users can extend the properties of existing features and add new features which do not adversely affect global standardisation.'
18. (Part-AIS) Exchange Format -Encoding  
**To use XML & XML Schema for data encoding is not required anymore.**  
In a GM XML is just mentioned as one of many examples of a data encoding format (amongst GML and JSON).
19. (Part-AIS) Exchange Format – **Mapping to the Data Catalogue**  
The exchange format shall be structured in accordance with the data catalogue.  
The opinion requires a mapping between the data catalogue and the exchange format.



20. (Part-AIS) Exchange Format – Encoding of geographical information  
**The Geography mark-up language (GML) is not a requirement anymore**  
In a GM GML is just mentioned as one of many examples of a data encoding format (amongst XML and JSON).

## METADATA

21. (all regulated parties) ISO 19115:2003 - Geographic information – Metadata  
**ISO 19115 is not required for metadata** anymore.  
A GM just states that “Further explanation on the schema required for describing geographic information and services by means of metadata may be found in the International Organisation for Standardisation, ISO 19115”
22. (all regulated parties) Metadata -**Traceability**  
The traceability of aeronautical data shall be ensured (this is a new term introduced with the Opinion)  
A GM (Part ATM/ANS) states that ‘Traceability is supported by maintaining the metadata.’
23. (all regulated parties) Metadata items  
Opinion defines a new minimum of metadata (overlapping but not with the one 1.1 as in 37/2010), also slightly different depending on the regulated party (i.e. AIS, ATM/ANS & other data originator, aerodromes)
- the identification of the organizations or entities performing any action of originating, transmitting or manipulating the data
  - **the action performed**; (more generic as in 73/2010 which listed the particular actions!)
24. (Part -AIS) Protection of individuals  
A GM states ‘When collecting metadata, the **protection of individuals** with regard to the processing of personal data and on the free movement of such data applies, in accordance with Directive 95/46/EC on Data protection.’
25. (Part-AIS) **Metadata- Digital data sets**  
Additional, data set specific metadata requirements apply, if provided
- the name of the organisations or entities providing the data set;
  - the date and time when the data set was provided;
  - validity of the data set;
  - any limitations with regard to the use of the data set.

Appendix: Analysis of ADQ vs. EASA Op 02-2018 (*provided as separate file*)

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Co-financed by the Connecting Europe  
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