World Meteorological Organization **CAeM-MG/2018/Doc. 5.1(5)**

COMMISSION FOR AERONAUTICAL METEOROLOGY 15.I.2018

MANAGEMENT GROUP 2018 ITEM 5.1

Geneva, Switzerland
22-24 January 2018 English only

REVIEW OF THE WORK PROGRAMME IMPLEMENTATION

Expert Team Reports and Coordination of Tasks

Report of the Expert Team on Information and Services for Aviation (ET-ISA)

(Submitted by Stéphanie Desbios and Jun Ryuzaki, ET-ISA Co-Chairs)

Summary and Purpose of Document

This document provides an overview of the activities of the ET-ISA since the last meeting of the CAeM Management Group held 8 to 10 November 2016 together with detailed information on the working arrangements and work plan of the expert team.

ACTION PROPOSED

The CAeM Management Group is invited to review the progress made by ET-ISA since November 2016, to review the working arrangements and work plan of the expert team and, as necessary, to formulate actions accordingly.

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1. EXECUTIVE SUMMARY

<Text to be included in the Final Report of the meeting>

1.1 The meeting was informed that the members of the Expert Team on Information and Services for Aviation (ET-ISA) had continuously provided their active contribution to the ICAO Meteorology Panel (METP) Working Groups and other relevant bodies regarding the development of future requirement, concept and services and associated documentation.

1.2 One of the ET-ISA co-chairs, as one of the three designated experts within the METP, contributed the work of an ICAO ASBU Panel Project Team on the revision of the ASBU modules regarding Advanced-MET services (A-MET modules) to be included in the ICAO GANP 2019 version, gathering inputs from the members of ET-ISA. The meeting also noted that the work for the revision of A-MET modules in ASBU Block 2 will be continued in early 2018.

1.3 The members of ET-ISA had been involved in the METP WGs to develop concepts of operation (ConOps) for enhanced aeronautical meteorological services and the relevant documentation, i.e. WAFS, Space Weather Information Service, Regional Hazardous Weather Advisory System, and Release of Radioactive Material. One of the ET-ISA co-chairs led the work to develop guidance for the improvement of SIGMET harmonization in the WG-MISD, which will be included in ICAO Doc 8896 – *Manual on Aeronautical Meteorological Practices*.

1.4 The meeting noted with appreciation that a WMO Aeronautical Meteorology Scientific Conference (AeroMetSci-2017) was successfully held in Toulouse, France, from 6 to 10 November 2017, hosted by Météo-France with their excellent services and hospitality. The conference was attended by more than 200 participants from various experts around the world, including atmospheric research institutes, meteorological service providers, airlines, pilots and the other aviation representatives. Co-chairs of ET-ISA were involved in the Organizing Committee and also in the event itself as 'master of ceremonies' or session co-chairs and panel moderator. The conference was concluded with a series of recommendations which will guide the direction of scientific research activities for the next 15 years to meet the need of global aviation industry and to address issues related to climate change.

1.5 The meeting was informed that the ET-ISA continued their work to gather information on progress in the large ATM modernization project, i.e. NextGen (USA), SESAR (Europe), CARATS (Japan) and CMATS (Australia), for further understanding on how meteorological information will be utilized in future Air Traffic Management (ATM) environment.

1.6 Furthermore, ET-ISA contributed both global and regional discussion for the facilitation of information exchange under system-wide information management (SWIM), mainly through one ET-ISA co-chair and a core member, including publishing two CAeM Newsletter articles and the development of the short guide text regarding the distinct explanation on MET product, data and information.

1.7 In regards to performance metrics and validation methodologies for new or enhanced MET information and services, the meeting was informed that this work had made little progress due to heavy workload associated with the AeroMetSci-2017 and the ET-ISA agreed with ET-ASC to jointly prepare a paper on this topic for future distribution.

2. PROGRESS/ACTIVITY REPORT

<Text not to be included in the Final Report of the meeting>

Development of relevant background material, methodology and implementation guidance on the MET components of the ASBU (WPA)

2.1 The development of MET components of the GANP ASBU is in the remit of the ICAO MET Panel WG-MRI, as well as under the scope of the ICAO ASBU Panel Project Team (PPT) in charge of the update of the ASBU framework for the next edition of the Global Air Navigation Plan (2019). ET-ISA members that are advisors within the WG-MRI contributed to the elaboration of functional and performance requirements of MET information & services to support selected ASBU Block 1 Met modules. It should be noted that in this framework, ET-ISA members expressed again the need for functional and performance requirements specific to the services for the terminal area. This statement was grounded by the work performed by the ET-ISA and the former CAeM ET-M&M about services for ATM with a focus on the terminal area. The ET-ISA work plan includes a task for updating the documentation coming from this work on current and foreseeable MET capabilities for Met services in support of ATM, with a focus on the terminal area, with generic examples and with information on performance of those capabilities. This activity made little progress since November 2016 and was reminded at the ET-ISA/2 meeting in May 2017.

2.2 The ASBU methodology in the current version of the GANP (2016 edition) does not include any Block 2 MET modules. The WG-MRI work programme includes an activity for the development of this module, which has not started yet. ET-ISA members as advisors in this group would assist in this development according to the timeline given by the WG-MRI.

2.3 One of the ET-ISA co-chairs as one of the three ICAO MET Panel experts in the ICAO ASBU Panel Project Team (PPT) (see §2.1) contributed to the work of this team in gathering comments from ET-ISA members and inserting them in the B0 and B1 Advanced-MET (A-MET) modules description that was under revision in 2017. The description improvement on terminal area aspects of B1 A-MET module which ET-ISA contributed to is going to be taken into account by the ASBU PPT MET experts. At the end 2017 this team has also initiated the description of a Block 2 A-MET module to be included in the 2019 GANP edition. Similarly to what has been done for Blocks 0 and 1 A-MET modules, feedback and comments from ET-ISA members are going to be sought and gathered in early 2018.

2.4 Team members as advisors in the other ICAO MET Panel working groups were also assisting in the development of concepts, related services and associated documentation, as needed, especially those for the WAFS (WG-MOG), for the Space Weather information service, and for the Regional Hazardous Weather Advisory Centre (RHWAC) and Release of Radioactive Material (RRM). At the end of 2016 the WG-MISD work stream for RHWAC started the development of the new concept for a globally-consistent phenomenon-based hazardous weather information service (new concept named "International Aviation Hazard Watch (IAHW)"). For that purpose the group has been performing a deep user needs analysis in the recent months. In parallel there is a need to further mature the concept itself with the view to integrate the service into the future SWIM environment, and to support development of draft provisions for inclusion in Amendment 79 to Annex 3 (Applicability date November 2020, in the ASBU Block 1 time frame). ET-ISA members as advisors in the WG-MISD would still assist and contribute to these activities in the near future.

2.5 It should also be noted that one of the ET-ISA co-chairs led with success the development of guidance to improve the SIGMET provision. After endorsement by the MET Panel, this guidance material would be included in Doc 8896 - *Manual on Aeronautical Meteorological Practices.*

2.6 With regard to the SIGMET service, the Management Group is invited to note that some SIGMET-related matters, including those out coming from METP/2, have been included into the ICAO METP WG-MOG list of actions, such as decided at the last meeting of this group.

2.7 In line with the activity A4.2 of the team, the main driver of activities of the ET-ISA in the second semester of 2017 was undoubtedly the WMO Aeronautical Meteorology Scientific Conference (AeroMetSci-2017), hosted by Météo-France in Toulouse, France, held on 6 to 10 November, 2017. Agenda item 4.2 of this CAeM-MG/2018 meeting provides all information about this event. The following paragraphs explain how ET-ISA members were involved.

2.8 One of the ET-ISA co-chairs acted as the host representative. The preparation of this event started in January 2017; an Organizing Committee (OC) was set up which both ET-ISA co-chairs were involved in. At the 2nd conjoint ET-ISA/ET-ASC meeting in May 2017, the agenda of the conference and the organization as a whole was further discussed. This meeting decided to organize the event into three sessions: Session 1) Science underpinning meteorological observations, forecasts, advisories and warnings; Session 2) Integration, use cases, fitness for purpose and service delivery; Session 3) Impacts of climate change and variability on aviation operations and associated science requirements. One of the ET-ISA co-chairs was also involved in the local organizing committee with the conference center team and technicians. IT experts from this committee then launched the conference website.

2.9 After the WMO announced the event in July 2017, the organizing committee received more than 130 proposals for oral or poster presentations. During Summer 2017, a Scientific Committee was set up to assist the OC in identifying proposals that best fit for oral presentations and those more adequate for poster sessions. The two ET-co-chairs were members of the Scientific Committee and as such, contributed to the elaboration of the programme of oral sessions and of poster sessions. Some members of ET-ISA also contributed as co-authors of abstracts and associated presentations. During the conference, ET-ISA co-chairs were highly involved in the event itself, as 'master of ceremonies' during the whole week or as session co-chair or panel moderator.

2.10 The conference was co-sponsored by aircraft manufacturer Airbus, and aerospace technology companies Selex ES and Thales. It was attended by more than 200 participants, including world-leading atmospheric science research institutes, meteorological service providers from the public and private sector, airline operators, pilots and other aviation representatives. Thanks to this broader audience and a very high level of skill in science, the conference was successful in developing a blueprint for action to boost scientific support for aviation safety, air navigation efficiency and environmental protection. The conference concluded with a series of recommendations on how to plan scientific research activities for the next 15 years in order to meet the needs of the rapidly growing global aviation industry and address the reality of a changing climate. These recommendations and associated statements would be the basis of future ET-ISA and ET-ASC work and their successors.

Current and future MET capabilities to support requirements of GANP and ASBU (WPB)

2.11 The large-scale projects such as SESAR, NextGen and CARATS have developed functional and performance requirements for new Met Information and Services. Some of these new services would be implemented in a near future, for instance through deployment projects. During the ET-ISA/ET-ASC/2 conjoint meeting, several presentations were made about these large scale projects' status, outcomes and future plans or activities. Further information was also provided by the ET-ISA member from Australia about the on-going project in Australia called CMATS (Civil-Military Air Traffic System). By 2021 CMATS is intended to deliver the most advanced integrated (civil-military) air traffic control system unified under ‘one sky’ for Australia. The implementation phase was expected to begin in

2018, providing new levels of operational and cost efficiency and improved safety through a shared situational awareness for civil and military controllers, use of common data, new safety nets and alerts, and greater information security. From a MET perspective, it was highlighted that the Bureau of Meteorology was an embedded part of a CMATS centre in Canberra.

2.12 Further understanding of how meteorological information will be used in future Air Traffic Management (ATM) environments was gained from these presentations about ATM modernization programs in Europe, Japan, Australia and the United States.

2.13 The gathering activity of functional and performance requirements of the new MET services associated to these programmes has started; in particular coordination with the Eurocontrol unit representative in charge of MET information and SWIM and involved in SESAR1 Met-related work package was needed to address IPR-related issues before communicating on this programme. This coordination was launched in mid-2017 and will be reactivated soon so that the co-chairs in coordination with the AeM/D could organize the repository of this information into WMO web facilities. Presentations about these large-scale programmes will also be posted on the WMO web facilities after a quick check that the information contained could be made publically available.

Performance metrics and validation methodologies for new or enhanced MET information and services (WPC)

2.14 Due to the work load associated with the WMO AeroMetSci-2017 conference and the ICAO MET Panel WGs, this work package C of the ET-ISA work plan about performance metrics and validation methodologies has only made limited progress up to now, mainly during the ET-ISA/ET-ASC/2 conjoint meeting. Given the variety of users within the 'ATM user community' – each with their own needs, modes of operation, flexibility and particular sensitivity to different weather scenarios – the two teams (ET-ISA and ET-ASC) agreed that it would be worthwhile to jointly prepare a paper that considers performance metrics and validation issues in this context. The results of the AvRDP project, the gathering activity of performance information for the current and foreseen Met capabilities as one task of the ET-ISA work program and outcomes from the aforementioned conference would also assist in populating this paper and ground the tasks under this WPC, which are now due to 2018.

SWIM MET data standards and policies; implementation of MET information exchange under SWIM by WMO Members (WPD)

2.15 The ET-ISA noted that more understanding is needed amongst CAeM Members about the ICAO's system-wide information management (SWIM), which will facilitate information exchange in digital format, such as GRIB2 and XML, so that aeronautical users can make their own custom products from that information and will be able to integrate this digital MET information into their own decision-aid systems. As a first answer to this, and for the purpose of communication and raising awareness of CAeM members, the ET-ISA edited two articles (or snapshots) about SWIM to be a part of the 2017 CAeM Newsletters. Moreover, at the second ET-ISA/ET-ASC conjoint meeting, it was agreed that some guidance should be prepared regarding distinction among MET products, data and information services. A short guide text was edited by the ET-ISA member from Belgium, which will be finalised in early 2018 and then shared within the CAeM.

2.16 In October 2017, the three ICAO regions APAC, EUR/NAT and MID held an interregional workshop about service improvement through integration of AIM, MET and ATM information services. One of the ET-ISA co-chairs and Greg Brock (WMO/WDS/AeM) attended this meeting. The objective of the workshop was to address the planning and implementation issues of the Performance Improvement Area (PIA) #2 Aviation System Block Upgrade (ASBU) Modules related to Aeronautical Information Management (AIM), Air Traffic Management (ATM), MET, Flight and Flow Information for the Collaborative Environment (FICE) and SWIM, including the pre-requisites for an efficient and timely

implementation of the Block 1 Modules. Some good examples of integrated information services were demonstrated during the workshop by several organisations and also industry representatives, through oral presentations, where benefits of integrating MET information services into decision-aid systems for air traffic control operations or for airport operations were showcased.

2.17 The workshop acknowledged that more harmonized standardization and guidance in different aspects of SWIM was needed and that Block 1 Modules and SWIM implementation timelines should be more realistic, taking into consideration the challenges at the national and regional levels and delays in the implementation of B0 Modules.

2.18 The workshop concluded that a globally harmonized implementation of SWIM will be facilitated by inter-/intra-regional coordination focussed on planning and implementing SWIM (data and services). In relation to this, setting-up regional task forces or sub-groups for SWIM implementation and the definition of regional SWIM roadmaps (if not already available) were identified as an urgent need. As an example of follow-up of this workshop's conclusions, it is noted that EUR/NAT Region through its European Air Navigation Planning Group (EANPG) started the establishment of a SWIM implementation coordination group. Similar groups or task forces would be established in other ICAO regions, as needed, which may assist States in the implementation of SWIM and implementation of Met information exchange under SWIM.

2.19 At the last CAeM-MG meeting, the ET-ISA informed the group of the proposal made by the ICTT-WIS to establish a new Task Team, under ICT-ISS, to address information management and governance issues; the establishment of this new team called TT-IM was approved by the CBS at its 16th session (23-26 November 2016). The ICTT-WIS recommended participation in the TT-IM by experts from Technical Commissions. Although approved by the CBS-16, and as far as the ET-ISA co-chairs know, no request for nomination of experts from the AeM community to contribute to this team has reached the group up to today. No further coordination with the WMO CBS groups about connection between SWIM and the WMO Information System (WIS) happened since then.

Reporting and outreach (WPE)

2.20 Since the last Management Group meeting in November 2016, two issues of the CAeM Newsletter were edited and published in 2017, which the ET-ISA contributed to. Articles provided by the expert team focussed on the implementation of the ICAO Meteorological Information Exchange Model (IWXXM) and on the system-wide information management (SWIM). On the latter subject, two snapshots were provided by the team, one for each issue of the Newsletter in 2017. The objective of the ISA team was to contribute in raising the awareness of the CAeM members about the SWIM. Two further articles proposed by the team presented developments under the ET-ISA (in Newsletter-2017/1) and the outcomes of the conjoint ET-ISA/ET-ASC meeting held in May 2017 (in Newsletter-2017/2).

2.21 Through the first issue of the Newsletter-2018, the ET-ISA will communicate on implementation of OPMET information exchange in IWXXM format (case studies from France and South Africa; the article would also contain another case study from the Russian Federation), on the ICAO Interregional EUR/MID/APAC workshop on Service Improvement through integration of AIM, MET and ATM information services and on the outcomes of the AeroMetSci-2017 conference. This article would be prepared conjointly by one co-chair of ET-ASC and ET-ISA.

3. WORKING ARRANGEMENTS AND WORK PLAN

Over page.

TEAM			
Commission	**WMO Commission for Aeronautical Meteorology (CAeM)**		
Expert Team on	**Information & Services for Aviation (ISA)**		
Start Date / End Date	August 2014	August 2018	
Stakeholders	ATM community, NMHS Aviation Weather Services, VAACs, Space Weather community		
Team	**Name**	**Organization / Country**	**E-mail**
Chair / Co-chairs	Stephanie Desbios Jun Ryuzaki	Meteo-France, France Japan Meteorological Agency, Japan	stephanie.desbios@meteo.fr jryuzaki@met.kishou.go.jp
Core Members	Cecilia Miner Bart Nicolaï P.W. Chan Albert Moloto Michael Berechree	NOAA/NWS, USA Belgocontrol, Belgium Hong Kong Observatory, Hong Kong, China South African Weather Service, South Africa Bureau of Meteorology, Australia	cecilia.miner@noaa.gov bart.nicolai@belgocontrol.be pwchan@hko.gov.hk albert.moloto@weathersa.co.za m.berechree@bom.gov.au

DESCRIPTION	
Objective	To develop proposals for enhanced Meteorological Information and Services for Aviation (ISA) which will meet future requirements from the ICAO's GANP/ASBU framework, including digital exchange of meteorological information via SWIM environment. The proposals for ISA should be developed in response to user needs identified in coordination with the relevant ICAO expert group(s) and grounded on high-level scientific basis. The proposal(s) may be put forward to the relevant ICAO expert group(s), when necessary, during the inter-session period and finally shall be reported to the WMO CAeM 16th session in 2018.
Background	With increasing air traffic in several regions leading to severe issues of aerodrome and route capacity limits, different regions are developing different tailored meteorological products to support Air Traffic Management (ATM) to fill the perceived gap between the legacy products required by Annex 3 and ATM requirements on MET. To avoid further costly parallel development of similar products, with a high risk of confusion between similar products using different ways of presentation to users, the WMO Commission for Aeronautical Meteorology (CAeM) has undertaken an initiative to develop, harmonize, and promote new meteorological services for the wider terminal area[1] intended mainly for ATM/ATC and operations staff. In the context of the two major regional programs SESAR and NextGen and the emerging project in other regions (e.g. CARATS in Japan) and taking into account that ICAO has recently embarked in the development of requirements for MET support to ATM and information

[1] The terminal area is defined as that portion of the airspace within the proximity of a controlled aerodrome within which arriving and departing aircraft are managed to provide separation, assurance, appropriate arrival spacing, appropriate departure spacing and final approach sequencing.

	exchange through its MARIE -PT, the scope of the CAeM initiative has been expanded to be performed to all MET Services to ATM and to also include MET Information Exchange related activities. In this way, the CAeM expert team for Met Services To ATM & Met Information Exchange (ET/M&M) has been supporting the work of the MARIE-PT in coordination with the ICAO ATMRPP for the development of the Meteorological Information Integration for Trajectory-Based Operations (TBO) Concept and Roadmap, by providing a detailed description of the current, emerging and foreseen MET capabilities in terms of services in support to ATM, with a focus on the terminal area. In July 2014 in Montreal, the ICAO MET Divisional Meeting agreed on the development of the MET components of the Aviation System Block Upgrades (ASBU) methodology for the Global Air Navigation Plan (GANP). The Meeting also endorsed the recommendation for the inclusion of ATM-tailored meteorological services for the terminal area in Block 1 and subsequent blocks of the ASBU methodology, and their integration into the future system-wide information management (SWIM) environment. The future development of the MET Information Integration for TBO Concept & Roadmap, as well as of the other concept of operations and roadmaps for the future WAFS, for the International Airways Volcano Watch (IAVW) or space weather services has also been adopted by the Meeting. The service-related components of some of these roadmaps and concepts of operations need to be addressed by the ET-ISA, in collaboration with ICAO MET Panel, its working groups and relevant ICAO groups and in cooperation with relevant subsidiary bodies of WMO, such as the CBS and the CAS.
Terms of Reference	*Refer to the work programme below.*

Work Programme

I. Terms of Reference

a. To work closely with ICAO and other partners in developing relevant background material, methodology and implementation guidance on the MET components of the Aviation System Block Upgrades (ASBU) based on identified user requirements;

Translated into actions:
- *Support the development and finalization of CONOPS and roadmaps:' Concept for the Integration of MET Information for ATM, RRM, SWx, WAFS, RHWAC*
- *Advise on current MET capabilities vis-à-vis requirements established by ICAO*

b. To contribute to the development of new or enhanced MET information and services in close collaboration with ICAO;

Translated into actions:
- *Organize repository of development of new MET I&S under the large-scale projects (SESAR, NextGen, CARATS, etc.) and facilitate result sharing*
- *Assist in WMO projects and dissemination of results (e.g., AvRDP)*

c. To develop relevant performance metrics and validation methodologies for new or enhanced MET information and services;

Translated into actions:
- *Develop a "white paper" on performance metrics and validation to build common understanding*
- *Collect examples of current performance metrics and verification/validation methods, containing evaluation of MET impact on ATM*
- *Develop draft guidance on performance metrics and verification/validation including impact-oriented approach*

d. To contribute to the development of SWIM MET data standards and policies, and to promote implementation of MET information exchange under SWIM by Members;

Translated into actions:
- *Contribute to the development of guidance and training materials on the implementation of IWXXM through the relevant WMO and ICAO bodies*
- *Support trials and testing of MET information exchange under SWIM*
- *Address issues related to information management governance in coordination with CBS*

e. To report regularly on progress to the president of CAeM

Translated into actions:
- *Submit regular reports on progress*
- *Submit other relevant information to raise awareness of developments in the area of responsibility of the ET-ISA*

II. Work Packages (WP), Tasks, Activities

WP A (TOR a)	Development of relevant background material, methodology and implementation guidance on the MET components of the Aviation System Block Upgrades (ASBU) based on identified user requirements			Responsibility	Deliverable	Target date	Status
	Task A1	***Assist in finalizing the TBO roadmap by providing background material on the envisaged new or enhanced MET information and services***					
		Activity A1.1	Provide comments and additions to the TBO roadmap as required by the ICAO METP WG-MRI Rapporteur	All, coord. by co-chairs	Comments on TBO doc provided to WG-MRI Rapporteur	As required by the WG-MRI Rapporteur	Comments provided on 25.09.2015 No other request since then. COMPLETE
		Activity A1.2	Complete/update the Appendices A & B to the TBO roadmap, with information on performance of the current and foreseen MET capabilities, when available, and with generic examples (See also A4.1)	All, coord. by co-chairs	Updated Appendices A & B to the TBO roadmap (To coordinate with WG-MRI Rapporteur)	To coordinate with WG-MRI Rapporteur.	No request from WG-MRI Rapporteur (see A4.1) COMPLETE
	Task A2	***Assist in development of other relevant roadmaps and CONOPS (WAFS, SpWx, RRM, RHWAC), as necessary*** *(Note: need to define to what extent ET-ISA will be into this task and who will be responsible)*					
		Activity A2.1	Contribute to the development of other relevant roadmaps and CONOPS	ET-ISA members as advisors in the ICAO METP WG	Inputs as necessary	According to WG-MISD work streams time lines.	On-going WAFS, RRM, SpWx: inputs provided in July 2016 RHWAC : new concept for IAHW adopted by METP/2, new CONOPS and roadmap to be defined by WG-MISD. COMPLETE INSOFAR AS ET-ISA IS CONCERNED (any future inputs to be fed through experts membership of the METP WGs).

		Activity A2.2	Report to the ET-ISA on foreseeable consequences on existing or foreseen MET information & services; raise any issues related to this development	ET-ISA members as advisors in the ICAO METP WG	As necessary	METP WG meetings ; METP meeting	Summary of MISD/2 and MRI/2 and of METP/2 provided in Q1 2017. Issues related to WAFS ConOps and process for REQs definition to be presented in a SN at MRI/3 in July 2017 (or MISD/3) Issues partly raised at MOG/4 and MRI/3. WAFC issues paper drafted by ET-ASC co-chair as action upcoming from ET-ISA/ET-ASC/2. To be further discussed and consolidated.
	Task A3	***Support development of implementation guidance on new MET information and services*** *(Note: this is relevant for mature information and services that are in or close to implementation phase)*					
		Activity A3.1	Communicate to the ET-ISA on new services requirements, starting with Met Services for the terminal area ; seek and collate feedback	Bart & Stephanie (SESAR Projects); Cecilia (NextGen and other US projects); Jun & Michael (ASIAPAC)	Communication through reports, web pages about requirements for these new services.	July 2018	On-going. Discussed at F2F meeting in May 2017. Communication of latest developments to Members via AeMP website, CAeM Newsletters as necessary
		Activity A3.2	Review, comment and report (one page) on implementation guidance on new MET information and services, starting with Met Services for the terminal area	All. Through ICAO METP WG-MRI or WG-MISD or regional groups	Provide input to the implementation guidance	When guidance is available.	~~Draft of APAC's implementation guidance to be shared by Jun within ET-ISA in May 2017.~~ APAC's implementation guidance was shared by Jun within ET-ISA in Jan 2018.
	Task A4	***Study and inform on current and future MET capabilities to support requirements of GANP and ASBU***					
		Activity A4.1	Update the existing demonstration documentation, with information on performance of the current and foreseen MET capabilities, when available, and with generic examples (See also A1.2)	Bart & Stephanie (Europe); Cecilia (N&S America); Jun & PW (Asia); Michael (S Pacific, Australia, NZ); Albert (Africa)	Y	End September 2017	Demonstration documentation from the former CAeM ET-M&M sent by Stephanie to the group. On-going action to update it with performance information of the Met capabilities

		Activity A4.2	Gather information on science supporting foreseen and future MET capabilities, in coordination with ET-ASC	All	Inputs to Scientific Conference	6-10 Nov 2017	Co-chairs are members of Organizing Committee. Stephanie acts as host representative. Scientific topics and possible presenters discussed at F2F meeting in May 2017. Event preparation and running was a full time activity in Sept and Oct 2017. COMPLETE
	Task A5	***Contribute to further development of MET ASBU modules***					
		Activity A5.1	Contribute to the development of ASBU-2 Met module (description to be included in update of GANP)	ET-ISA members as advisors in the ICAO METP WG-MRI	Y		On hold. Waiting for WG-MRI to start the activity. Relates to WG-MRI activity 3.2. Activity launched by ASBU PPT in Nov 2017. ET-ISA contribution to be collected in Jan 2018. See Activity A5.4 COMPLETE
		Activity A5.2	Contribute to the description improvement on terminal area aspects of ASBU-1 Met module (A-MET)	ET-ISA members as advisors in the ICAO METP WG-MRI	Y	First draft by Stephanie in May 2016	Complete. First draft discussed at MRI/2 in July 2016, revised version endorsed at METP/2. Approval from ANC in March 2017 COMPLETE
		Activity A5.3	Assist WG-MRI in the development of functional requirements of MET information & services to support selected ASBU-1 Met modules (A-MET)	ET-ISA members as advisors in the ICAO METP WG-MRI	N	According to WG-MRI time line. Activity 2.1 of WG-MRI started in Jul 2016	On-going. Assistance from ET-ISA members as advisors in the ICAO METP WG-MRI agreed at MRI/2. Draft development of functional & performance requirements sent by the WG-MRI task leader on 23 March 2017. Feedback from ET-ISA members is requested.

		Activity A5.4	Contribute to the ICAO Review of ASBU framework (GANP update in 2019 ; inputs to be ready mid-2017)	Stephanie (in coordination with Dennis Hart and Sue O'Rourke)	N	June 2017	On-going. First teleconference on 20 Oct 2016. F2F meeting in May 2017 : AMET thread restructured and reworded. Dependencies of operational threads on MET identified. Feedback from ET-ISA on B0 and B1 AMET threads provided to ASBU PPT. Development on B2 AMET on going. ET-ISA's feedback to be collected before 2nd F2F ASBU PPT meeting end Feb 2018.

WP B (TOR b)	Current and future MET capabilities to support requirements of GANP and ASBU			Responsibility	Deliverable	Target date	Status
	Task B1	***Organize repository of development of new MET I&S under the large-scale projects (SESAR, NextGen, CARATS, etc.) and facilitate result sharing***					
		Activity B1.1	Organize the repository into WMO web facilities ; provide URLs and communicate to the CAeM community through the ET-CCP	Dimitar & ET-ISA Co-chairs	Y	End June 2017	On-going. Team members to check for existing demo projects on MSTA website to be made public on the AeM website
	Task B2	***Assist in WMO projects and dissemination of results (e.g., AvRDP)***					
		Activity B2.1	Contribute to WMO CAeM-CAS Av-RDP project as appropriate; report to the ET and the CAeM-MG	Jun, Cecilia, Stéphanie, Albert (for JNB airport)	Y	According to the AvRDP time line.	On-going. *Link with ET-ASC Activity B1.3*
		Activity B2.2	Contribute to other WMO projects as appropriate; report to the ET and the CAeM-MG	All	Y	According to those projects time line.	No other project up to now. COMPLETE

WP C (TOR c)	Develop relevant performance metrics and validation methodologies for new or enhanced MET information and services			Responsibility	Deliverable	Target date	Status
	Task C1	***Develop a briefing note (or similar) on performance metrics and validation to build common understanding***					
		Activity C1.1	Develop a briefing note (or similar) on: i) performance metrics and verification; and ii) validation including ATM impact-oriented approach, taking into account any necessary outcomes of the Scientific event	All	Y	Feb 2018	*Not started*
		~~Activity C1.2~~	~~Develop a "white paper" on evaluation of MET impact on ATM~~	~~All~~	~~Y~~	~~First draft end Sep 2017~~	~~*Not started*~~ *Superseded by update to C1.1*
	Task C2	***Collect examples of current performance metrics and verification/validation methods, containing evaluation of MET impact on ATM***					
		Activity C2.1	Establish a catalog of current performance metrics and verification/validation methods [refer to existing ET-M&M documentation] (See also A4.1)	All	Y	End Dec 2017	*Not started*
		Activity C2.2	Identify generic performance metrics and verification/validation methods	All	Y	Feb 2018	*Not started*
	Task C3	***Develop draft guidance on performance metrics and verification/validation including impact-oriented approach***					
		Activity C3.1	Develop draft guidance on performance metrics and verification/validation including impact-oriented approach [Predecessors C2.1 and C2.2]		Y	April 2018	*Not started*
		~~Activity C3.2~~	~~Communicate to the CAeM community through the ET-CCP~~		~~N~~	~~As available~~	DELETED. See E2.2

WP D (TOR d)	SWIM MET data standards and policies; Implementation of MET information exchange under SWIM by WMO Members			Responsibility	Deliverable	Target date	Status
	Task D1	***Contribute to the development of SWIM MET data standards and policies***					
		Activity D1.1	Contribute to this development in coordination with WMO CBS TT-AvXML and other relevant WMO teams	Bart, Stephanie	N	According to WMO CBS time line.	On-going. Bart : communication on IWXXM releases Stephanie & Greg : contribution to the new ICTT on WIS, for CAeM requirements on WIS (12-13 Sep)
		Activity D1.2	Contribute to this development in coordination with the ICAO METP WG-MIE and other relevant ICAO groups	Albert, PW, Stephanie	N	According to WG-MIE time line.	On-going.
		Activity D1.3	Contribute to the CBS Task Team on Information Management (under ICT-ISS) as necessary	Stephanie, Jun	N	According the TT-IM time line	TT endorsed by the CBS in Nov 2016 No request from this CBS group since then.
	Task D2	***Development of guidance and training materials on the implementation of IWXXM***					
		Activity D2.1	Contribute to the development of guidance and training materials based on the CONOPS on IWXXM ; in coordination with the ICAO METP WG-MIE	All	Y	According to WG-MIE time line.	On-going.
	Task D3	***Support trials and testing of MET information exchange under SWIM***					
		Activity D3.1	Inform the CAeM-MG on trials and testing of MET information exchange under SWIM	All	N	As available	On-going
		Activity D3.2	Inform the CAeM-MG on the status of implementation of MET information exchange under SWIM, in States	All	N	As available	On-going See Newsletter/1-2018 articles on IWXXM/AMHS implementation (case studies) and on ICAO interregional workshop on MET, ATM and AIM services integration

WP E (TOR e)	Reporting and outreach			Responsibility	Deliverable	Target date	Status
	Task E1	***Submit regular reports on progress***					
		Activity E1.1	Yearly reporting	Co-chairs	Y	May each year	Report for MG Nov 2016 Report for MG Jan 2018
	Task E2	***Prepare and disseminate other relevant information to raise awareness of CAeM community on developments in the area of responsibility of the ET-ISA***					
		Activity E2.1	Prepare relevant information to raise awareness of the CAeM Community on developments under the ET-ISA scope (reports, web pages, etc)	All	Y ?	As available	
		Activity E2.2	Communicate through the ET-CCP articles for the CAeM Newsletter	Co-chairs	Y	As necessary	Three articles on ET-ISA in CAeM Newsletter 1/2017. Three articles (IWXXM/AMHS, ICAO workshop, AeroMetSci-2017) in CAeM Newsletter/1-2018

List of meetings:
Teleconference, 23 Jan 2015; First joint ET-ISA / ET-ASC face-to-face meeting, 30 March – 1 April 2015, Toulouse, France; Teleconference, 4 May 2015; Informal co-chairs meeting, 18 Nov 2015, Washington, DC, USA; Teleconference, 1 March 2016; Teleconference, 7 April 2016; Informal co-chairs meetings, Jul and 20 Oct 2016, Montreal, Canada; CAeM Management Group meeting (co-chairs), 8-10 Nov 2016, Innsbruck, Austria; Teleconference, 8 Dec 2016; Teleconference, 31 Mar 2017, Second joint ET-ISA / ET-ASC face-to-face meeting, 22 to 24 May 2017.

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