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Lineamientos de codificación AIXM

GroupEAD Scope and Approach,
Mexico Sep-19, Rev. 01.00

Contenido

- Antecedentes
    - Datos e información aeronáutica
    - Dataset
    - Productos vs datos
- Digital data set y AIXM
    - Catalogo de datos y AIXM
    - Modelo conceptual y AIXM
    - Modelo intercambio y AIXM
- Lineamientos de codificación AIXM
    - AIP DS Mapeo
    - AIP DS Reglas y ejemplos
    - Espécimen
- Expectativas

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ANTECEDENTES

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Claves| Preguntas preliminares

- ¿Cual es la diferencia entre datos aeronáuticos e información aeronáutica?

- ¿Cuáles son los digital data set?

- ¿Cómo puedo usar AIXM para cumplir con los requerimientos de los digital data set?

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Definición| Datos Aeronáuticos

- Representación de hecho, conceptos o instrucciones aeronáuticas de manera formal y adecuado para la comunicación, interpretación o procesamiento.
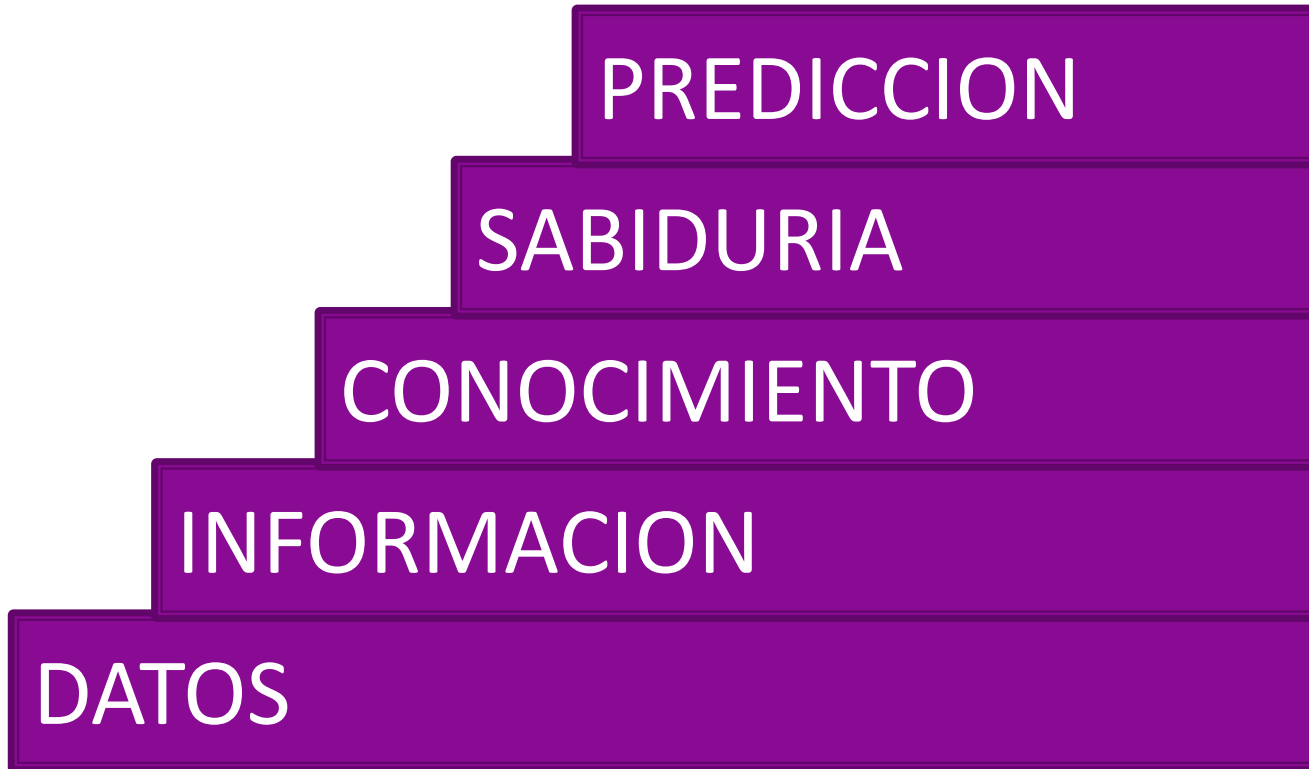
RWY	Orientación Direction	DIM (m)	THR PSN	THR ELEV TDZ ELEV
14L (8) (9)	142.21° GEO 143° MAG	3500 x 60	402941.71N 0033328.33W	THR: 592 m / 1942 ft TDZ: No

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Definición| Información Aeronáutica

- Información resultante del ensamblaje, análisis y formateo de datos aeronáuticos.

PREDICCION

SABIDURIA

CONOCIMIENTO

INFORMACION

DATOS

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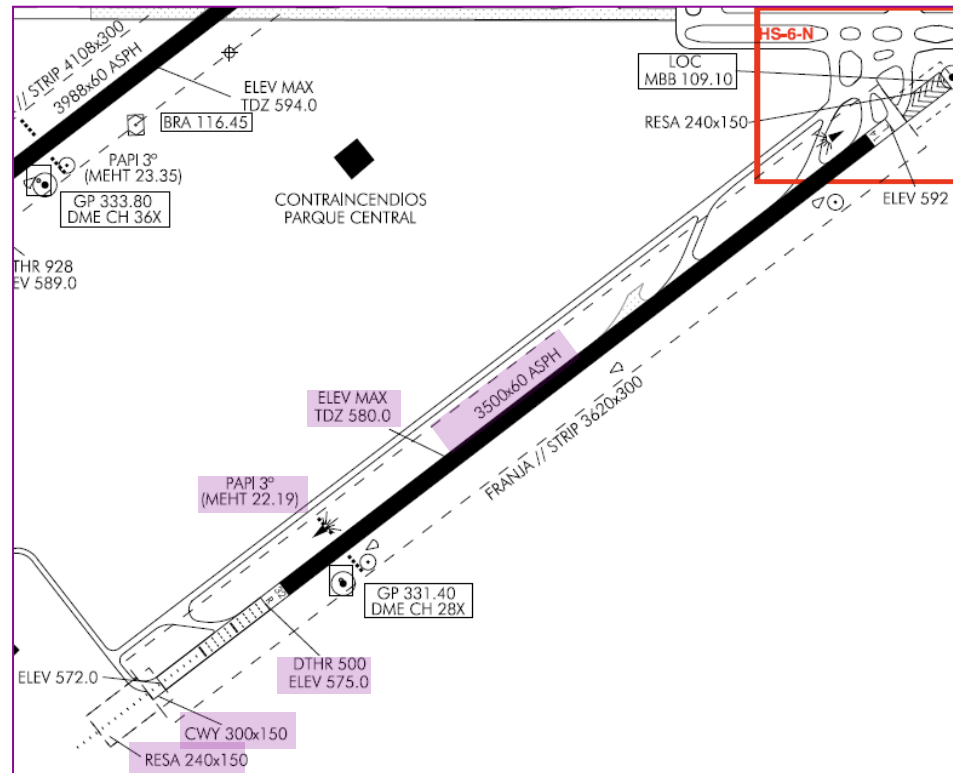
Definición| Conjunto de datos (Data Set)

- Colección de datos en tablas

RWY	Orientación Direction	DIM (m)	THR PSN	THR ELEV TDZ ELEV
14L (8) (9)	142.21° GEO 143° MAG	3500 x 60	402941.71N 0033328.33W	THR: 592 m / 1942 ft TDZ: No
32R (1) (7)	322.22° GEO 323° MAG	3500 x 60	402824.85N 0033210.30W	THR: 574.8 m / 1886 ft TDZ: 579.9 m / 1903 ft
14R (8) (10)	142.20° GEO 143° MAG	3988 x 60	402905.50N 0033433.64W	THR: 608 m / 1995 ft TDZ: No
32L (2) (7)	322.21° GEO 323° MAG	3988 x 60	402747.10N 0033314.02W	THR: 589.1 m / 1933 ft TDZ: 594.2 m / 1949 ft
18L (3) (7)	179.76° GEO 181°MAG	3500 x 60	403141.22N 0033333.68W	THR: 585.9 m / 1922 ft TDZ: 587.7 m / 1928 ft
36R (8) (11)	359.76° GEO 001°MAG	3500 x 60	403003.97N 0033333.15W	THR: 592 m / 1942 ft TDZ: No
18R (4) (7)	179.76° GEO 181° MAG	4179 x 60	403122.40N 0033429.27W	THR: 606.9 m / 1991 ft TDZ: 606.9 m / 1991 ft
36L (8) (12)	359.76° GEO 001° MAG	4179 x 60	402933.32N 0033428.64W	THR: 605 m / 1985 ft TDZ: No

Campo 1 | Campo 2 | Campo 3 | Campo 4

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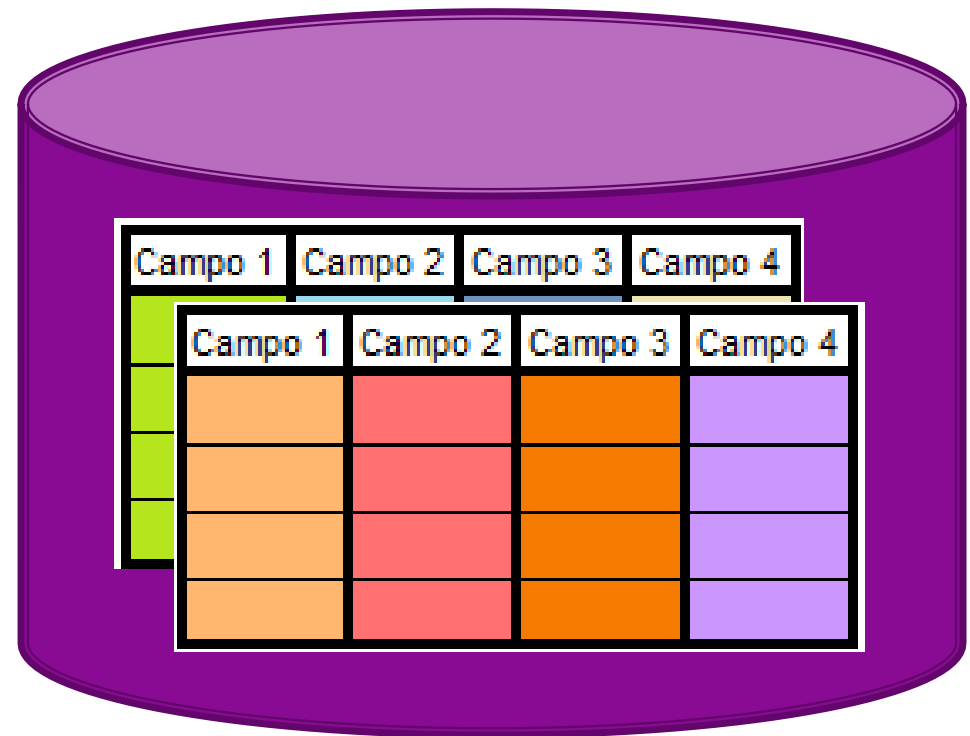
Definición| Productos vs. Datos
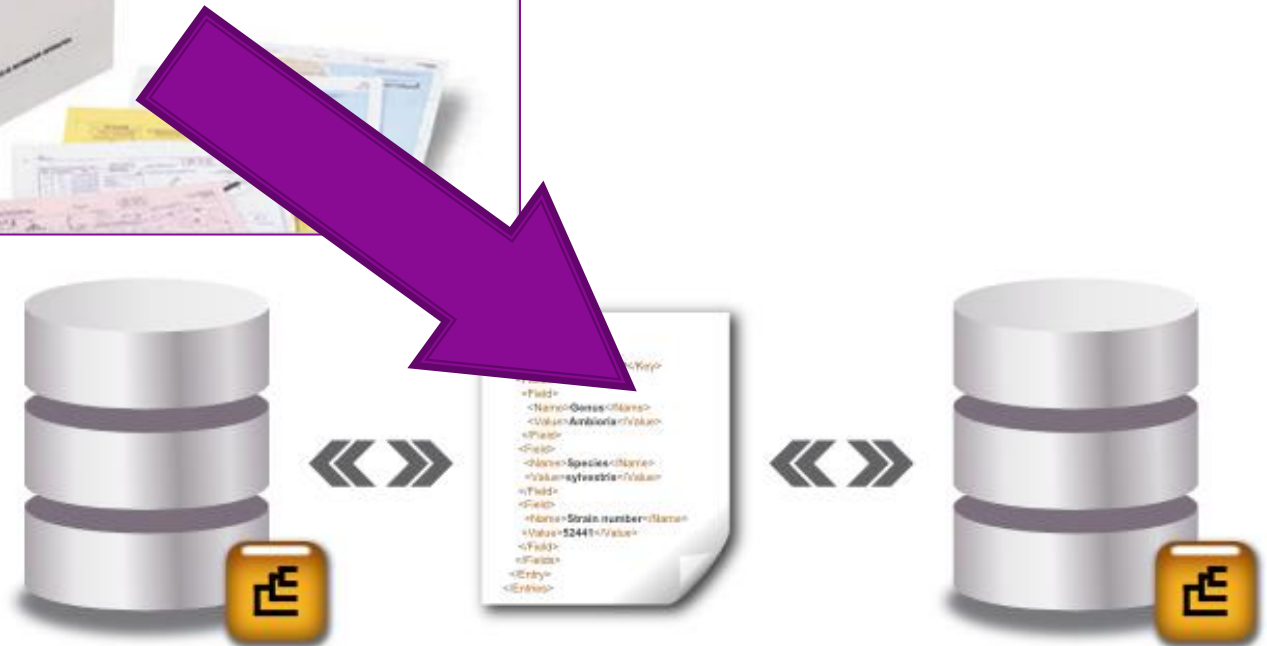
DIGITAL DATA SETS Y AIXM

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Requisitos| Digital Data Set y AIXM

- Anexo 15: Uno de los Productos de Información Aeronáutica (antes IAIP)
  - AIP
  - Obstáculos
  - Terreno
  - Mapas de Aeródromo
  - Procedimientos Instrumental de vuelo

  ED 98/DO 276 Manual eTOD

  ED 99/DO 272

  AIXM 5.1(.1)

  AIXM 5.1(.1)

  AIXM 5.1(.1)

  AIXM 5.1(.1)

- PANS AIM
  - Requerimientos mas detallados
  - Basado en Data Catalogue
    - Entidades y propiedades
    - Tipos y descripción

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Requisitos| Digital Data Set y AIXM

- Debe incluir Metadatos (ej. Nombre organización, fecha y hora)
- Sujeto al mismo ciclo de actualización que el AIP

AIRAC Cycle

Publication — Reception — AIRAC Effective Date

14 days for postal delivery — 28 days for system updating

56 days for major changes
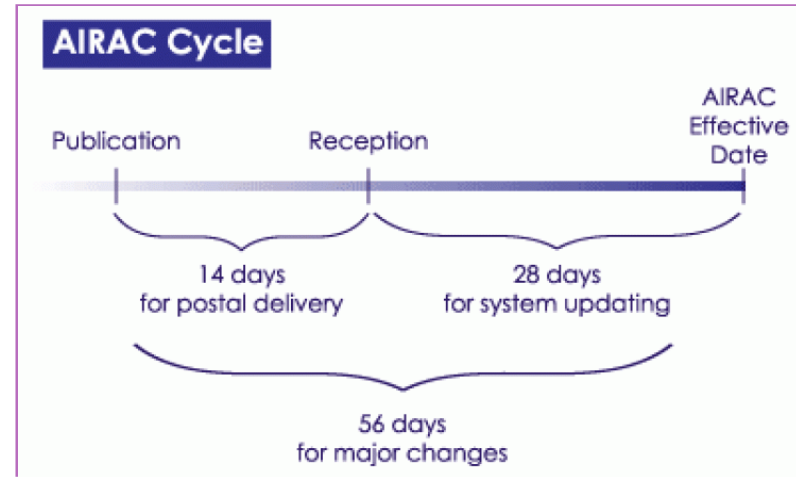
AIXM cumple con los requisitos de Metadatos y temporalidad

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Requisitos| Catalogo de datos y AIXM

- Describe detalladamente elementos y propiedades, los requerimientos de calidad y los tipos de datos

	Subject	Property	Sub-Property	Type	Description	Note	Accuracy	Integrity	Orig Type	Pub. Res.	Chart Res.
1					Table A 1-1 Aerodrome/Heliport data						
2	Subject	Property	Sub-Property	Type	Description	Note	Accuracy	Integrity	Orig Type	Pub. Res.	Chart Res.
3	Runway				A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft. (Annex 14)						
4		Designator		Text	The full textual designator of the runway, used to uniquely identify it at an aerodrome/heliport. E.g. 09/27, 02R/20L, RWY 1.						
5		Nominal length		Distance	The declared longitudinal extent of the runway for operational (performance) calculations.		1 m	critical	surveyed	1 m or 1 ft	1 m
6		Nominal width		Distance	The declared transversal extent of the runway for operational (performance)		1 m	essential	surveyed	1 m or 1 ft	1 m
7		Geometry		Polygon	Geometries of RunwayElement, RunwayDisplacedArea and RunwayIntersection						
8		Centre line points									
9			Position	Point	The geographical location of runway centre line at each end of the runway, at the stopway and at the origin of each take-off flight path area, and at each significant change in slope of runway and stopway	Definition from Annex 4 3.8.4.2	1 m	critical	surveyed		
10			Elevation	Elevation	The elevation of the corresponding centre line point.		0.25 m	critical	surveyed		
11			Geoid undulation	Height	The geoid undulation at the correspoding centre line point						

AIXM cumple con los requisitos del catalogo de datos

Requisitos| Modelo Conceptual y AIXM

- Basado en UML
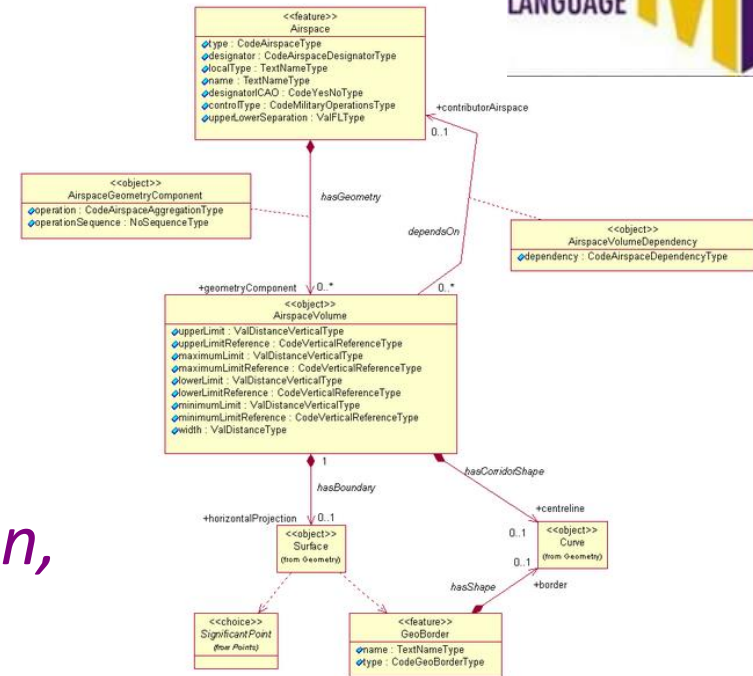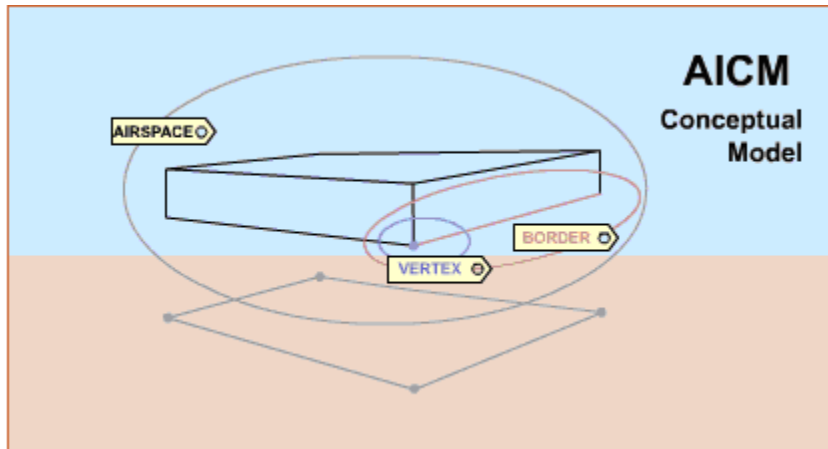
"Vocabulario del lenguaje común, los conceptos y sus relaciones"

AIXM esta definido en UML

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Requisitos| Modelo Conceptual y AIXM

- Incluir restricciones y reglas de verificación

Name	Data Type	Definition
nilReason	NilReasonEnumeration	
AD	string	Aerodrome only.
AH	string	Aerodrome with heliport landing area.
HP	string	Heliport only.
LS		
OTHE		

F	G
§	**Rule textual description**
AirportHeliport	It is prohibited that **Runway** with assigned **type** equal-to 'RWY' isSituatedAt **AirportHeliport** with assigned **type** equal-to 'HP'

AIXM incluye restricciones y reglas de verificación

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Requisitos| Modelo Conceptual y AIXM

- Incluir un modelo de temporalidad

Temporal Data

Change to Static Data (Baseline Data 2)

Static Data – Baseline Data 1

AIXM incluye un extenso modelo de temporalidad

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Requisitos| Modelo Conceptual y AIXM
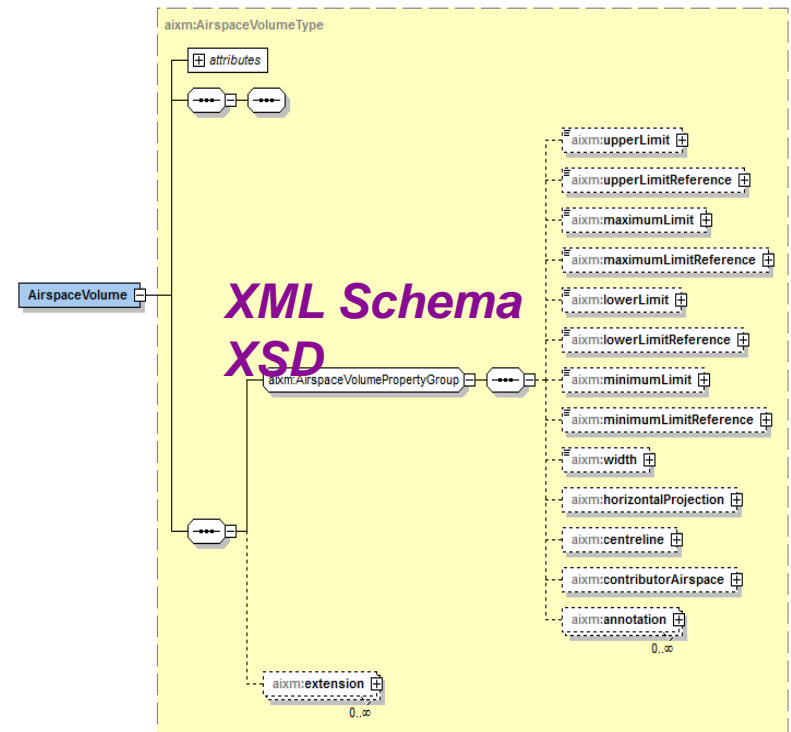
- Incluir un modelo de temporalidad

Temporal Data

Baseline

AIXM incluye un extenso modelo de temporalidad

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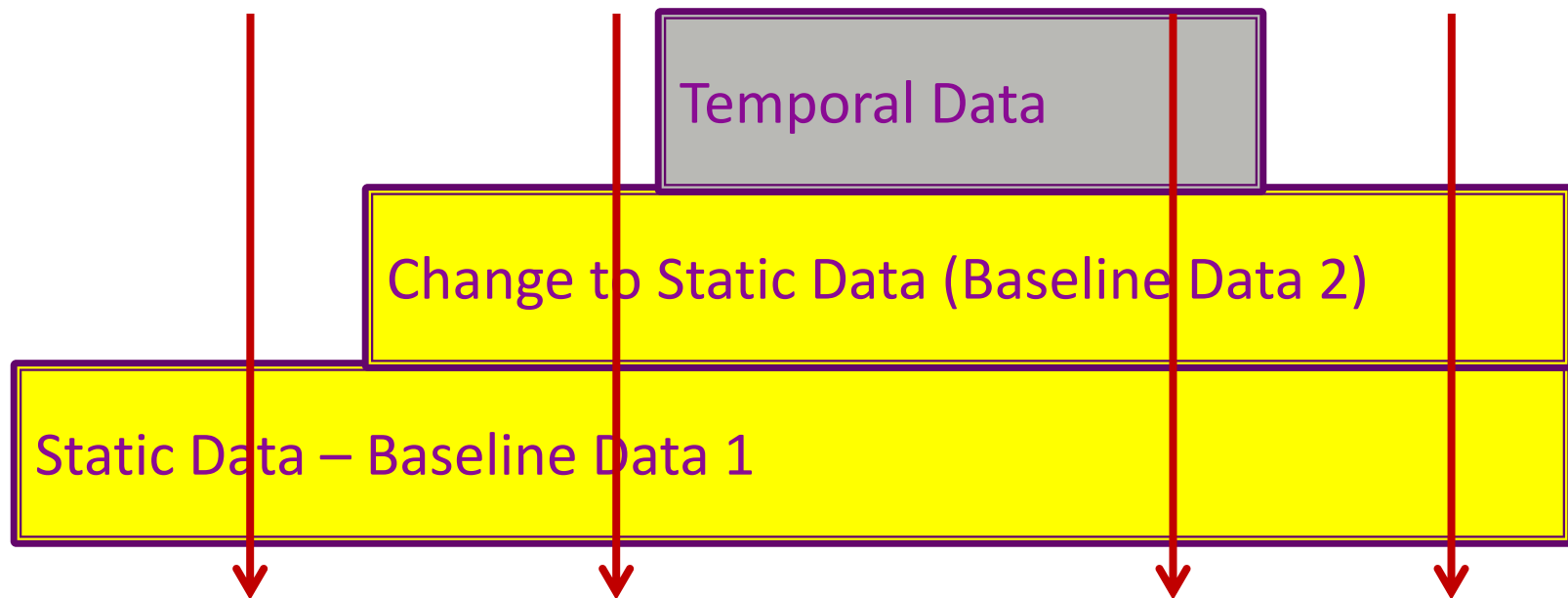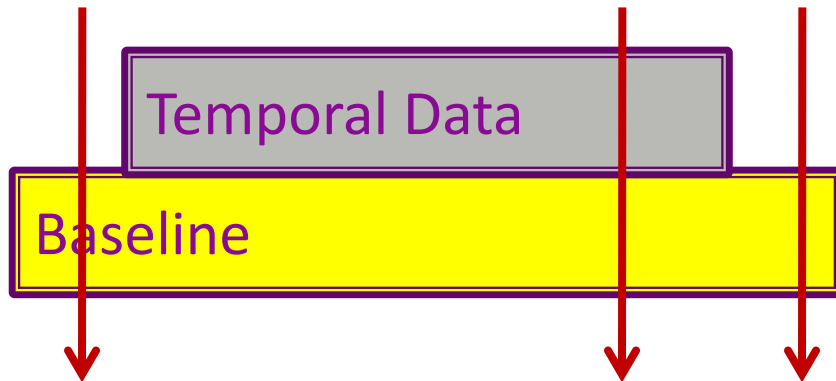
Requisitos| Modelo Intercambio y AIXM

- Utilizar un formato común de codificación (ej. XML, GML, JSON)


```
<aixm:type>CTA</aixm:type>
<aixm:designator>EADD</aixm:designator>
<aixm:name>CTA DONLON</aixm:name>
<aixm:geometryComponent>
 <aixm:AirspaceGeometryComponent gml:id="AV001">
  <aixm:operation>BASE</aixm:operation>
  <aixm:operationSequence>1</aixm:operationSequence>
   <aixm:theAirspaceVolume>
    <aixm:AirspaceVolume gml:id="V001">
    <aixm:upperLimit uom="FL">245</aixm:upperLimit>
    <aixm:upperLimitReference>STD</aixm:upperLimitReference>
    <aixm:lowerLimit uom="FL">30</aixm:lowerLimit>
    <aixm:lowerLimitReference>STD</aixm:lowerLimitReference>
```
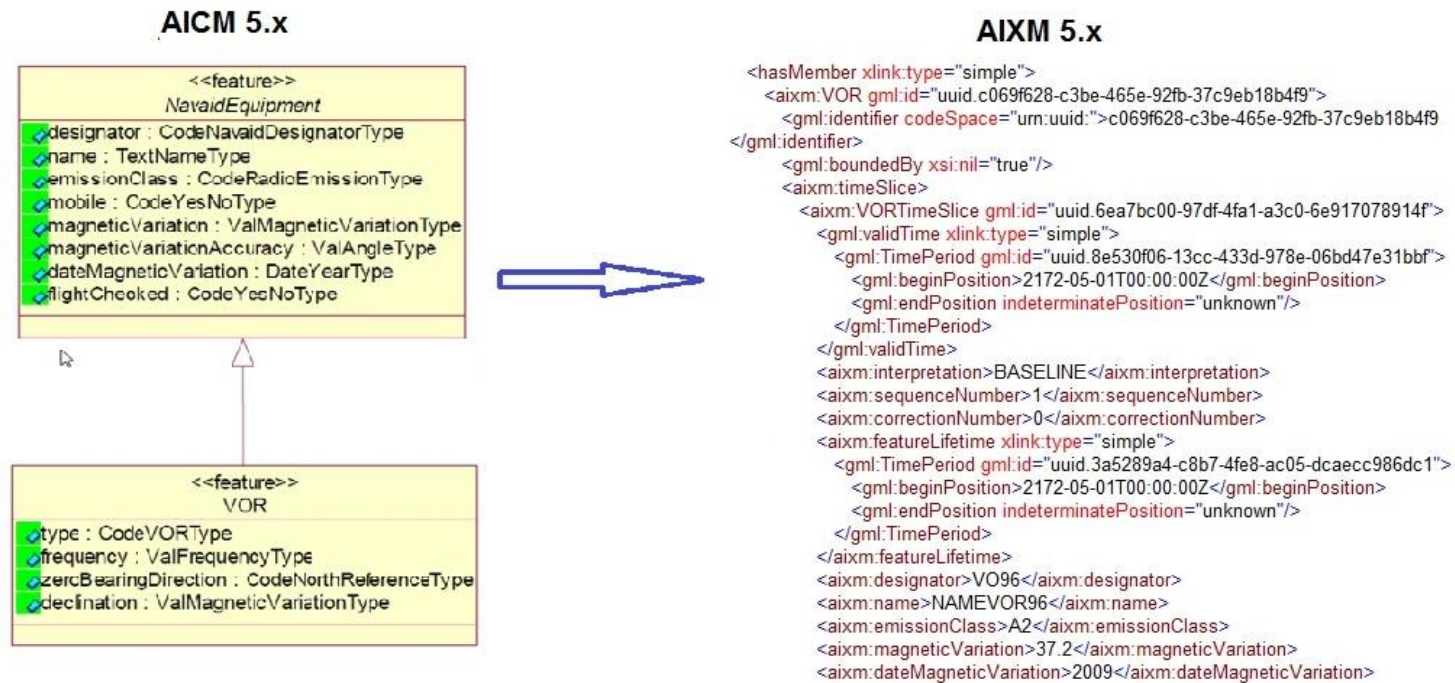
XML Schema XSD

"Formato y gramática del lenguaje común"

AIXM se codifica en GML/XML

Requisitos| Modelo Intercambio y AIXM

- Cubrir todas las elementos, atributos y relaciones del modelo conceptual

AIXM es la implementación de AICM en XML/GML

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Requisitos| Modelo Intercambio y AIXM
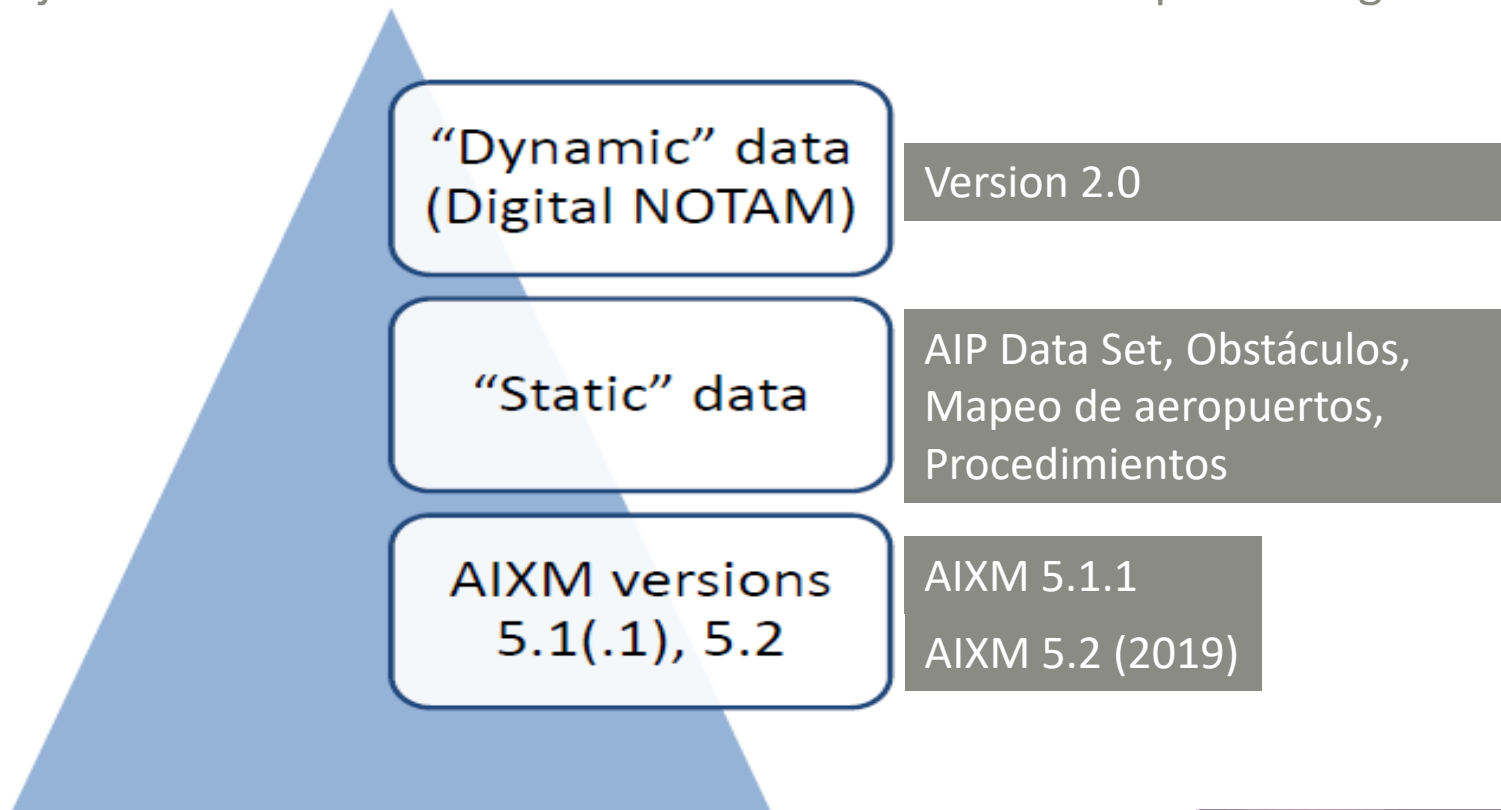
- Proveer un mecanismo de extensión
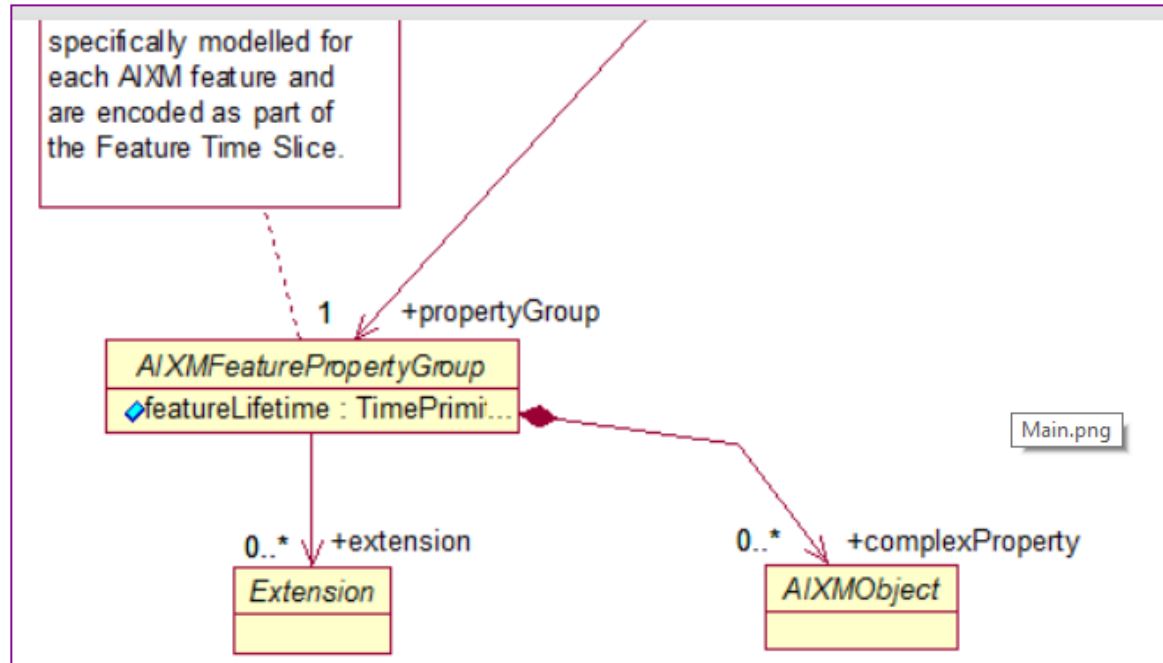
AIXM provee un mecanismo de extensión

LINEAMIENTOS DE CODIFICACION AIXM

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AIXM| Lineamientos de Codificación

- Mayo 2016 - Grupo de trabajo de Eurocontrol sobre lineamientos de codificación AIXM

- Objetivo: desarrollar lineamientos de codificación de aplicación global

"Dynamic" data (Digital NOTAM) — Version 2.0

"Static" data — AIP Data Set, Obstáculos, Mapeo de aeropuertos, Procedimientos

AIXM versions 5.1(.1), 5.2 — AIXM 5.1.1, AIXM 5.2 (2019)

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AIXM | Lineamientos de Codificación

- https://ext.eurocontrol.int/aixm_confluence/display/ACG

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AIXM| Lineamientos de Codificación – AIP DS

Overview

Created by Manfred BECKMANN, last modified by EDUARD POROSNICU on 24 May 2019

(ICAO) AIP Data Set - Coding Guidelines
Initial development by EUROCONTROL
Further maintained by the AIXM Community

EUROCONTROL

Co-financed by the European Union
Connecting Europe Facility

This space provides coding guidelines for the ICAO AIP Data Set in AIXM 5.1/5.1.1 format. The objective is to ensure that AIP data sets provided by different States can be effectively used by the downstream AIS data chain actors, particularly by Data Provider (DAT) organisations. This includes a formal mapping into AIXM 5.1/5.1.1 of the AIP Data Set subject/properties, as contained in the new PANS-AIM (ICAO DOC 10066).

> ⚠ **Concerning the status of the coding guidelines**
> The AIP Data Set coding guidelines are in **PROPOSED** status. EUROCONTROL intends to start a formal consultation process, with the objective to release a formal AIP Data Set - AIXM Coding Specification by the end of 2019. Although the exact content and structure of the intended Specification remains to be defined through further consultation with the stakeholders, it is likely that it will include only the mapping to PANS-AIM and the data set verification rules. Guidance on the coding of particular cases will probably continue to be provided through this collaboration area.
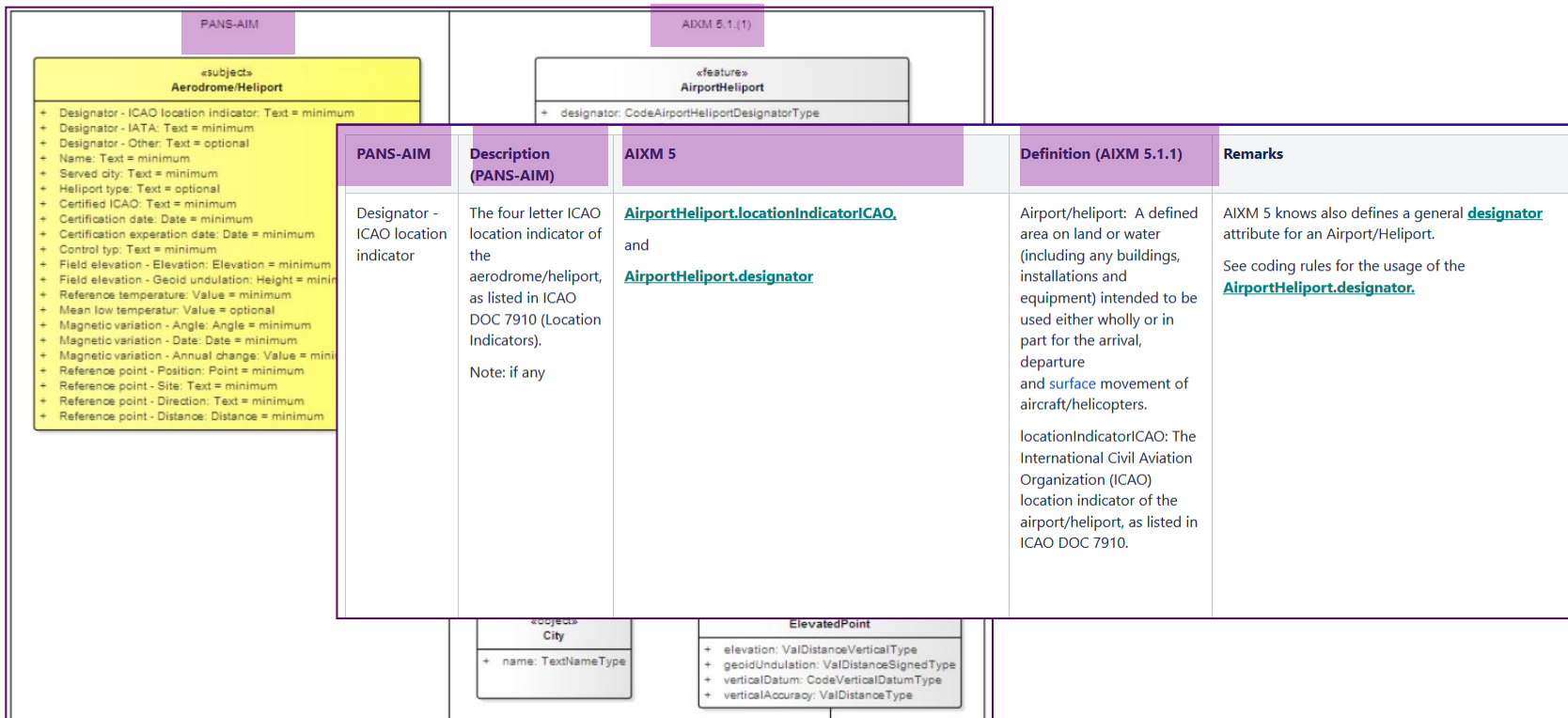
Child Pages

- Introduction
- Copyright notice
- Mapping PANS-AIM AIP Data Set to AIXM 5
- Coding Guidelines
- Interoperability rules
- AIP Data Set - Specimen (DONLON)
- File lists
- References
- FAQ

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AIXM| AIP DS - PANS-AIM – AIXM (mapeo)

- Diagramas UML
- Tablas

PANS-AIM

«subject»
Aerodrome/Heliport

- Designator - ICAO location indicator: Text = minimum
- Designator - IATA: Text = minimum
- Designator - Other: Text = optional
- Name: Text = minimum
- Served city: Text = minimum
- Heliport type: Text = optional
- Certified ICAO: Text = minimum
- Certification date: Date = minimum
- Certification experation date: Date = minimum
- Control typ: Text = minimum
- Field elevation - Elevation: Elevation = minimum
- Field elevation - Geoid undulation: Height = minim
- Reference temperature: Value = minimum
- Mean low temperatur: Value = optional
- Magnetic variation - Angle: Angle = minimum
- Magnetic variation - Date: Date = minimum
- Magnetic variation - Annual change: Value = mini
- Reference point - Position: Point = minimum
- Reference point - Site: Text = minimum
- Reference point - Direction: Text = minimum
- Reference point - Distance: Distance = minimum

AIXM 5.1.(1)

«feature»
AirportHeliport

- designator: CodeAirportHeliportDesignatorType

PANS-AIM	Description (PANS-AIM)	AIXM 5	Definition (AIXM 5.1.1)	Remarks
Designator - ICAO location indicator	The four letter ICAO location indicator of the aerodrome/heliport, as listed in ICAO DOC 7910 (Location Indicators). Note: if any	**AirportHeliport.locationIndicatorICAO,** and **AirportHeliport.designator**	Airport/heliport: A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft/helicopters. locationIndicatorICAO: The International Civil Aviation Organization (ICAO) location indicator of the airport/heliport, as listed in ICAO DOC 7910.	AIXM 5 knows also defines a general **designator** attribute for an Airport/Heliport. See coding rules for the usage of the **AirportHeliport.designator.**

«object»
City

- name: TextNameType

ElevatedPoint

- elevation: ValDistanceVerticalType
- geoidUndulation: ValDistanceSignedType
- verticalDatum: CodeVerticalDatumType
- verticalAccuracy: ValDistanceType

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AIXM| AIP DS - PANS-AIM – AIXM (mapeo)

- Categoría de elementos:
  - Elementos mínimos:
    - De cumplimiento obligatorio de acuerdo a PANS-AIM 5.3.3.1.1 (parte del mapeo)
  - Elementos condicionales:
    - Adicionales a PANS-AIM 5.3.3.1.1. y descritos en el apéndice 2 de PANS-AIM (parte del mapeo)
    - Adicionales para compatibilidad con plan de vuelo o ARINC 424 (parte del mapeo)
  - Elementos opcionales:
    - adicionales a PANS-AIM y descritos en el catalogo de datos (no son parte del mapeo)

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A **Runway** is situated at maximum one **AirportHeliport**.

The runway is a defined rectangular area on a land aerodrome/heliport prepared for the landing and take-off from aircraft.

> ⚠ **Note:**
> This includes the concept of Final Approach and Take-Off Area (FATO) for helicopters. The **Runway.type** attribute is used to distinguish if it is a 'RWY' or 'FATO'.

An airport may have an arbitrary number of physical runways associated with it, each of which has -in general- up to two runway directions defined (It is possible to record less or more than two RWY directions if required).

The Runway at an airport will be identified by a **designator**, normally composed of the designators of its runway directions. A runway has a **nominalLength** and a **nominalWidth**.

The **Runway** has a surface that can be described by the attributes of the **SurfaceChracteristics** class. This includes inter alia the type of the predominant material of which a surface of the movement area is ~~~~~ ent Classification Number).

Coding Examples

The figure shows a simple example of a Runway with designator "RWY-09L/27R" situated at "EADD".

It is composed of the designators of the runway directions.

The runway has a nominal length of "2800 Meters" and a nominal width of "45 meters".

Each runway direction has a true and magnetic bearing defined.

Each runway direction has also a defined runway centre line point, viz. the threshold with its elevation.

The figure below shows the encoding of some of the Runway properties described above in AIXM 5.1.

AIXM| AIP DS – Reglas de interoperabilidad

Use of compression

The size of an AIP Data Sets in AIXM format is likely to be in the range between 100 MB and up to 1-2 GB (if provided for an entire region). Such files have very good compression rates (up to 10 times) with widely used standards, such as ZIP. In order to reduce the transmission times and the archiving size on the client side, the AIP Data Sets should be exchanged in compressed formats. The use of compression algorithms provide a side benefit, as they guarantee the integrity of the files, through the use of CRC or similar mechanisms.

ⓘ **Recommendation**
When made available as a single XML file, the AIP data set should be compressed using a widely used compression algorithm, such as ZIP.

File name

The ICAO PANS-AIM, item 5.4.1.4 requires a *"checklist of data sets shall be made available through the same distribution mechanism as used for the data sets"*. This implies that each data set may be uniquely identified in some way, so that it can be listed. Therefore, a naming convention for the AIP Data Set files is proposed in this section.

ⓘ **Recommendation**
An AIP Data Set file should have the following name structure "CC_CC_CC...[Territory]_AIP_DS_Type[_Part]_YYYYMMDD[_AIRAC].xml", where:

- CC represents the 1-letter or 2-letters ICAO Country code(s) of the State(s) under which authority the data set is published, according to the ICAO DOC 7910 - Location Indicator;
    Note: When a Data Set is published for an entire region, as result of a regional database agreement, CC may be replaced by a code representing that region, such as "EU" in the case of the European AIS Database.
- [_Territory] is optional and is the official name of the Territory covered by the data set, if applicable;
- AIP_DS is a fixed text (meaning "AIP Data Set");
- Type is a mandatory element and it can take one of the following values:

    a. FULL - when the file contains a complete AIP data set or a subset thereof;
    b. UPD_BL - when the the file contains an AIP Data Set - Baseline Update or a subset thereof;
    c. UPD_DELTA - when the file contains an AIP Data Set - Delta Update or a subset thereof.

- [_Part] is optional and indicates that the file constitutes a subset of the complete AIP data set provided by the State. Note: the exact split in parts and their names is left at the discretion of each State;
- YYYYMMDD is the start of effective date in the format year, month, date;
- "_AIRAC" is optional and it shall be appended for Data Sets that contain changes complying with the AIRAC cycle rules.

AIXM| AIP DS – Donlon Data Set Espécimen

AIP Data Set - Specimen (DONLON)

Created by Wolfgang SCHEUCHER, last modified by EDUARD POROSNICU on 29 Jan 2019

Content

A Specimen AIP Data Set is provided in order to exemplify the coding guidelines on a concrete case. The content of the Specimen AIP Data Set is based on the fictitious Specimen AIP provided with the ICAO AIS Manual (DOC 8126) [1], also known as the "DONLON" data. When needed, the ICAO DONLON data has been altered or extended (e.g. to correct errors such as wrong coordinates or to provide additional features that are not containe threshold, airspace aggregations, etc). It will con examples for various situations that might exist i

This fictitious set of digital AIS data sets complie PANS-AIM provisions. The DONLON AIP Data Se AIXM coding guidelines.

⚠ **Note**
This data is entirely fictitious, located some NEVER BE USED AS OPERATIONAL DATA. T Atlantic!!!

In addition to an initial Donlon data set, this refe

- a series of fictitious updates, which provid Temporality use cases;
- Digital NOTAM coding examples, which ar NOTAM Specification.

⚠ **Note**
The gml:id and the xlink:title naming appli Specimen file are for the convenience of lc a recommendation of how to code these e
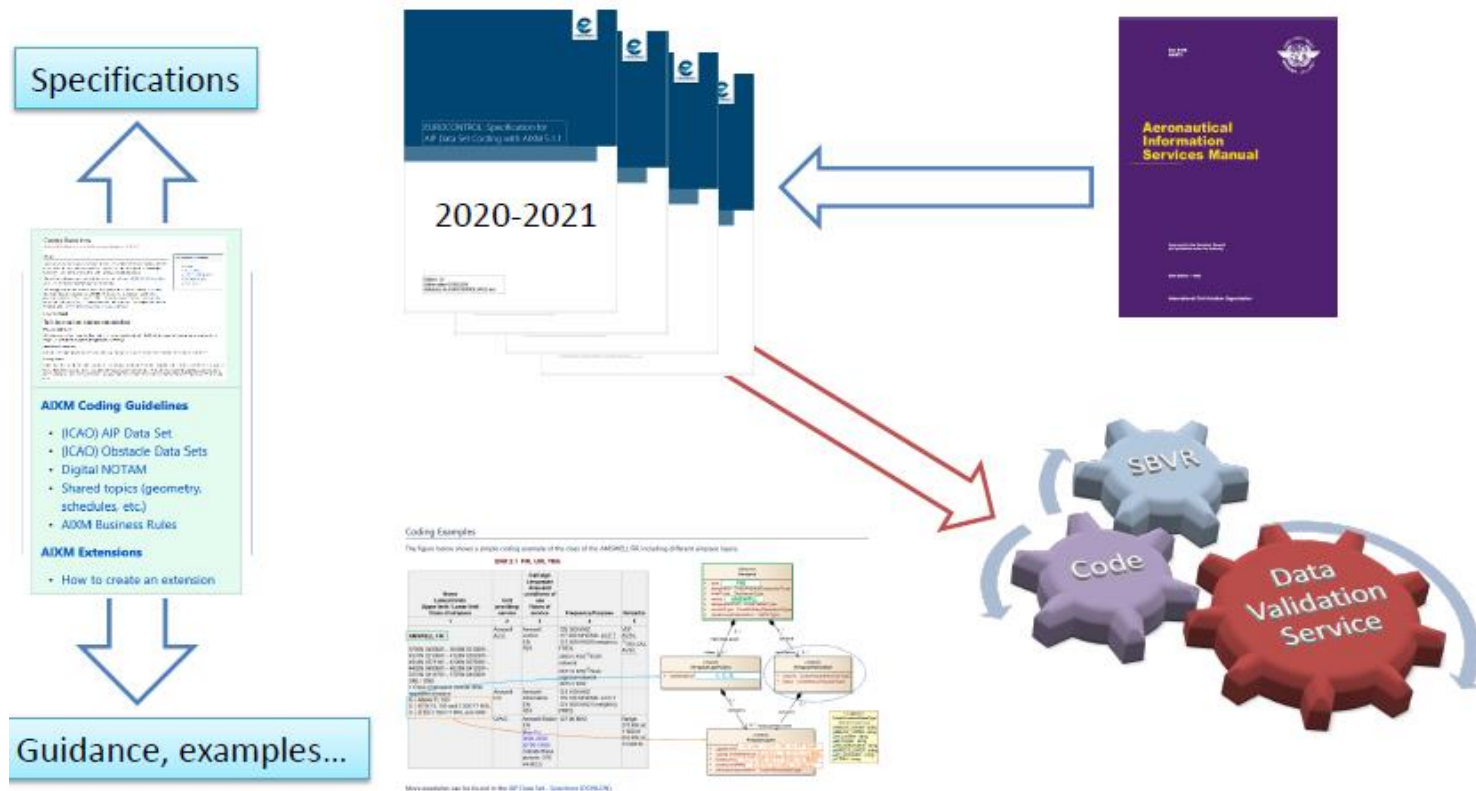
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EXPECTATIVAS

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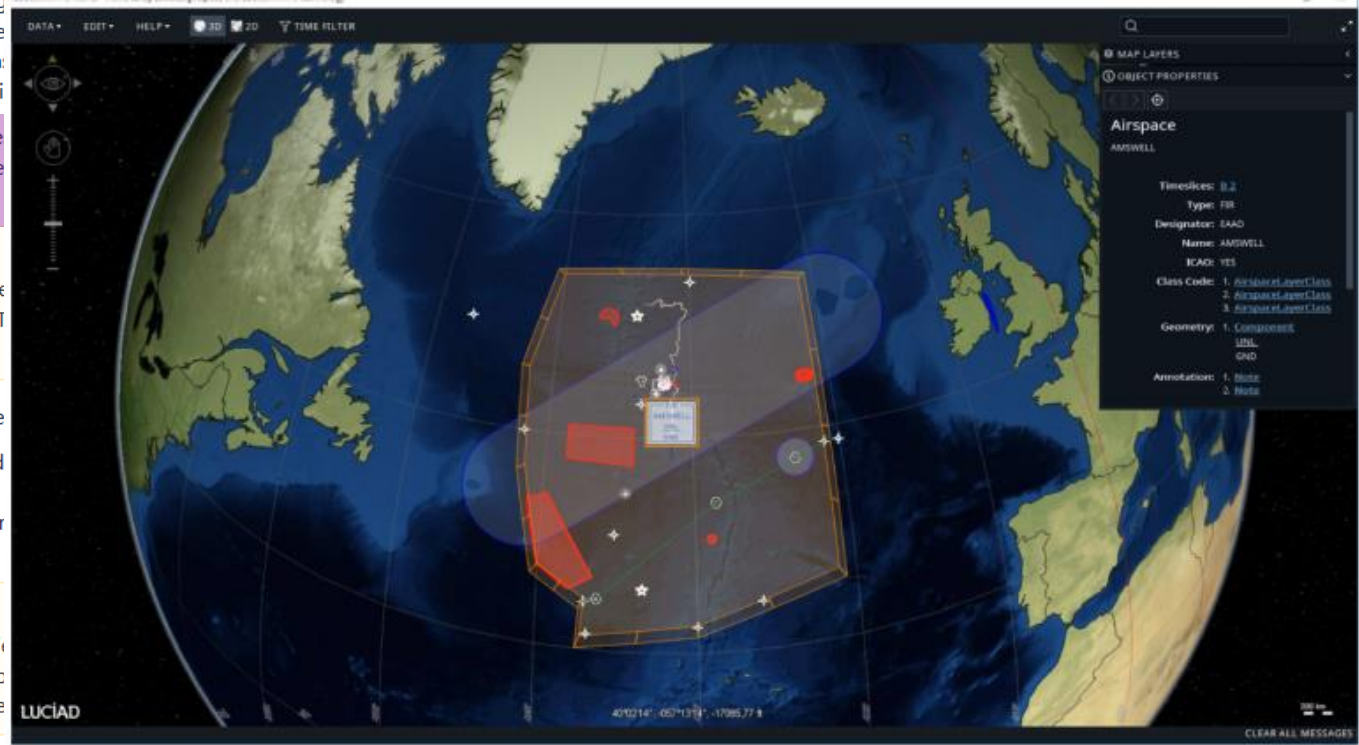
AIXM| WIP

- Obstáculo Data Set
  - Lineamientos de codificación AIXM
  - Mapeo de PANS-AIM a AIXM
  - Reglas de codificación y ejemplos
  - Propuesto para finales de 2019

- Procedimientos instrumentales de vuelo Data Set
  - Lineamientos de codificación AIXM
  - Trabajo en paralelo con AIXM 5.2
    - SBAS/GBAS, FAS DB, PBN, etc
  - Propuesto para mediados de 2020

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AIXM| Data Set - Especificaciones

- EUROCONTROL Specification for AIP Data Set Coding using AIXM 5.1.1 – 2do cuarto 2020.

¡Forma parte de la revolución del AIM!

www.groupead.com

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