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Guidelines for the Implementation of OPMET Data Exchange using IWXXM

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ICAO AFI IWXXM Implementation WEBINAR

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IWXXM implementation Guidelines

- March 2013: First draft by DMG (together with PT/MARIE & EC)
- Nov. 2013: AMD 76 to ICAO ANNEX 3 enabled States in the position to do so, to exchange OPMET data in GML (in addition to TAC)
- Nov. 2015: First version of CONOPS-Concept of Operations (EUR Doc 033)
- Oct. 2016: CONOPS adopted as global document by METP and renamed into “Guidelines for the Implementation of OPMET Data Exchange using IWXXM”

» **4th Edition, issued November 2020**

IWXXM implementation Guidelines

- Proposal that ICAO-regions maintain a regional version to cover regional features e.g.:
  - **EUR Doc 033, 5th Edition issued on 19.10.2019**
  - **MID Doc 012, Edition issued in September 2018**
- Nov. 2016: AMD 77 to ICAO ANNEX 3 ➔ *Recommendation*: that states **should** disseminate data in IWXXM in addition to TAC-data.
- Nov. 2018: AMD 78 to ICAO ANNEX 3 ➔ Standard: that states shall disseminate data in IWXXM in addition to TAC from 5. November 2020.

IWXXM implementation Guidelines

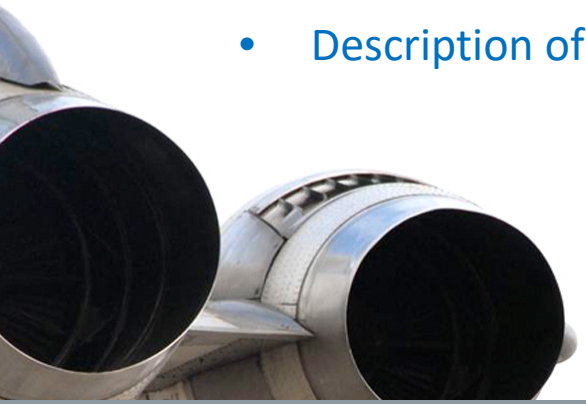
WHY NOT STAYING WITH TAC?

- WMO decision to move to BUFR
- TAC data is not geo-referenced & Coding exceptions are commonly used by states
- TAC often **contains typographical errors, is poorly structured, lacks validation**
- Extension of TAC code not easily possible
- SWIM requires a machine-readable format for web services

IWXXM implementation Guidelines

WHAT TO FIND IN THE GUIDELINES?

- Current operations and capabilities
- Principles and requirements for the transition to introduce IWXXM
- Description of the new functionalities



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CURRENT FUNCTIONS AND CAPABILITIES

- Originating Unit
- National OPMET Centre (NOC)
- Regional OPMET Centre (ROC)
- Interregional OPMET Gateway (IROG)
- Regional OPMET Database (RODB)

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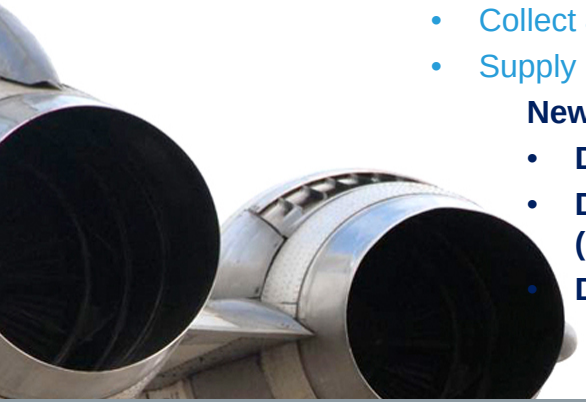
NEW FUNCTIONALITIES (1)

- Originating Unit
  - Current Tasks: Issue TAC-Data (METAR, TAF, SIGMET,..)
  - New Tasks
    - Data Producer: Issue in parallel IWXXM-versions
- NOC (National OPMET Centre)
  - Current Tasks
    - Collect & validate national data, compile into bulletins and send to responsible ROC
    - Supply national users with required data

New Tasks

- **Data Translator ➔ translate national TAC-data into IWXXM**
- **Data Aggregator ➔ aggregate individual IWXXM-reports into a collection (bulletin)**
- **Data Switch ➔ compress file before sending to responsible ROC**



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NEW FUNCTIONALITIES (2)

- ROC (Regional OPMET Centre)
  - Current Tasks
    - Collect and validate TAC OPMET data from NOCs in AoR
    - Correct invalid messages based on principles in EUR Doc 018, Chapter 12
    - Send TAC OPMET-data from AoR to other ROCs
    - Supply NOCs in AoR with required TAC OPMET-data
  - **New Tasks : Data Switch**
    - **Collect IWXXM OPMET data from NOCs in AoR**
    - **Log information on received IWXXM OPMET data based on principles in EUR Doc 033, Chapt 8**
    - **Send IWXXM OPMET-data from AoR to other ROCs**
    - **Supply NOCs in AoR with required IWXXM OPMET-data**
  - **Data Translator**
    - **Translate TAC OPMET-data on behalf of states in the AoR (for limited time)**

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NEW FUNCTIONALITIES (3)

- **IROG (Interregional OPMET Gateway)**
  - Current Tasks
    - Collect and validate TAC OPMET data from defined ICAO-region
    - Correct invalid messages based on principles in EUR Doc 018, Chapter 12
    - Send TAC OPMET-data from EUR-region to defined ICAO-region
    - Send TAC OPMET-data from defined ICAO-region to ROCs in EUR-region
  - **New Tasks**
    - **Data Switch**
      - **Collect IWXXM OPMET data from defined ICAO-region**
      - **Send IWXXM OPMET-data from EUR-region to defined ICAO-region**
      - **Send IWXXM OPMET-data from defined ICAO-region to ROCs in the EUR-region**

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NEW FUNCTIONALITIES (4)

- RODB (Regional OPMET Databank)
  - Current Task ➔ Support request/reply functionalities for TAC OPMET-data
  - **New Task ➔ Support request/reply functionalities for IWXXM OPMET-data**

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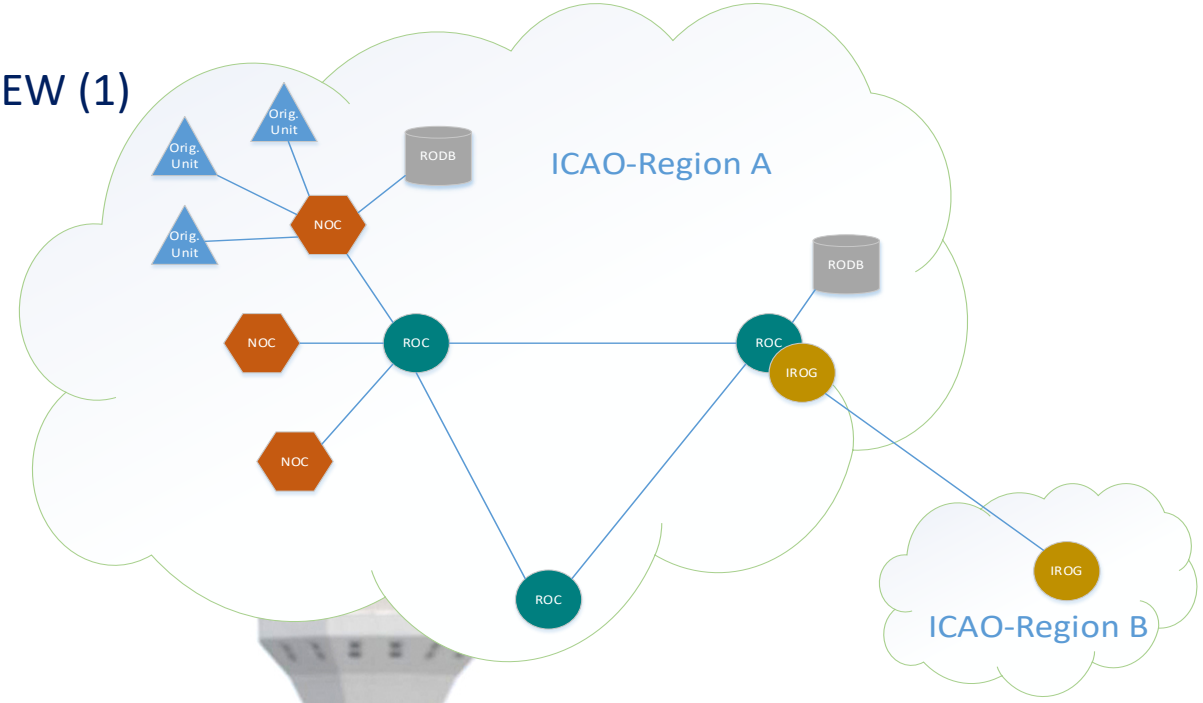
COMPARISON OLD & NEW (1)



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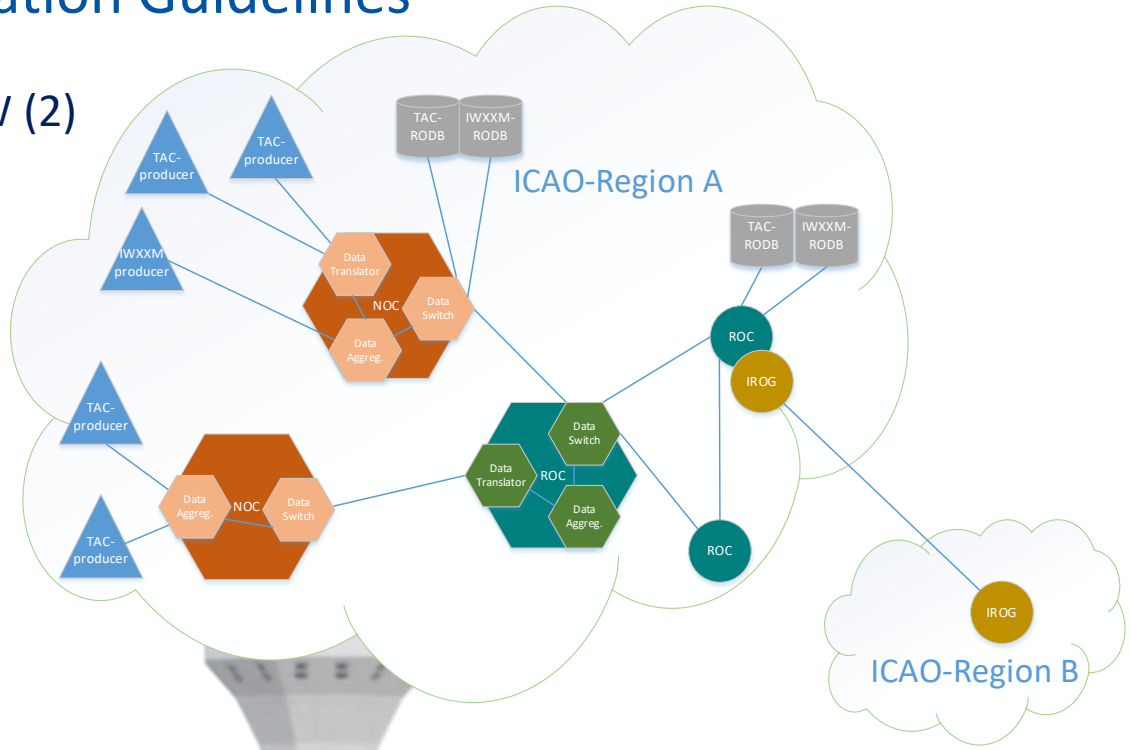
COMPARISON OLD & NEW (2)



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EXCHANGING IWXXM-DATA (1)

- IWXXM-Data > AFTN-Limit of 1800 characters
- Solution ➔ Send as File using Extended AMHS
  - FTBP (File Transfer Body Part)
  - Compression (Average date size ratio compr. IWXXM- and TAC-data = 5,8)
- File naming according to WMO naming convention
- Bulletin Header included in Filename (necessary for MET-Switch to route data)

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EXCHANGING IWXXM-DATA (2)

WMO naming convention

A_TTAAiiCCCCYYGGgg*BBB*_**C**_CCCC_YYYYMMddhhmmss**.xml.gz**

- Elements in **black and bold** are fixed elements
- TTAAiiCCCCYYGGgg is the current WMO header with the date time group
- *BBB* is optional like for the TAC-versions
- CCCC is the repeated CCCC part from TTAAiiCCCC
- YYYYMMddhhmmss is the creation date/time group of the file
- **gz** is the Compression suffix of the officially defined compression method


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EXCHANGING IWXXM-DATA (3)

WMO T1T2 definitions for IWXXM data

- Aviation Routine Report (*METAR*): *LA*
- Special Aviation Weather Reports (*SPECI*): *LP*
- Aerodrome Forecast (*"short" TAF*) (VT < 12 hours): *LC*
- Aerodrome Forecast (*"long" TAF*) (VT >= 12 hours): *LT*
- AIRMET LW
- Aviation General Warning (*SIGMET*): *LS*
- Aviation Volcanic Ash Warning (*VA SIGMET*): *LV*
- Volcanic Ash Advisory LU
- Aviation Tropical Cyclone Warning (*TC SIGMET*): *LY*
- Tropical Cyclone Advisory LK
- *Space Weather Advisory (SWXA):* *LN*

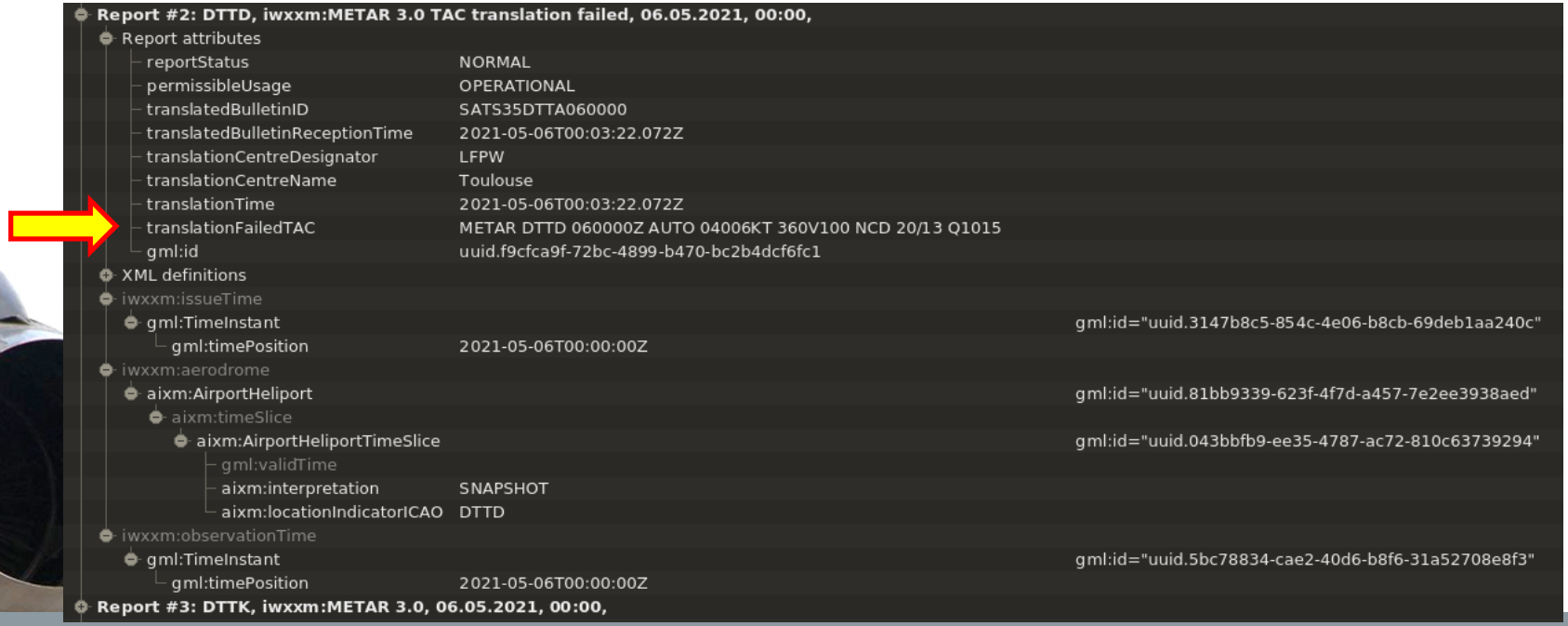
IWXXM implementation Guidelines

OPERATING PRINCIPLES (1)

- Managing the Transition
  - Dedicated Group per Region beneficial (DMG in EUR)
  - METP WG-MIE (Meteorological Information Exchange) to assist on a global level
  - Exchange and co-ordination with other regions depending on availability of AMHS-connection
- Translation
  - Final target is to produce IWXXM at source
  - Translation shall only take place **once** to prevent different versions
  - No translation from IWXXM to TAC during the parallel phase
  - Translation Centre and **date/time of translation** is included in IWXXM-message
  - **If translation** fails IWXXM **message shall** be produced without any MET-parameters but containing the original TAC-message (see screenshot next slide)

IWXXM implementation Guidelines

OPERATING PRINCIPLES (2)



```
Report #2: DTTD, iwxxm:METAR 3.0 TAC translation failed, 06.05.2021, 00:00,
  Report attributes
    reportStatus                NORMAL
    permissibleUsage            OPERATIONAL
    translatedBulletinID        SATS35DTTA060000
    translatedBulletinReceptionTime  2021-05-06T00:03:22.072Z
    translationCentreDesignator LFPW
    translationCentreName       Toulouse
    translationTime             2021-05-06T00:03:22.072Z
    translationFailedTAC        METAR DTTD 060000Z AUTO 04006KT 360V100 NCD 20/13 Q1015
    gml:id                      uuid.f9cfca9f-72bc-4899-b470-bc2b4dcf6fc1
  XML definitions
  iwxxm:issueTime
    gml:TimeInstant                                  gml:id="uuid.3147b8c5-854c-4e06-b8cb-69deb1aa240c"
      gml:timePosition          2021-05-06T00:00:00Z
  iwxxm:aerodrome
    aixm:AirportHeliport                             gml:id="uuid.81bb9339-623f-4f7d-a457-7e2ee3938aed"
      aixm:timeSlice
        aixm:AirportHeliportTimeSlice                gml:id="uuid.043bbfb9-ee35-4787-ac72-810c63739294"
          gml:validTime
          aixm:interpretation   SNAPSHOT
          aixm:locationIndicatorICAO  DTTD
  iwxxm:observationTime
    gml:TimeInstant                                  gml:id="uuid.5bc78834-cae2-40d6-b8f6-31a52708e8f3"
      gml:timePosition          2021-05-06T00:00:00Z
Report #3: DTTK, iwxxm:METAR 3.0, 06.05.2021, 00:00,
```

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OPERATING PRINCIPLES (3)

- Data Collection
  - Bulletin realized by “COLLECT” feature to be used for all data types
  - Aggregating Centre Identifier and date/time group in XML
  - No mixture of TAC and IWXXM data
  - Single file contains only one bulletin
- Transmission & Routing
  - Ext. AMHS shall be used for exchange
  - Filename used as data identifier, no header on top of message

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OPERATING PRINCIPLES (4)

- Compliance Testing (1)
  - Testing between centres involves MET & COM-switches!!
    - Correct parameters used in P3 submission-envelope
    - Correct filename used
    - Correct usage of FTBP as well as IA5 Text Body Part with ATS-message-header
    - Checking of IWXXM message to follow rules for schema and schematron
    - Checking of RODB-functionalities (if applicable)

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OPERATING PRINCIPLES (5)

- Compliance Testing (2)
  - Standardized test would be beneficial
    - As a minimum the proposed conformance tests defined in EUR Doc 020, Appendix H, 3.2.4.
    - On MET-switch level, check correct format of exchanged messages.
    - Use different types of data

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OPERATING PRINCIPLES (6)

- RODB
  - IWXXM-requests use similar rules as for TAC
  - Answers may include operational as well as non-operational IWXXM-messages
  - In case no full AMHS-path available (non-delivery report received by databank) error reply sent in IA5-bodypart to user

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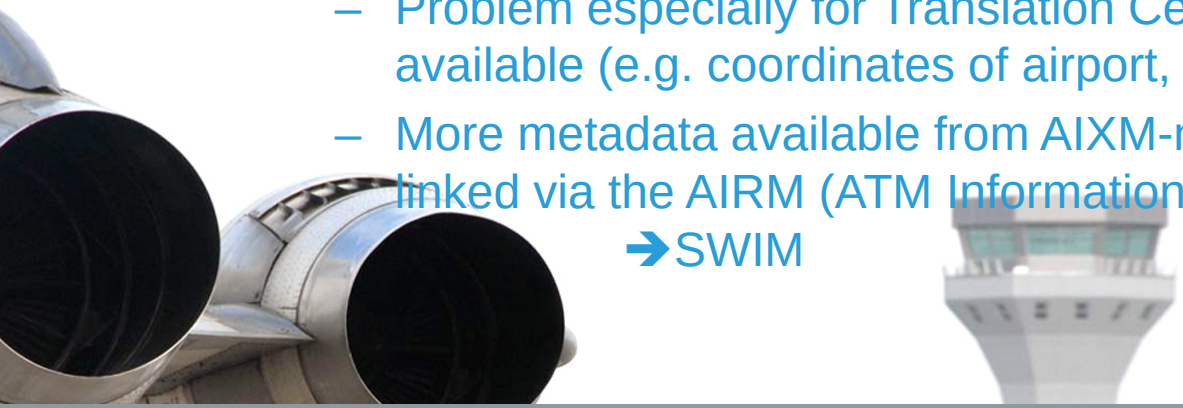
OPERATING PRINCIPLES (7)

- Aeronautical Information Metadata
  - Partly included as metadata in IWXXM (Name, aerodrome coordinates)
  - Problem especially for Translation Centres to have this available (e.g. coordinates of airport, FIR shapes)
  - More metadata available from AIXM-model which could be linked via the AIRM (ATM Information Reference Model)

➔SWIM



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OPERATING PRINCIPLES (8)

- Additional Clarification for IWXXM 3.0
  - IWXXM 3.0 supports national extensions
    - Procedure to co-ordinate/inform about national extensions needed (idea of global repository)
    - Procedure to implement widely used national extensions in future IWXXM versions
    - WMO proposed a new version of IWXXM (& a new versioning policy)


IWXXM implementation Guidelines

STATUS EUR/NAT-REGION

- There are 52 states in the EUR-region
- For 48 states (92%) IWXXM-data is available, of which
  - 26 states (54%) make use of a translation agreements with a ROC

ICAO Paris and DMG initiated several surveys to get an actual picture of the implementation status. ROCs regularly co-ordinate with AoR to have up-to-date information, which can be found on DMG website.

- Questions ?

ICAO

THANK YOU