AIM Data Catalogue

Towards a common National Reference in Switzerland

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Outline

- Introduction to the ICAO AIM Data Catalogue
- Purpose of Switzerland‘s work
- Approach taken in Switzerland to establish a national Data Catalogue
- Conclusions

Purpose of the ICAO AIM Data Catalogue

- The data Catalogue included in PANS-AIM Appendix 1 shall be considered as a **reference** for all provisions related to aeronautical data origination and publication.
- The Data Catalogue provides a **common language** that can be used by data providers/originators and AIS;
- The Data Catalogue consolidates **data that may be collected** and maintained by AIS
- The Data Catalogue is the source of the **accuracy and integrity requirements** for determination and reporting of aeronautical data to AIS
- It is also the source of the **resolution and integrity requirements** for publication and charting of products including aeronautical data included in Annex 15

Data Sub-Domains of AIM

- Aerodromes;
- Airspaces;
- ATS Routes;
- Instrument Flight Procedures;
- Radio Navigation Aids / Systems;
- Obstacles and
- Geographic Information;

Data Catalogue Structure

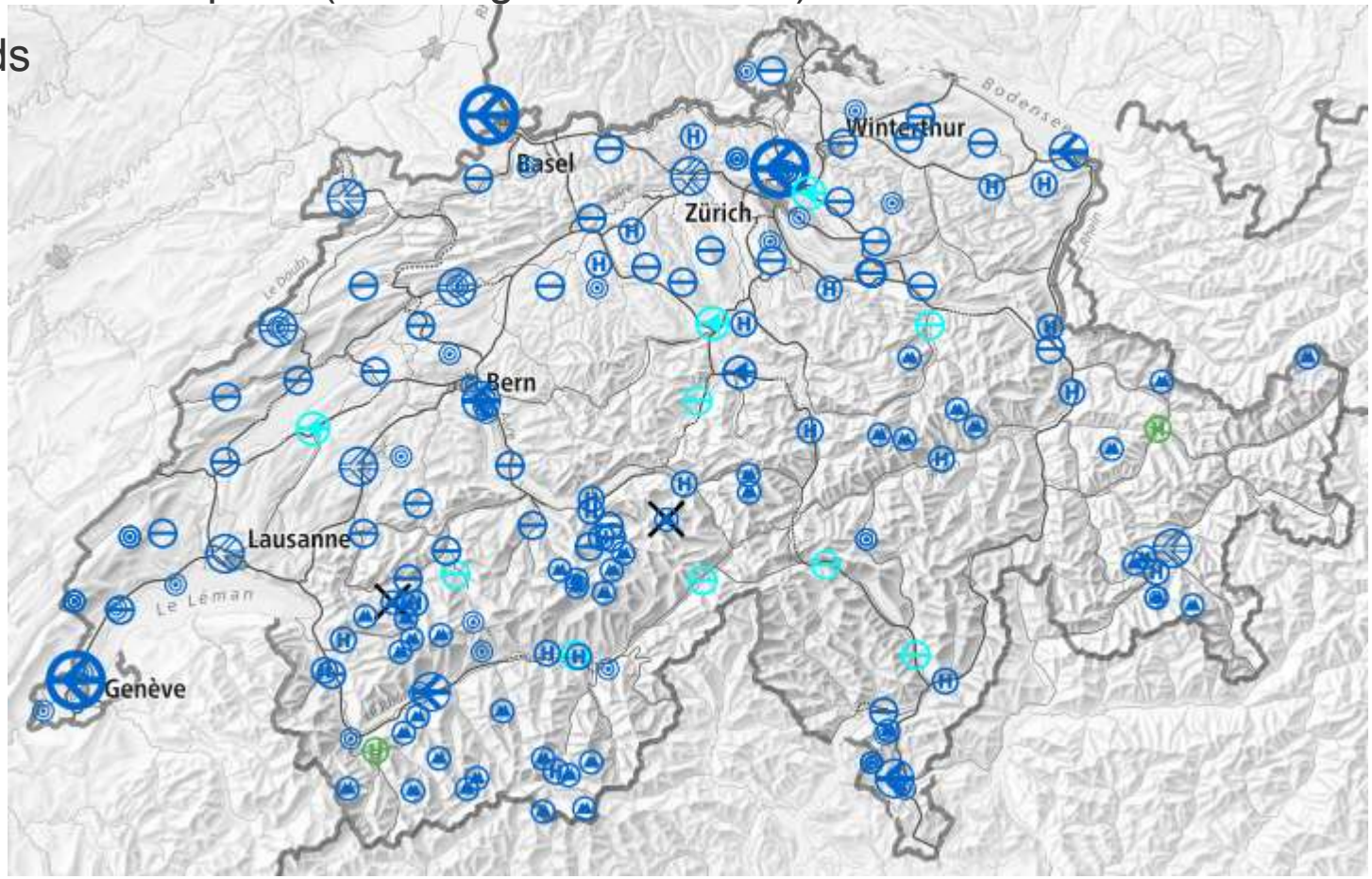
Title	Definition	Example
Subject	All Features mentioned in PANS-AIM	Runway;
Property	Property of the subject	Strip
Sub-Property		Length and width of strip
Type	Data Type and domain of values	Location, Elevation, or List of valid values (e.g. IFR, VFR, IFR/VFR)
Description	Definition (if an ICAO definition exists) or description of the subject and/or property and sub-property (taken from the source Annex or PANS document)	
Note	Additional information or conditions of the provision	“To be collected where appropriate”
Accuracy	Accuracy requirement according to Annex 11 and 14	1 m
Integrity	Integrity requirement	Critical, Essential, Routine
Origination	Type of origination	Surveyed, Calculated, Declared

Why a Data Catalogue in Switzerland?

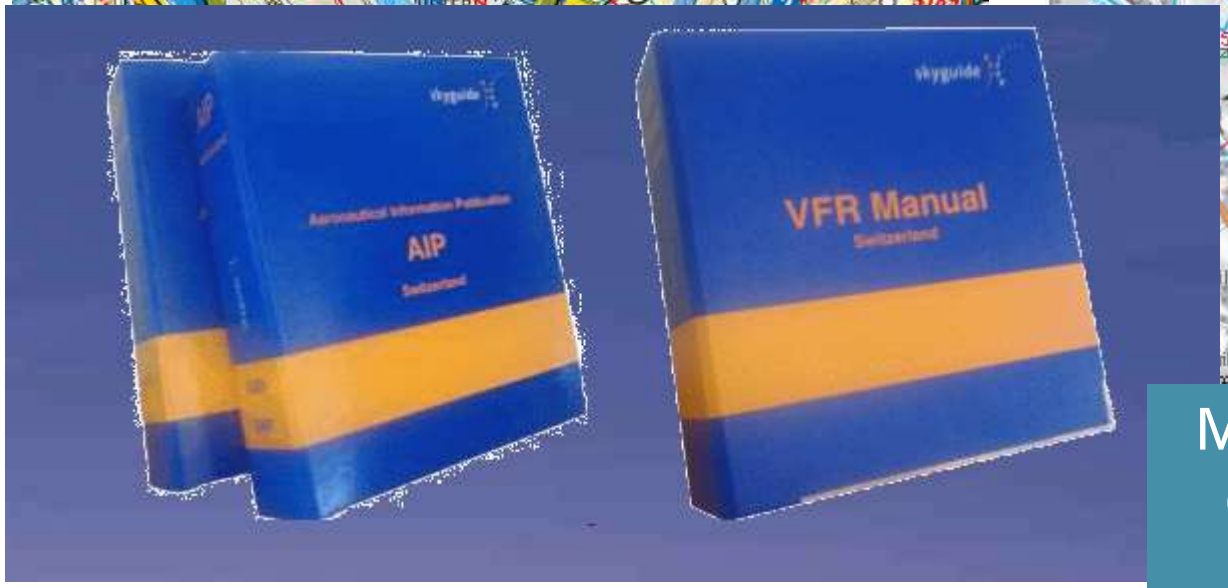
- Define the quality requirements for all aeronautical data collected in Switzerland, including national added IFR data as well as VFR an MIL data
- Define the authorised organisations responsible for origination of the data
- Define the organisational unit at the Federal Office of Civil Aviation (FOCA) for authorisation of the data as well as the units on military side to authorise military aviation data
- Comply with requirements of the European Aeronautical Data Quality regulation ADQ (EU Regulation 73/2010)

Airports in Switzerland

- 11 international Airports with published IFR-Procedures
- 75 VFR-Aerodromes and Heliports (including MIL locations)
- 42 Mountain airfields



Aeronautical Information Products



MIL AIP and other MIL products

VFR Products

Approach taken to establish the Data Catalogue

- Use the ICAO AIM Data Catalogue as available in the draft PANS-AIM on the ICAO website of the AIS-AIM SG.
- Analyse the national aeronautical information products to identify additional data items.
- Establish principles and rules how to assign DQR for all data items
- Conduct safety assessment workshops to define the national DQR for all data items according to the established rules and principles
- For each data item:
  - Identify the organisation responsible for the origination of the data item
  - Identify the organisational unit within FOCA responsible for authorising a change of the data item
- Consult with stakeholders
- “Publish” and declare the Data Catalogue applicable

ICAO AIM Data Catalogue as a Basis

- The work in Switzerland was started when the ICAO catalogue was still under construction
- A database facilitated the parallel development at ICAO and in Switzerland
- IDs assigned to each data item to link the national data

ICAO AIM Data Catalogue as a Basis

AIM Data Catalogue

Number of rows : 312

Subject	Property	Sub-Property	ID	Type	Description	Note	Reference	Accuracy	Integrity	Origin type	Pub. Resolution	Chart Resolution
Aerodrome/Heliport	Name		18	Text	The primary official name of an aerodrome as designated by an appropriate authority.		Annex 15 App 1 AD 1.3 1)/ AD 2.1					
	Designator	ICAO location indicator	17	Text	The four letter ICAO location indicator of the aerodrome/heliport, as listed in ICAO DOC 7910 (Location Indicators).		Annex 15 App 1 AD 1.3 1)/ AD 2.1					
		IATA Designator	976	Text	The identifier that is assigned to a location in accordance with rules (resolution 767) governed by the International Air Transport Association (IATA).		AMDB					
		Other	977	Text	A locally defined airport identifier, if other than an ICAO Location Indicator		AIS-AIM SG 12					
	Served city		20	Text	The full name (free text) of the city or town the aerodrome/heliport is serving		Annex 15 App 1 AD 2.2 2)					
	Type of traffic permitted	International_national	50	Code list	Indication if international and/or national flights are permitted at the aerodrome/heliport		Annex 15 App 1 AD 1.3 2)					
		IFR_VFR	51	Code list	Indication if IFR and/or VFR flights are permitted at the aerodrome/heliport		Annex 15 App 1 AD 1.3 2)/ AD 2.2 7)					
		Sched_nonsched	52	Code list	Indication if scheduled and/or nonscheduled flights are permitted at the aerodrome/heliport		Annex 15 App 1 AD 1.3 2)					
		Civil_military	53	Code list	Indication if civil commercial aviation and/or general aviation and/or military flights are permitted at the aerodrome/heliport		Annex 15 App 1 AD 1.3 2)					
		Restricted_use	54	Text	Indication if an aerodrome or heliport not open for the public (Only for the use of the owners).		AIXM 5.1 AirportHeliport					
	Heliport type		22	Text	The type of the heliport as mention in Annex 14 Volume II (Surface-level, elevated, shipboard or helideck)		Annex 14 II 2.4.1 a)					
	Control type		23	Text	Indication if an aerodrome is under civil control, military control or joint control		Annex 4 App 2 Chart symbol					
	Certified ICAO		24	Text	Indication if airport is/is not certified according to the ICAO rules		Annex 15 App 1 AD 1.5					
	Certification date		25	Date	The date when the airport certification has been issued by the supervising authority.		Annex 15 App 1 AD 1.5 2)					
	Certification expiration date		26	Date	The date when the airport certification will become invalid.		Annex 15 App 1 AD 1.5 2)					
	Field elevation	Elevation	55	Elevation	The vertical distance above Mean Sea Level (MSL) of the highest point of the landing area.		Annex 15 App 1 AD 2.2 3) Annex 14 I 2.3.1	0.5 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
		Geoid undulation	56	Height	Geoid undulation at the aerodrome/ heliport elevation position	where appropiate	Annex 15 App 1 AD 2.2 4) Annex 14 I 2.3.1	0.5 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
	Reference temperature		28	Value	The monthly mean of the daily maximum temperatures for the hottest month of the year at an aerodrome. This temperature should be averaged over a period of years.		Annex 15 App 1 AD 2.2 3) Annex 14 I 2.4.1					

ID

Extention of the ICAO Catalogue with National Data

- Analysis of the AIP, VFR Manual and charts
- Add all new data items to the catalogue with a reference to the national product

	Marking		625	Text	Type of marking of obstacle	Annex 15 App 8 Table A8-4 Annex 14 2.5.5				
	Material		626	Text	Predominant surface material of the obstacle	AMDB				
	Operator / Owner		995	Text	Name and Contact information of obstacle operator or owner	AIS-AIM SG 12				
	Designation	Registration number	1061	Text	Registration number of obstacle in Swiss Obstacle Database	AIP, VFRM and WEGOM				
		NOTAM Nr	1062	Text	Nr of NOTAM the obstacle has first been published with	AIP, VFRM and WEGOM				
		Reference	1063	Text	Reference to aerodrome	AIP, VFRM and WEGOM				
		Runway / Area	1064	Text	Runway or AOC affected by obstacle	AIP, VFRM and WEGOM				
	Coord Swissgrid		1060	Point Line	Horizontal position of obstacle in Swiss Grid coordniate system (CH1903/LV03, EPSG 21781)	VFRM				
	Position Description		1067	Text	Description of the position of the obstacle relative to a map point or ARP	VFRM				

Assessment workshops

- 6 workshops with domain experts
  - Aerodromes
  - NAV / CNS
  - Airspace and Routes
  - IFP
- Categorisation of the data items that can be assessed with the same arguments for example:
  - DQR defined by ICAO
  - Non-relevant for safety of the flight
  - Airspace limits (Airspace is a volume → lateral and vertical limits have the same integrity)
  - …
- Assess all data items applying the category rules
- Provide a rationale for the assessment made in all cases where the rule alone is not a sufficient argument

Rules applied for Accuracy

Rule-ID	Name	Description
A-002	Defined by ICAO (IFR / SVFR)	The data accuracy requirements defined by ICAO standards will be adopted to the data element in the IFR catalogue CH without a re-assessment.
A-004	Aerodrome Distance + Point (IFR / SVFR / VFR)	The accuracy requirements for aerodromes are set according the specification of the “Obstacle Limitation Surfaces”, which does not distinguish between IFR and VFR use. Data elements “Distance” + “Point” are set to 1m as for equal data elements defined by ICAO
A-005	Aerodrome Elevation (IFR / SVFR / VFR)	The accuracy requirements for aerodromes are set according the specification of the “Obstacle Limitation Surfaces”, which does not distinguish between IFR and VFR use. The accuracy for “Elevation” is set to 0.5m as for equal data elements defined by ICAO
A-008	Airspace and ATS routes Vertical Limits	Data elements, which are defining vertical limits (declared altitudes or flight levels) of airspaces and routes are set to 100 ft which corresponds to the publication resolution. (IFR / SVFR / VFR)
A-011	Alphanumeric elements	Accuracy cannot assigned to the following data elements. • “Text” • “Code List” • “Schedule” • “Date”
A-012	Resolution	Data elements, which have only a defined resolution and no accuracy. The value in the data catalogue shall be read as resolution.
A-013	Defined format	Data elements, describing a specific information with a given format e.g. FREQ 125.125 have no defined accuracy.

Rules applied for Integrity

Rule-ID	Name	Description
I-002	Defined by ICAO (IFR / SVFR)	The data integrity requirements defined by ICAO standards will be adopted to the data element without a re-assessment.
I-003	Non-relevant for flight safety	Data elements identified as not directly relevant for the continued safe flight – including ground movement, start- and –landing phase (e.g. lights) are classified “routine”. For each of those elements is a separate justification needed.
I-004	Alphanumeric elements	Data element of the following data types are classified “routine” • “Text” • “Code List” • “Schedule” • “Date”
I-005	Designators / Identifiers (IFR / SVFR)	Designators / Identifiers (type Text) of data elements which are directly influencing the flight path without ATC clearance (e.g. waypoint identifiers) have the same integrity classification as the classified parts (e.g. coordinates).
I-006	Airspace limits	Airspaces are considered as a volume. Therefore vertical and horizontal airspace-limits shall be set to the same integrity.
I-007	IFP minimum altitudes / heights	Data elements are categorized as “critical”. Risk of CFIT in case of corrupted data.
I-008	Not defined by ICAO (IFR / SVFR)	Data elements not classified by an ICAO standard can only be ”routine” or “essential”. This element needs to be assessed and documented. For each of those elements is a separate justification needed.
I-010	VFR operation	In VFR operation the pilot should not only trust on aeronautical information. The pilot can always be considered as a mitigation. Therefore all VFR elements are “routine”.
I-011	VFR operation re-assessed	If a data element is classified “critical” in the IFR-use, the VFR data element shall be re-assessed whether a higher integrity classification than “routine” (rule I-010) is required.

Responsible Parties for Origination and Authorisation

- Several organisations are not aware that they are responsible for the origination of information in GEN, ENR 1 and AD1 section of the AIP
- Aerodrome categories:
  - International and regional Airports with IFR operations
  - Regional Airports without IFR
  - Private Aerodromes
  - Heliports & Hospital Helipads
  - Mountain Airfields
- Party responsible for Origination vs Originator of a data item
  - Aerodrome is responsible for the provision of data on runways and instrument flight procedures to AIM
    - Surveyor originates data of the runways
    - Procedure designer originates the instrument flight procedures

National Data Quality Requirements

Property	Sub-Property	ID	Type	Description	Note	Reference	Accuracy	Integrity	Origin type	Pub. Resolution	Chart Resolution	ADQ HL-	IFR Accuracy	IFR Integrity	VFR Accuracy	VFR Integrity	National Reference
Frequency		45	Value	Frequency of the station providing the service		AMDB											
Boundary		46	Polygon	Area boundary of the frequency area		AMDB											
Identifier		47	Text	The indentifier of the hot spot		AMDB											
Annotation		48	Text	Additional information about the hot spot		Annex 4 13.6 h)											
Geometry		49	Polygon	The geographical area of the hot spot		Annex 4 13.6 h) AMDB							5 m	routine	5 m	routine	VFR AD INFO chart
Designator		67	Text	The full textual designator of the runway, used to uniquely identify it at an aerodrome/heliport. E.g. 03/27, 02R/20L, RWY 1.		Annex 15 App 1 AD 2.12 1) Annex 14 I 2.5.1 a)											VFR AD INFO
Nominal length		68	Distance	The declared longitudinal extent of the runway for operational (performance) calculations.		Annex 15 App 1 AD 2.12 3) Annex 14 I 2.5.1 a)	1 m	critical	surveyed	1 m or 1 ft	1 m	LD005	1 m	critical	1 m	routine	VFR AD INFO
Nominal width		69	Distance	The declared transversal extent of the runway for operational (performance) calculations.		Annex 15 App 1 AD 2.12 3) Annex 14 I 2.5.1 a)	1 m	essential	surveyed	1 m or 1 ft	1 m	LD007	1 m	essential	1 m	routine	VFR AD INFO
Geometry		70	Polygon	Geometries of RunwayElement, RunwayDisplacedArea and RunwayIntersection		AMDB											
Centre line points	Position	108	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	Annex 14 I App 5 A5-1 Annex 4 Ch 3 and 4, 5 AMDB	1 m	critical	surveyed			LL020	1 m	critical			
	Elevation	109	Elevation	The elevation of the corresponding centre line point. (See Annex 14 I 2.3.2: ---- for non-precision approaches ... any significant high and low intermediate points along the runway shall be measured to the accuracy of one-half metre or foot...)		Annex 4 I 2.3.2 Annex 14 I App 5 A5-2 Annex 4 Ch 3 and 4, 5 AMDB	0.25 m	critical	surveyed			EH013	0.25 m	critical			
	Geoid undulation	110	Height	The geoid undulation at the correspoding centre line point		AMDB											
RWY exit line	Exit guidance line	111	Line	The geographical location of the runway exit line		Annex 14 AMDB	0.5 m	essential	surveyed	1/100 sec	1 sec	LL025	0.5 m	essential			
	Colour	112	Text	Colour of runway exit line		AMDB											
	Style	113	Text	Style of runway exit line		AMDB											
	Directionality	114	Code List	Directionality of RWY exit line (one-way or two-way)		AMDB											
Surface type		73	Text	The surface type of the runway defined as specified in Annex 14 Volume I		Annex 15 App 1 AD 2.12 4) Annex 14 I 2.5.1 a)											VFR AD INFO
Strength	PCN	115	Text	Pavement classification number		Annex 14 I 2.6.2.a)											VFR AD
	Pavement type	116	Text	Pavement type for aircraft classification number — pavement classification number (ACN-PCN) determination		Annex 14 I 2.6.2 b)											VFR AD INFO
	Subgrade category	117	Text	Subgrade strength category		Annex 14 I 2.6.2 c)											VFR AD
	Allowable pressure	118	Text	Maximum allowable tire pressure category or maximum allowable tire pressure value		Annex 14 I 2.6.2 c)											VFR AD INFO
	Evaluation method	119	Text	The evaluation method used		Annex 14 I 2.6.2 c)											VFR AD
	MPW	1065	Value	Runway strength in MPW (maximum permissible weight) for asphalt and concrete runways		VFRM											VFR AD INFO
	MPA	1066	Value	Runway strength in MPA (Max. tire pressure) for grass runways		VFRM											VFR AD INFO
Strip	Length	120	Distance	The longitudinal extent of the runway strip.		Annex 15 App 1 AD 2.12 10) Annex 14 I 2.5.1 b)							1 m	routine			
	Width	121	Distance	The transversal extent of the runway strip		Annex 15 App 1 AD							1 m	routine			

Conclusions

- To be useable as a basis for national catalogues, the ICAO Data Catalogue
  - Should be made available in digital form
  - Should be kept up-to-date to reflect future amendments to Annexes and PANS
- Process of establishing the catalogue has helped to
  - Identify inconsistencies between IFR and VFR products
  - Clarify responsibilities for origination

Thank you for your attention

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