



ICAO ESAF GANP 8th Edition and ASBU Implementation Data Submission Workshop

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**INTERNATIONAL
CIVIL AVIATION
ORGANIZATION**



Overview of the Applicable ATM, SAR & AIM Elements of ASBU in AFI region

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AFI Region Priorities



Safety
enhancement



Capacity and
efficiency



Regional
interoperability



Environmental
sustainability



Digital
transformation of
ATM

FRTO (Free Route
Operation)-B0/1
Direct routing
(DCT)

Direct routings are established with the aim of providing airspace users with additional flight planning route options.

Enablers: DCT Procedures, ATC system upgrades, Upgrade of Aircraft Operators Flight Planning Systems, Training requirements and ATFM system for FUA.

FRT0-B0/2
Airspace planning
and Flexible Use
of Airspace (FUA)

Establishment of Flexible Use of Airspace (FUA) process and improved data exchange between civil and military stakeholders by automation.

Enablers: Operational approval, FUA Procedures, Tools and System to support FUA, Training requirements and ATFM system for FUA.

FRT0-B0/3 Pre-validated and coordinated ATS routes to support flight and flow

During instances when ATC needs to move traffic away from, or into, a particular area of airspace, traffic managers will typically implement reroutes that are predetermined and applied to the certain sector/airport accordingly.

These collection of routes have been pre-validated and coordinated with impacted ATC centers and airspace users.

- Preferred Routes: Normal routes
- Playbook Routes: Back up routes
- Coded Departure Routes (CDR): standardized coded instructions that reduces communication.

Do not confuse Conditional Routes (CDR) used in Flexible Use of Airspace (FUA).

FRT0-B0/4

Basic conflict detection and conformance monitoring

Reduction of ATCO's workload via early and systematic conflict detection and conformance monitoring.

Medium-Term Conflict Detection (MTCD) tool: advanced ATC decision support system, automatically analyzes flight plans and radar trajectories to warn controllers, proactively, of potential mid-air collisions or airspace violations up to 20 minutes before they occur.

Monitoring Aids (MONA): an automated ATC function designed to assist controllers in tracking and managing the routine flow of air traffic and alerts controllers of any potential flight discrepancies.

1. Deviation Warnings
2. Operational Reminders
3. Trajectory Updates

APTA (Airport Accessibility)-

B0/1

PBN

Approaches
*(with basic
capabilities)*

The use of PBN in design of approach procedures to provide more flexibility to airspace planners to manage the use of airspace, and to facilitate access to airports.

Provides instrument approach procedures with vertical guidance in support of stabilized approaches.

Can be used to facilitate access at aerodromes where conventional procedures are not implementable, or in support of existing procedures for contingency use.

APTA (Airport
Accessibility)-
B0/2
PBN SID and
STAR
procedures
*(with basic
capabilities)*

PBN capabilities allows more flexible placement of arrival and departure routing without the need for Ground-based infrastructure to support these routes.

Applicable in all terminal areas: **Arrivals facilitates descent** and connects to the approach phase. **Departures facilitates climb** and provides lateral path to exit terminal area.

Provides the basic capability to support the implementation of CDO and CCO operations.

Enables better airspace management, reduced path distance, and reduced noise footprint.

APTA (Airport
Accessibility)-
B0/3
SBAS/GBAS
CAT I
precision
approach
procedures

Introduction of SBAS and GBAS CAT I procedures allow for reduced minima at aerodromes situated in areas of significant terrain, where ILS is not possible.

Applicable in Runway ends where precision approach guidance is considered a requirement.

Enablers: CAT I Precision Approach Procedure design and use, procedure validation, approval and publication, SOPs, Training requirements, Contingencies, Aircraft capability & Ground based system.

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APTA (Airport Accessibility)- B0/4 CDO (Basic)

Arriving aircraft are allowed to descend continuously from top of descent by employing minimum engine thrust, ideally in a low drag configuration, prior to the Initial Approach Fix (IAF)

ATC procedures exist to facilitate uninterrupted descent, reducing ATC/Pilot interaction.

Reduce fuel burn by not requiring application of power during descent.

Applicable in non-congested terminal airspace with PBN STAR routings where greater efficiency is required, and in noise sensitive areas requiring reduced noise footprint.

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APTA (Airport Accessibility)- B0/5 CCO (Basic)

Departing aircraft are allowed to climb continuously from take-off and climb efficiently using climb profiles that reduce controller/pilot communications and segments of level flight until the top of climb.

ATC procedures exist to facilitate uninterrupted climb, reducing ATC/Pilot interaction.

Reduce fuel burn by not requiring level-offs during climb.

APTA (Airport
Accessibility)-
B0/6
PBN
Helicopter
Point in Space
(PinS)
Operations

Helicopter unique capabilities allow IFR operations that start or terminate from any suitable point in space (PinS), if visual conditions support take-off/landing capability from that point.

PinS operations facilitates arrivals and departures to landing locations which do not otherwise support such operations.

Enablers: Helicopter PBN Point in Space (PinS) Procedure design, procedure validation, approval and publication, SOPs, Training requirements, Contingencies, Aircraft capability.

APTA (Airport
Accessibility)-
B0/8
Performance
based
aerodrome
operating
minima –
Basic aircraft

Instrument approaches to non-instrument runways (***no ILS***), improving airport access.

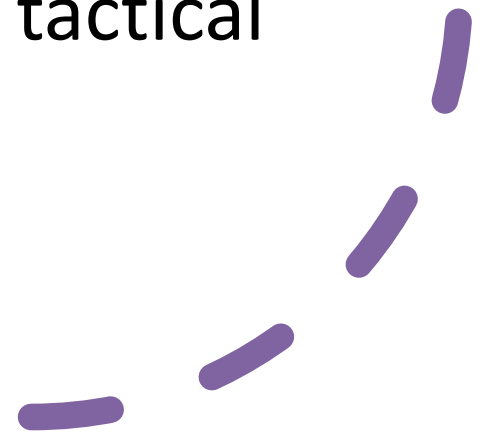
Flexibility to gradually improve the ground infrastructure with consequent improvements in operating minima.

Applied at airports with limited infrastructure wanting to implement or improve instrument approach procedures.

GNSS-based instrument approaches for basic aircraft and then progressively improve airport infrastructure (such as runway and approach lighting).

NOPS (Network
Operations)-
B0/1
Initial integration
of collaborative
airspace
management
with air traffic
flow
management

- Introduce ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process applicable to the strategic through to the tactical phases of operations.



NOPS-B0/2 Collaborative Network Flight Updates

Improve ATFM situation awareness in order to facilitate re-routings and coordinated application of ATFM measures.

This element will involve all ANSPs, AUs and the ATM Network Function for the collaborative updates of the flight status within an ATFM area.

This will enhance predictability and better utilisation of available capacity.

Enablers: Procedures for updated flight plan information, and Network Planning, correlated Position Reports, ATFM message exchanges, Flight activation messages & updated flight plan info.

NOPS-B0/3

Network Operation Planning basic features

- The Network **Operation Planning** provides an overview of the situation from strategic planning through real time operations with ever increasing accuracy up to and including the day of operations by a common situational awareness for all ATFM actors within and adjacent to the ATFM area and allowing network wide demand and capacity balancing.
- NOP is based on enhanced participation in a **dynamically updated** collaborative planning process.
- NOP requires the sharing of the **latest flight status and intentions; airport and airspace component, associated demand and capacity balancing** measures in a frequently updated plan which is aimed to be realised as target by all actors.
- The **elements and formats of the plan** need to be established and harmonized, taking into account the requirements of the users of these plans.

NOPS-B0/4 Initial Airport/ATFM slots and A-CDM Network Interface

Initial integration of airports into the ATM network function.

A-CDM integrates with ATFM via exchanges of specific messages.

Stakeholders share relevant airport and flight turnaround information with ATM network function resulting in better predictability and better use of existing capacity whilst considering user preferences and requirements.

Ensures ATFM slot adherence and limited ATFM slot swapping in order to meet airline demands in line with capacity declarations.

Convergence is ensured between airport slots, and flight plans, together with airport slot monitoring processes in order to improve consistency.

SNET-B0/1 Short Term Conflict Alert (STCA)

To assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance.

Surveillance data from ground radars and ADS-B stations is used to track aircraft.

STCA systems alert the controller when a given separation between two aircraft is actually lost or may be lost within a given amount of time.

The warning time for the linear prediction may depend on the control unit specificities but is typically equal to or lower than 2 minutes.

SNET-B0/2 Minimum Safe Altitude Warning (MSAW)

To assist the air traffic controller in preventing controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles.

Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels) and environment data (including terrain and obstacle data) are input to the MSAW system to generate the alerts to the controller working position.

SNET-B0/3 Area Proximity Warning (APW)

APW is designed, configured and used to make a significant positive contribution to the prevention of accidents arising from unauthorized penetration of an airspace volume.

Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels and RVSM status) and environment data (including airspace volumes) are input to the APW system to generate the alerts to the controller working position(s).

SNET-B0/4 Approach Path Monitoring (APM)

APM is a Ground-based safety net intended to warn the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles during final approach.

Surveillance data (including tracked pressure altitude), flight data (including concerned sectors) and environment data (including terrain and obstacle data) are input to the APM system to generate the alerts to the controller working position(s).

SURF (Surface
Operations)-
B0/1
Basic ATCO
tools to
manage traffic
during ground
operations

- To improve safety and efficiency during ground operations by providing proper indications to pilots and vehicle drivers.
- The guiding and routing service is delivered using visual aids and signals on the aerodrome.
- The service is managed by the ATCO to provide pilots and vehicle drivers all necessary information to taxi and drive with the aim of avoiding incursions on the runway or conflicts on the taxiway.

ACAS-B1/1 Airborne Collision Avoidance Systems (ACAS) Improvements

- To provide airborne collision avoidance as a last resort safety net for pilots.
- TCAS systems selectively interrogate nearby aircraft to determine their position and velocity (using Mode C/S replies).
- Resolution advisories provide flight crews with vertical guidance (climb, descend, remain level, do not descend/climb) as appropriate to avoid collisions.

CSEP-B1/1

Basic airborne situational awareness during flight operations (AIRB)

Improves traffic situational awareness in all phases of flight.

- AIRB facilitates out-the-window visual acquisition of airborne traffic within visual range and traffic situational awareness for traffic beyond visual range.

- It enhances traffic situational awareness and quicker visual acquisition of targets through basic airborne situational awareness during flight operations enabled by the use of a cockpit display traffic information (CDTI).

- It supports the flight crew in integrating information from these sources into a comprehensive and accurate traffic picture including long traffic detection range.

FRT0-B1/1 Free Route Airspace (FRA)

FRA is a specified volume of airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) significant points, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.

FRA enables airspace users to fly as close as possible to what they consider the optimal trajectory without the constraints of a fixed ATS route network structure.

The Free Route Airspace (FRA) concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users.

FRT0-B1/2
~~Required Navigation
Performance (RNP)~~
routes
FRT0-B1/2
Performance Based
Navigation (PBN)
routes

- The use of PBN (Area Navigation (RNAV) or Required Navigation Performance (RNP)) routes aims to increase the efficiency of en-route airspace, including within Free Route Airspace (FRA).
- Where FRA is deployed PBN routes also ensure the connectivity with TMAs, where required.

FRT0-B1/3 Advanced Flexible Use of Airspace (FUA) and management of real time airspace data

FUA and airspace management (ASM) need to be enhanced with collaborative airspace data sharing between all ATM actors, negotiation procedures, system support and real time ASM data integration.

FUA procedures are enhanced by ASM data sharing between the ATM network function, ASM actors, airspace users and ATC.

ASM data regarding the planning and tactical management of airspace reservations are continuously exchanged and integrated in real time between the ATM systems.

Continuous exchange of ASM data between civil and military national actors will be enhanced.

FRT0-B1/5 Enhanced Conflict Detection Tools and Conformance Monitoring

- Enhancements of basic mid-term conflict detection (MTCD)/ monitoring alert (MONA) functions and thus further improving the ATCO productivity and reducing the workload.
- MTCD will be complemented **by basic conflict resolution advisor** and a what if function.
- Monitoring aids (MONA) provide controllers with reminders and warnings and are enhanced via the integration of Aircraft Derived Data (ADD).

SNET-B1/1 Enhanced STCA with aircraft parameters

- Assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and flight intent reported by aircraft.
- Using aircraft intent parameters allows STCA systems to reduce the number of unnecessary alerts, to increase the number of relevant alerts and to alert earlier, compared to the basic STCA system in Block 0.
- ***SNET-B1/1 Enhanced STCA uses aircraft intent data such as the Selected Flight Level from ADS-B or Mode S to predict where an aircraft will actually level off, instead of assuming it will continue climbing or descending indefinitely, thereby reducing false conflict alerts and improving safety-net performance.***

RSEQ-B0/1 Arrival Management

- Arrival management metering and sequencing by ATC is based on inbound traffic prediction information, and decision-making support.
- Time-based metering (as opposed to time-based separations) is the practice of planning a sequence of traffic by time rather than distance.
- Typically, the relevant ATC authorities will assign a time in which a flight must arrive at the aerodrome or at a specific control point, and/or advises subject flights of speed changes as required to achieve the optimal separation on final approach.

RSEQ-B0/2 Departure Management

- Departure management sequences the aircraft for optimized utilization of ground infrastructure and efficiently meet en-route and destination airport constraints.
- Slots assignment and adjustments will be supported by departure management automation like departure flow management.
- It will sequence aircraft, based on the ground and airspace structure, wake turbulence, aircraft capability, en-route and destination ATFM constraints, and airspace users' preferences.
- This will serve to increase aerodrome throughput and compliance with allotted departure time.

RSEQ-B0/3

Point merge

- Allows merging of arrival flows.
- Sequencing using pre-defined legs equidistant from a point that are used for shortening or stretching the arrival path.
- Point Merge is based on a specific route structure that is made of a point (the merge point) with pre-defined legs (the sequencing legs) equidistant from this point that are used for shortening or stretching the arrival path.

SURF-B0/1

Basic ATCO tools to manage traffic during ground operations

The guiding and routing service is delivered using visual aids and signals on the aerodrome.

The service is managed by the air traffic controller (ATCO) to provide pilots and vehicle drivers all necessary information to taxi and drive with the aim of avoiding incursions on the runway or conflicts on the taxiway.

Provision of guidance and routing information to the pilot in order to manage the traffic in a safe and efficient way by the controller:

- to confirm the routing of all aircraft and vehicles according to the defined identification procedures;

- to prevent incursions on the **runway using visual aids, stop bars in particular.**

The Controller monitors and commands the lighting systems.

SURF-B0/2 - Comprehensive situational awareness of surface operations

To better maintain ATCO awareness of ground operations.

The surveillance service of Advanced Surface Movement Guidance and Control System (A-SMGCS) provides situational awareness through the positioning, identification and tracking of suitably equipped aircraft and vehicles on the aerodrome movement area.

Information is presented on the air traffic controller (ATCO) and airport operator display independent of visibility conditions and ATCO line of sight.

SURF-B0/3 - Initial ATCO alerting service for surface operations

Detection by the ATCO of potentially unsafe situations with regard to runway operations.

The ATCO will be provided with a short-term conflicting alerting tool (A-SMGCS initial alerting service) that monitors movements on or near the runway and detects possible conflicts between an aircraft or aircraft and vehicles, including unauthorised aircraft or vehicles.

DATS B1/1 – Remotely Operated Aerodrome Air Traffic Services

- To provide ATS at aerodromes not from a traditional on-site tower, but remotely from either a local or a distant location.
- Provide ATS for an aerodrome which due to its location has limited support living facilities for staff and results in increased overall operational costs to build and maintain a conventional on-site tower.
- Provide a contingency ATC Tower Facility from a remote tower in the event the regular on-site tower is unavailable.

GADS-B1/1 Aircraft Tracking

- To provide support to the ATSU Alerting Service in areas without ATS surveillance with an update rate of the aircraft position of at least once per 15 mins.
- To assist the relevant stakeholders in the timely identification and location of aircraft in distress, to reduce reliance on the procedural methods for determining aircraft position and helping to ensure the availability and sharing of aircraft position data.
- Aircraft operator will be able to track the aircraft, detect missing position reports, notify if necessary the relevant ATSUs and timely share relevant information including last known position(s).

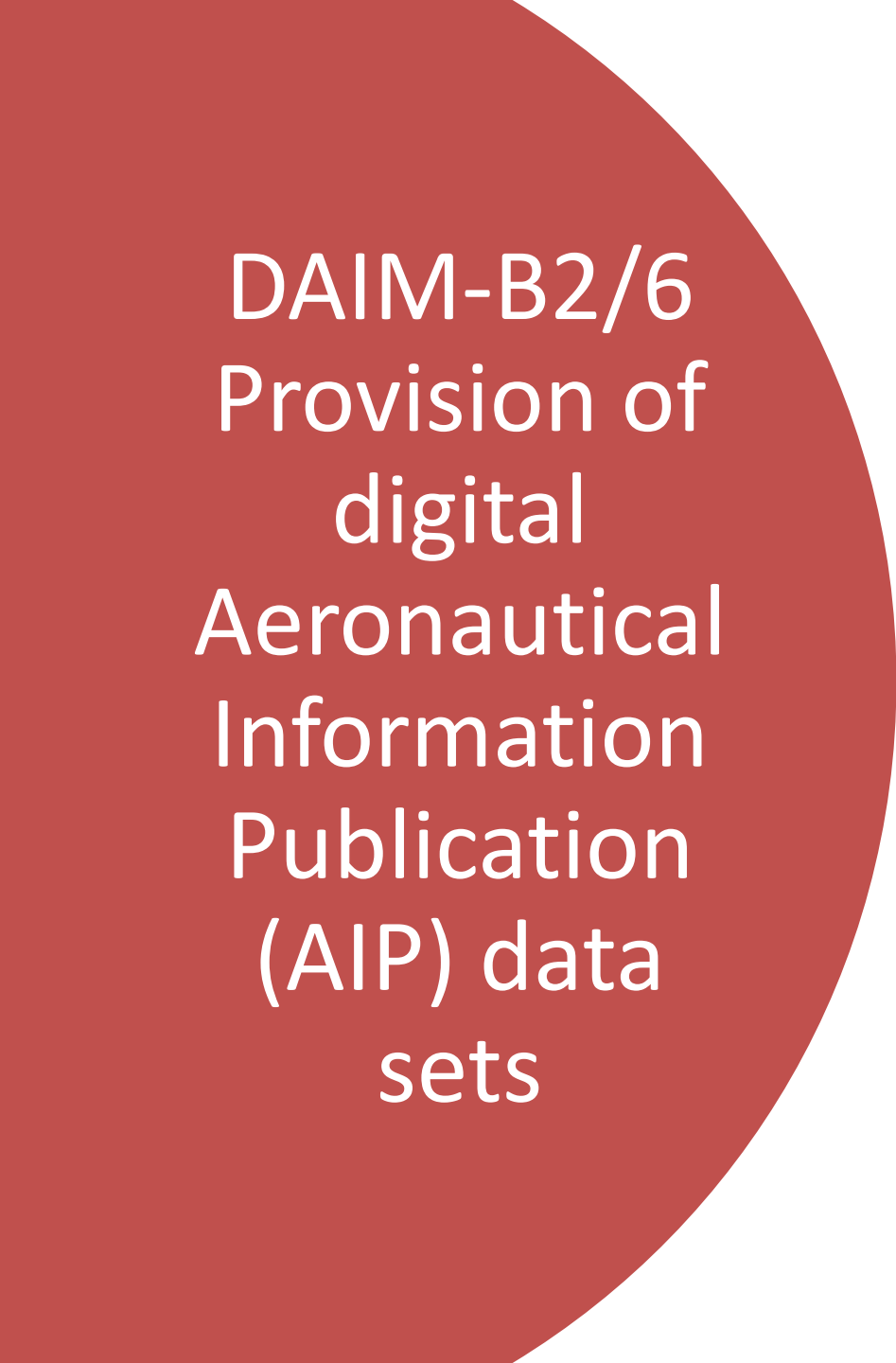
GADS-B1/2
~~Contact~~
~~directory service~~
GADS-B1/2
Operational
Control Directory

- To ensure that Point of Contact (PoC) information is available and can be accessed by Rescue Coordination Centres (RCCs), ATSUs and aircraft operators in support of emergency situations.
- Point of Contact repository is part of the Global Aeronautical Distress and Safety System (GADSS) and is used to enable timely contact between the persons relevant to an emergency situation involving an aircraft in a specified area.

DAIM-B1/1 - Provision of quality-assured aeronautical data and information

To ensure that aeronautical data and information comply with quality standards to meet the needs of airspace users and support the safety of flight operations.

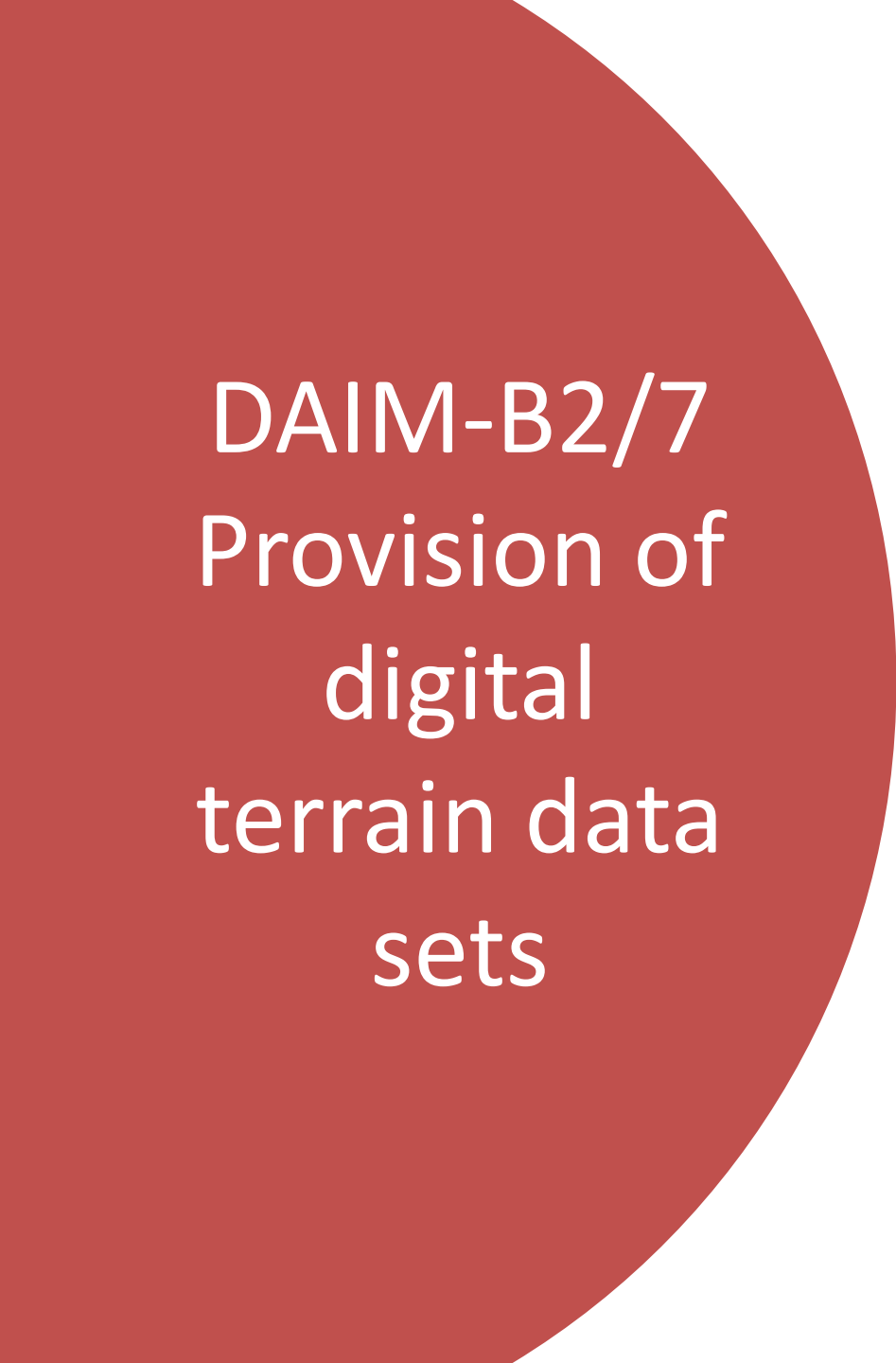
Provision of high quality aeronautical data and information; consistent interpretation and timely exchange of aeronautical data and information; and, automatic management, processing, verification, usage and exchange of aeronautical data and information.

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DAIM-B2/6 Provision of digital Aeronautical Information Publication (AIP) data sets

To make available digital AIP data and information in an interoperable and mutually understood manner.

Provision of digital AIP data sets. This will facilitate the exchange of aeronautical information that becomes easy to be integrated and filtered, thus increasing cost effectiveness and efficiency.

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DAIM-B2/7 Provision of digital terrain data sets

To make available digital terrain data and information in an interoperable and mutually understood manner.

Provision of terrain data as digital data sets. This will facilitate the exchange of terrain data that becomes easy to integrate and easily filtered, thus increasing cost effectiveness and efficiency.

The need for interoperable exchange of terrain data requires providing the data in digital form and complying with digital data exchange requirements.

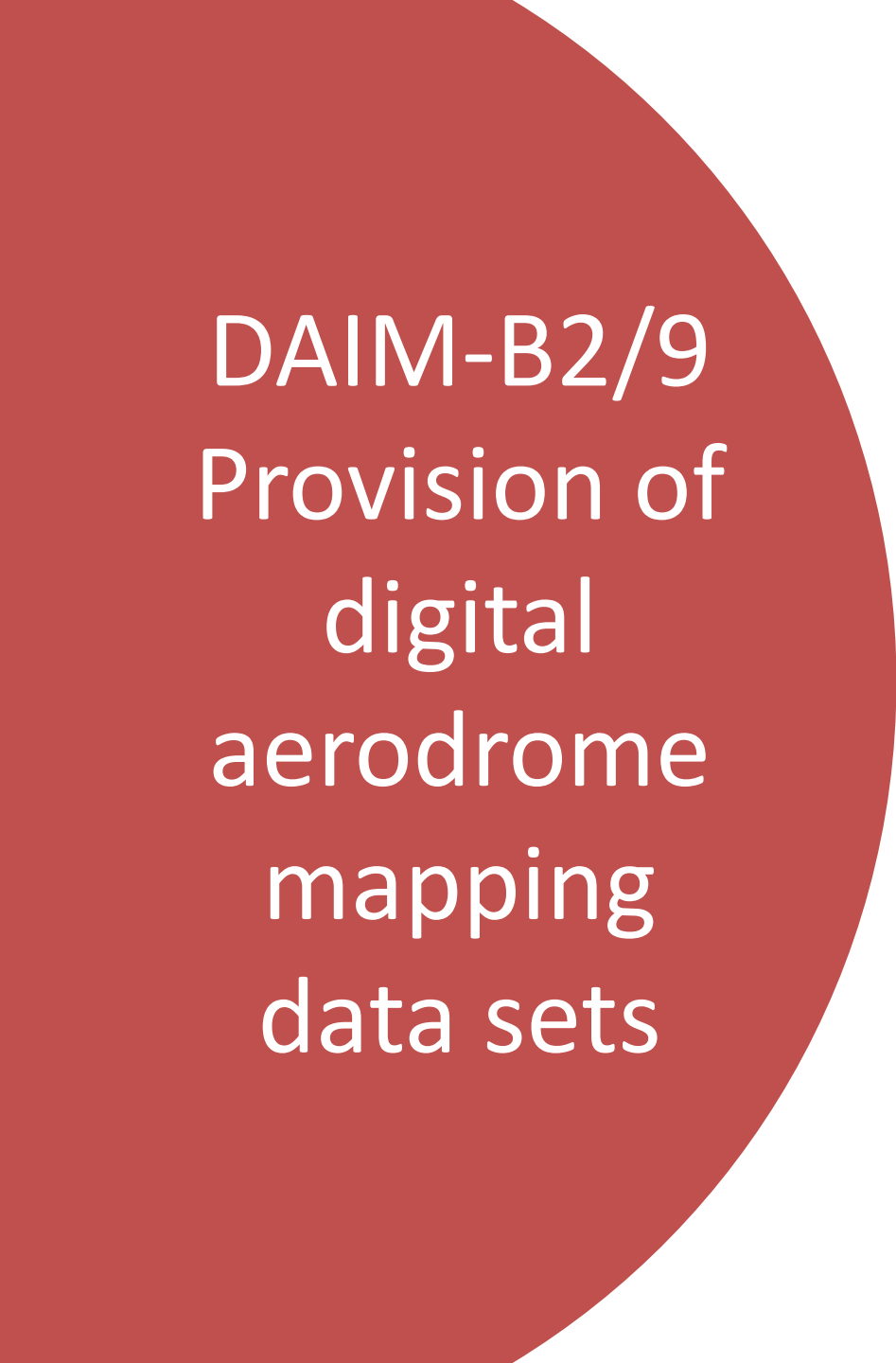
DAIM-B2/8

Provision of digital obstacle data sets

Provision of obstacle data as digital data sets. This will facilitate the exchange of obstacle data that becomes easy to integrate and easily filtered, thus increasing cost effectiveness and efficiency.

To make available digital obstacle data in an interoperable and mutually understood manner.

The need for interoperable exchange of obstacle data requires providing the data in digital form and complying with digital data exchange requirements. This element consists in the replacement of existing obstacle data by digital obstacle data sets.

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DAIM-B2/9 Provision of digital aerodrome mapping data sets

To make available digital aerodrome mapping data and information in an interoperable and mutually understood manner.

Provision of aerodrome mapping data as digital data sets.

This will facilitate the exchange of aerodrome mapping data that becomes easy to integrate and easily filtered, thus increasing cost effectiveness and efficiency.

DAIM-B2/10 NOTAM improvements

- To provide timely and relevant information about status and condition of the ANS infrastructure to the next intended users via NOTAM.
- Identification of clear operational conditions to determine when a NOTAM shall or shall not be originated, thus ensuring that the information provided meets the needs of the users; provision of digital NOTAMs to enhance the quality of the information provided and allow the graphical representation and better filtering of information to assist operators in retrieving the relevant information.

Thank You

