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## LIST OF ANNEXES

1. Agenda

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1. OPENING OF THE MEETING

1.1 The Joint ET-ISA/ET-ASC meeting was opened by Stéphanie Desbios who welcomed participants on behalf of Météo-France. The meeting was attended by 19 participants (7 members of ET-ISA and 7 members of ET-ASC, 3 observers and 2 WMO Secretariat). Mr Neil Halsey, Technical Officer, AOI Section/MET, attended as an observer from ICAO. Mr Dimitar Ivanov, C/AEM provided secretariat support to Ms Stéphanie Desbios and Mr Jun Ryuzaki, Co-Chairs of ET-ISA, and Dr Herbert Puempel, Chair of ET-ASC. The list of participants is in Annex 2.

1.2 The meeting adopted agenda as shown in Annex 1.

1.3 The meeting was held in sessions of the group as a whole and in separate sessions of ET-ISA and ET-ASC on specific items.

2. REVIEW METEOROLOGICAL COMPONENTS OF THE GANP AND ASBU IN ACCORDANCE WITH THE ET TORS AND WORK PLANS

2.1 Mapping of ET ToRs and tasks to MET DIV recommendations

2.1.1 The meeting discussed Doc. 2.1. The teams were informed that aeronautical meteorology will stay a strategic priority the WMO Strategic Plan for the next financial period (2016-2019) which will be approved by the Cg-17 in May/June 2015. Congress will also endorse the recommendations of the MET DIV 2014 to be followed up by WMO in close coordination with ICAO.

2.1.2 The meeting reviewed the recommendations from MET DIV 2014 and mapped each recommendation to the relevant ETs of the CAeM, as shown here.

2.1.3 Neil Halsey informed the meeting that the follow-up of the MET DIV 2014 will be done through job cards approved by the ICAO Air Navigation Commission (ANC). Most (about 10) job cards have been drafted and will be reviewed and finalized by the first meeting of the ICAO Meteorology Panel (METP) in April. Job cards are thematic and may combine several recommendations. Neil Halsey suggested that the ET tasks should be closely aligned with the job cards after their finalization by METP. Some of the MET DIV recommendations will be followed by other ICAO Panels, e.g., the Information Management Panel (IMP) and the Communication Panel (CP), thus coordination with those panels should also be established.

2.1.4 The group made the following comments on some of the MET DIV recommendations:

- Recommendation 1.3, about SADIS 2G withdrawal. The recent information about earlier than expected satellite broadcast cessation in July 2016 (A.I.1) will require prompt action in order to ensure that some developing or least developed countries, in particular in RA I, have the required internet access and can sustain the costs related.

- Recommendation 2.4, especially b) i to iv are of high importance for the ASC and ISA teams. Many Members in the RAs have concerns with Recommendation 2.4 b) iv about regional hazardous weather centres.

- Recommendation 3, Neil Halsey informed the group that the creation of the Block 2 and of related MET modules has been questioned by some commissioners of the ANC that are not in favour of it. The decision will be taken depending on the outcomes of the corresponding job card activities/work.

- Recommendation 4.6, about English language proficiency; no specific action is foreseen from the ICAO side.
• Recommendation 5.1, the Amendment 78 application date will be November 2018. All Annexes will now have a 2-year amendment cycle. But it is envisaged that 8 months or one year after the application date would be given to States for implementation. Neil Halsey suggested this change especially be useful for the WMO because it will easily fit the changing process of coding rules maintained under the CBS, which was also basically done in 2-year cycle.

• Recommendation 5.2, about the PANS-MET will require a strong input from the METP, however, there are concerns about the necessary resources to conduct this task according to the planned timeline.

3. REVIEW AND UPDATE OF ET WORK PLANS

3.1 Dimitar Ivanov introduced Doc. 3 including draft work plans of the two teams as appendices. The meeting reviewed those work plans. Herbert Puempel suggested that the ET-GOV should be the relevant team for some tasks currently under the ET-ISA, like future digital data exchange. Neil Halsey also mentioned that, from ICAO side, WMO's consolidated views on data policy will be necessarily revised to meet the future SWIM environment and this issue should be discussed under ET-ISA or ET-GOV. The meeting was informed that the ICAO and WMO Secretariats had started coordination in terms of the revision of the working arrangement between the two organizations and that it will be discussed during Cg-17.

3.2 ET-ISA

3.2.1 Review of the ET-ISA work plan:

• Activity 1:
  o Nothing particularly suggested.

• Activity 2:
  o The work plan will be updated with information about upcoming regional MET/ATM events, such as the RA-6 aviation conference (ECMA) in October 2015 or the APAC MET/ATM seminar in June 2015.
  o The coordination between the Panels and WMO ETs should be done through specific working groups (WG) under the METP. Dimitar Ivanov, as a representative of WMO, would be able to nominate experts from ET-ISA to participate in the work of relevant METP's WGs as advisors to WMO. In this way, inputs from the ET will be reflected in the discussion under the METP. There was some concern about the lack of MET experts in the IMP. The coordination with the CP would be highly important for a formal confirmation of the availability of the ICAO AMHS (Air Message Handling System) for the exchange of XML-based meteorological information internationally. The meeting agreed that this issue should be recorded as an “urgent task” to be raised at the METP meeting.
  o It was agreed to remove the Milestone 2.3 of this activity, because ET-ISA was not expected to liaise directly with the ICAO ATMRPP. Neil Halsey suggested that this coordination or liaison should be done through the ICAO METP.

• Activity 3:
  o The group discusses the issue about the data policies on MET data for aviation. ICAO would suggest to WMO to review and update its data policy for meteorological information as it could not allow fulfilling possible requirements under the SWIM environment. The MG should decide which group would address this issue, e.g., ET-ISA, ET-GOV, relevant CBS bodies.
• **Activity 4:**
  - Michael Berechree offered to provide information on the Australian modernization project, “Australian One Sky Project”.

• **Activity 5:**
  - The team agreed to modify the title of this activity to replace the word “product” by “information”.

• **Activity 6:**
  - Nothing particularly suggested.

• **Activity 7:**
  - The meeting agreed that it is important to keep materials regarding verification methodology simple so that ATM or ATS people, who would be basically unfamiliar with this sort of techniques, could easily understand the results of the statistics.

• **Activity 8:**
  - Nothing particularly suggested.

3.2.2 A revised version of the work plan would be prepared by Stéphanie Desbios and Jun Ryuzaki as soon as after the meeting and in any case before the CAeM-MG meeting mid-May.

**Action ET-ISA/1/1**

3.3 **ET-ASC**

3.3.1 General discussion on ET-ASC ToRs and tasks:

3.3.1.1 The team noted that ET-ASC was a new team with a lot of tasks and challenges; therefore, support should be sought from established expert networks to follow up on the planned activities. Science is to be given in a sound way to ICAO. TORs may need to include the role of the team as a reference for scientific validity of methodology etc.

3.3.1.2 ET-ASC needs expertise in different areas including: nowcasting, volcanic ash, space weather and climate. It also needs to cover different geographical and climate regions.

3.3.1.3 ET-ASC will be the group to coordinate and consolidate the CAeM and WMO positions, including inputs from other specialised groups, such as VASAG and ICTSW. In this way, it should support the WMO member to METP to report to the panel consolidated views and positions. Therefore, the ET members working on VA and SW should be enabled to do effective liaison with the specialized interprogramme and interagency bodies (VASAG, ICTSW (or its successor)).

**Action ET-ASC 1/1**

3.3.1.4 The group agreed that one of its important tasks would be to follow developments in the areas of nowcasting and very-short-range-forecasting (VSRF) and facilitate in the migration of research and technology achievement into operational practice. It was also agreed that the ET-ASC ToRs item b) should be changed to include “to aviation” with regard to nowcasting.

**Action ET-ASC 1/2**

3.3.1.5 Concerning on-going activities in nowcasting and very short range forecasting (VSRF), the group noted that there will be a growing need for high-resolution, rapid refresh models based
on which to generate FIR-specific products. Ensemble predictions with fast update cycle is another area of development that need to be followed.

3.3.1.6 In addition to technological developments, the role of the human forecaster in this environment should be considered. In some instances, forecasters are again located back to the airports. Large airlines have forecasters in their operation control centres for the provision of up-to-date information throughout the flight. The role of the forecaster is in the interpretation of the huge amount of data and providing the best decision support information to users.

3.3.1.7 ET-ASC will have to establish close coordination with the CAS. In this regard, PW Li who is a member of the CAS nowcasting WG would be the liaison person. It was noted that the nowcasting ranges of 0-2 hrs and 0-6 hrs have been defined by the CAS WG and these are the ranges where for the aviation community fits in with focus on ATM as end user. PW informed that new ATM impact products are being developed in several places including the Hong Kong Observatory (HKO).

3.3.1.8 The group noted that the Aviation Research Demonstration Project (AvRDP) should be a major activity in its programme. The project has been established as a collaboration between CAeM and CAS, with support from the CBS; it engages several WMO Programmes like AEMP and the World Weather Research Programme (WWRP). In order to achieve its goals, AvRDP should bring a combination of expertise of mesoscale MET experts and ATM experts. In the next couple of years, this should provide research results that could be considered for migration to operations. The task will be to translate MET products into ATM impacts. This will require good networking between the AMSPs and close interaction with ATM in order to conduct the impact assessment.

3.3.1.9 The group noted that, for the tropical regions, development of nowcasting methods is of primary importance. As pointed out by Pascal Waniha, convective events in the tropics are short lived and the current forecast practice with infrequent updates is not relevant. There is a need to develop recommendations on the refresh rate of the forecasts in these regions.

3.3.1.10 ET-ASC will also have to identify gaps in observations (liaise with CBS) need to enable nowcasting. The group considered the possibility to develop a small publication on the state-of-the-art in nowcasting methodology that would also reflect the situation in different regions.

**Action ET-ASC 1/3**

3.3.1.11 The group considered also forthcoming events where contributions will be needed, e.g., the AvRDP kick-off meeting (Shanghai, June 2015); a WWRP workshop on nowcasting and VSRF with a special session on aviation (additional information from Peter is needed).

**Action ET-ASC 1/4** The research phase of the AvRDP should finish with a dissemination workshop by mid-2016, which will provide a good opportunity to discuss how the advanced scientific achievements could be migrated to operations – with clear understanding of the need to develop the underpinning regulatory and procedural provisions.

3.3.2 Related tasks of the ET-ASC work plan:

- **Activity 1:**
  - **Task 1.1**, there is a need to minimize the scope and to consult with the WMO validation community. Herbert Puempel and Bob Rutledge to prepare a concept. There is a shortage of data for validation of products: how to address the need for data for validation, e.g., AMDAR data. **Action ET-ASC 1/5**
  - **Task 1.2**, Liaise with WIGOS and analyse the need for observing data to run high-resolution (HR) local models. E.g., UK is using 1.5 km resolution over UK and even denser for Heathrow with 8 times update per date. **Action ET-ASC 1/6**
Matt Hort to lead and prepare a short info doc; Bob Rutledge, Cory P. Davis, PW Li to support.

- Reformulate Activity 1 and the tasks as discussed above.

- **Activity 2**: Lead experts – PW Li and Cory P. Davis

- **Activity 3**: Lead expert – PW Li

  - Note by Neil Halsey: Appendix 1 of Annex 3 could be used for putting such guidance material – examples of acceptable means of compliance. Be careful not to regard WMO as a sales agent. To demonstrate current capabilities that could become future requirements.

- **Activity 4**:

  - Need to clarify what would be the outcome; limit to some scoping issue paper – lead by Cory P. Davis and Herbert Puempel. **Action ET-ASC 1/7**
  - Delete task 4.1

- **Activity 5**: (tasks have been reformulated by Matt Hort)

  - 5.1 and 5.2 – Matt Hort
  - 5.3 – PW Li and Bob Rutledge
  - 5.4 – Bob Rutledge
  - 5.5 – Matt and Bob Rutledge

  - Note by Neil Halsey: there will be a working group that will be dealing with aspects of SWx, TC, etc, where WMO will be a member. Legacy task from previous groups will be part of the work. It is recommended to synchronize closely with METP and its working groups.

- **Activity 6**:

  - Herbert Puempel informed of two events that were already held. Different aspects and impacts have been considered – from aerodrome and aircraft design to demand for air travel on different routes; many stakeholders are interested.
  - Proposal – develop a white paper (scoping paper) to cover impacts on infrastructure and design, demand, hazards. The white paper will help to initiate discussions and should also be submitted to the ICAO CAEP. Need to engage eminent scientists for this task. In Europe, airports are mandated to do risk analysis for climate change. The white paper could also serve the WMO internally in terms of GFCS. Collaboration with the WCRP is envisaged. **Action ET-ASC 1/8**
  - Evaluate the need for updating aerodrome climatology requirements included in the WMO Technical Regulations, Volume II. These issues should be coordinated with the CCl. Anna Ivanova to lead this task. **Action ET-ASC 1/9**
  - Coordination with ICAO. Climate-related issues should go through CAEP, and Neil Halsey to be kept informed.

- The RRR task is carried out by a liaison person – Jitze Van der Meulen.

3.3.3 ET-ASC reviewed the draft ICAO job cards and considered the following:

3.3.3.1 For the operationalization of Space Weather, a set of requirements for the capabilities, performance and designation of SW centres (global and regional) has to be developed. Related provisions should go to Annex 3 and to facilitate the implementation, a new Manual on SW is to be
developed. ET-ASC would support these tasks and Bob Rutledge will lead with assistance from ET members, in particular those from countries with interest in SW.

3.3.3.2 Job card on radioactivity – no tasks for ET-ASC currently envisaged.

3.3.3.3 Job card on WAFS development – among scientific challenges is the scale problem; there will be a need for global scale and finer scale products. Another major development will be introduction of ensembles. In order to position ET-ASC to support these developments an issue paper should be prepared (Bob Rutledge to lead). [Action ET-ASC 1/10]

4. ASBU CONCEPTS & ROADMAPS

4.1 Service-related components (ET-ISA focus)

4.1.1 The meeting reviewed relevant ICAO job cards available on the MET Panel web site (http://icao.int/airnavigation/METP). In terms of the Job Card for ATM requirements, it was proposed to change the title to a more general phrase, by replacing the word “for TBO” by “ATM operations”. The rationale was that the TBO concept was well known in Europe and USA but less so in the rest of the world; it would also help in the involvement of the ATMRPP. The meeting also agreed that the establishment of the meteorological services for the terminal area and the clear relationship with the ET-ISA should be included in the Job Card, as well as references to other relevant documents and link to the non-MET ASBU modules if any. These suggested changes would be proposed by Dimitar Ivanov at the MET Panel's meeting [Action ET-ISA/1/2]. The meeting noted that additional Job Cards would be prepared before the Panel's meeting for recommendations regarding PANS-MET, regional advisory system, and MET modules in ASBU Block2.

4.1.2 ET-ISA members reviewed the Appendices A and B of the TBO document. The meeting considered all comments and remarks and agreed to modify somewordings in the document. The draft revision of the Appendices, after a final review by the group after the meeting, would be sent to Dennis Hart (ATMRPP focal point for the TBO document) and posted on the AEMP website. The group is also tasked to review the TBO main document itself and provide comments if any before the next teleconference [Action ET-ISA/1/3].

4.1.3 The meeting discussed possible steps regarding the demonstration of verification methodology, and concurred that it will be useful to gather good examples from the members that could be added to the Appendices A and B of the TBO document. Information on predictability or accuracy should also be added in order to demonstrate the performance capabilities described in Appendices A and B. Good material has already been prepared by the former MSTA team. It is suggested to review this existing material and extract the information that is easily understandable and add it to the TBO document's Appendices. [Action ET-ISA/1/4]. However the team agreed that further complexity should not be brought to something that is already complex.

4.2 SCIENCE AND RESEARCH REQUIREMENTS (ET-ASC)  

(Covered in 3.3 above)

4.3 WAFS, IAVW, SPACE WEATHER (ET-ISA&ET-ASC)  

4.3.1 The two ETs discussed how outcomes from the ET-ASC would be reflected in the discussion of the ET-ISA. Herbert Puempel suggested that science basically should be conducted in a proactive manner and we should propose latest technology beyond users’ expectation at the time, instead of a reactive way, just fulfilling the gaps between user requirements and the current technology. Neil Halsey mentioned that such consideration is not necessarily done through the METP. Herbert Puempel suggested that all the requirements ideally be consolidated by ICAO side and passed through the METP as being the focal point. The teams agreed to wait for the METP...
Panel outcomes (establishment of WG and associated job cards) and then try to map team tasks
to those defined in the job cards.

4.3.2 ET-ASC has set up tasks to coordinate with WMO scientific groups or bodies such as VASAG. Neil Halsey advised that the result of this consultation with science groups should reach the MET Panel in a way or another.

4.3.3 The two teams recognized that the expected benefit of any new service within the WAFS, or about VA or Space Wx, could not be demonstrated by the MET community alone. The liaison with aviation user groups such as IFATCA, CANSO, and IFALPA should be done through the MET Panel, even if the Panel just transfers information or requests to any user group.

4.4 MET INFORMATION EXCHANGE IN SUPPORT OF SWIM (ET-ISA&ET-ASC)

4.4.1 Mr Steve Foreman (C/DRMM), and Patrick Simon from Météo-France, member of the CBS TT-AvXML and chair of the Data Management Group under MET Group in ICAO EUR Region joined the discussions related to IWXXM and SWIM.

4.4.2 The meeting was informed by Patrick Simon on many questions raised in the ICAO EUR DMG about IWXXM/AvXML format, such as, responsibility of organizations for the revision of digital data format, how to use those IWXXM based data, development of methodology for compression of IWXXM data. It was realized that some of the limitations of the TAC format are translated in AvXML, so that we face the same limitations in AvXML (e.g., the limited number of groups, no possibility to report incomplete messages, etc). It was suggested that the EUR DMG questions be attached as an annex to a WP from WMO to be presented by Dimitar Ivanov at the MET Panel meeting, with the objective to urge ICAO to address these issues in close collaboration with WMO. The WP would also ask the MET Panel for the establishment of a WG that would address all these IWXXM and SWIM related questions. Actions ET-ISA/1/5 and ET-ISA/1/6.

4.4.3 Considering the plans for migration to the XML/GML exchange for METAR, SPECI, TAF and SIGMET, which would become a standard practice with Amendment 78 to Annex 3 in 2018, the meeting noted that there might be cost implication for Members to follow revisions of data format that would require updates of software and applications for the transfer TAC code to IWXXM. It is also envisaged that the Regional OPMET Data Bases (RODB) should have a supporting function to help States with difficulties in implementing IWXXM based data dissemination in the near future.

4.4.4 The meeting noted further that the WMO documentation on IWXXM/AvXML has been incorporated in the Manual on Codes (WMO-No.306), volume D, Part 3.1 and submitted for approval by the Congress-17 in May 2015. There was a concern that some States might not have enough time for implementation of Amendments changes or new SARPs considering that the Amendment cycle of ICAO Annexes will be shortened from 3 years to 2 years. In this regard, Neil Halsey confirmed that the date of cessation of the TAC dissemination would be fixed very carefully after analyzing the ability of States to comply.

4.4.5 WMO, including the CBS TT-AvXML and CAeM ET-ISA should play an important role in the capacity building activities, including education on how to get away from the notion of a “product” to the notion of “data” or “information”, i.e., the transition from product-centric to data-centric service. Such capacity building should include development of guidance material and organization of appropriate training activities to raise awareness of IWXXM/AvXML and the practical aspects of implementation.

4.4.6 The training activities should be closely coordinated with Regional Associations, in particular concerning the future role of the RODBs. It was suggested that ET-ISA members from different regions should contact people in respective RODBs: Albert Moloto for South Africa and
Senegal, Jun Ryuzaki for Asia, Michael Berechree for South West Pacific (who for South America ?), Albert Moloto shared his concern about implementation of IWXXM data exchange in ICAO AFI Region. In AFI region, the MET Task Force discussed OPMET data exchange issue, but he told the group that many States would have certain level of difficulties in migrating into digital data exchange, while South Africa had started its preparation work.

4.4.7 The meeting discussed potential data policy issues relation to the transition to SWIM environment. Neil Halsey informed that commercial entities would be involved in future data exchange under the SWIM environment. Most of aviation data is not useful outside aviation community; however MET data is valuable on its own right. That issue has not been discussed and need to be raised by the community. There are two strong parties to lead such a discussion – WMO, as the provider of a global infrastructure (through the NMHSs) and general meteorological science and research (including NWP), and IATA, as representing the air transport business interest. Problems are twofold – the relevance of the current data policy adequate, and the fact that it is not fully implemented. There is a problem with the description (or lack of) of the OPMET data in the WMO Resolution 40. All these issues with the data policy pose problems to the NMHSs in particular in the cost-recovery. SWIM will allow defining how the data will be shared through respective descriptors in the metadata. In conclusion, ICAO needs to develop a policy, but they need to be supported by a consolidated view of WMO and IATA, thus a WMO-wide discussion is a prerequisite.

4.4.8 With regard to a more open data policy that will be discussed at the WMO 17th Congress, security issues should be seriously considered. Also, the exchange with the commercial sector should be discussed and provision need to be developed. With making all data available to commercial sector, there is a threat for NMHSs that they will lose large part of the services currently provided to aviation. Moreover, the commercial sector will not contribute to the maintenance of the infrastructure and the underpinning research, which will impact negatively the sustainability of the NMHSs as infrastructure providers.

4.4.9 It was agreed that ET-GOV should have the main responsibility in CAeM for addressing the data policy and related cost recovery topics. ET-GOV will have to establish links with IATA in this regard. The issue will also be raised at the MET Panel at its 1st meeting, instead of sending a State Letter as a reminder of the current ICAO police on OPMET data as recommended by the MET Divisional Meeting last year.

5. UPDATE ON REGIONAL OR NATIONAL MET/ATM PROGRAMS: NEXTGEN, CARATS, SESAR

5.1 NextGen, presentation by Cecilia Miner. The NextGen Goals have been well defined. There are 5 main focus areas. The current activities include development of verification techniques, expanding the ceilometers range (mostly because of the general aviation), and a weather derived impact information display, named "INSITE".

5.2 CARATS, presentation by Jun Ryuzaki. The developments are linked to the coming Olympic Games in 2020 to be hosted by Japan. Cost benefit analysis for CARATS modules has been done in a comprehensive way. Some CDM tools have been implemented already, including an interactive web based briefing. Weather data downlink – several types of downlink systems, e.g., mode-S, are being considered. It is proposed to establish a repository of methodologies and achievements in order to facilitate information sharing on advanced development.

5.3 SESAR, presentation by Bart Nicolai. The developments of the MET-related work packages are accompanied with a lot of sensitivities, e.g., the definition of the display of MET information, and the realization of the 4D weather cube as a single source of MET information. There is a possibility that the commercial sector wants to become involved in the next stages of SESAR R&D as well as in the implementation phase. This will raise issues regarding the consistency and credibility of the information to be provided by different entities.
5.4 As another national MET/ATM activity, Michael Berechree informed the team about the program for the modernization of aviation MET services in Australia, with the new ATM system named One Sky currently under implementation. Michael Berechree offered to provide more information on this activity to the team in the next months Action ET-ISA/1/7.

6. CLIMATE CHANGE IMPACT ON AVIATION (ET-ASC)

6.1 Most of the discussion on this item is in p. 3.3 above.

6.2 ET-ASC has also interaction with the ICAO CAEP. Herbert Puempel is the CAEP member for WMO and he will provide MET inputs to the group. The main task of CAEP is about regulatory material. The other side is the impact of climate change on aviation. DLR develops methodology for reduction of the overall environment impact of the flights. Aviation induced Ci clouds issue. Need to quantify its importance in determining the flight track. Project for effect on cryosphere.

7. COORDINATION WITH RELEVANT ICAO GROUPS

7.1 The meeting was informed about the planned modus operandi of the MET Panel. It was explained that the role of the Panel is different to the previous ICAO OBS groups and study groups. It is envisaged to establish several working groups with rapporteurs. The WGs will be populated by people designated by the members of the Panel. WMO could nominate advisors from different countries (e.g., for SWIM 2 to 3 advisers). Groups on information management, ATM requirements, and operational matters are envisaged. Each WG will decide on its working methods. WMO should have a position/proposal for each group. More than one WMO representative is possible. The frequency of meetings will be decided by the Panel itself. As a minimum – one meeting in September 2016; in general – only when there is a need for decision, e.g., approval of amendment proposal. The Panel is responsible to the ANC directly and the Secretariat is to support its work. The Rapporteurs of WGs will be responsible for the delivery of the tasks.

8. SUPPORT TO REGIONAL ACTIVITIES

8.1 Dimitar Ivanov informed the meeting about the forthcoming events on aviation MET being organized in collaboration with the regional associations. Several RAs during their recent sessions requested a dedicated regional event to discuss the emerging challenges and related impacts on the NMHSs. The AEM division is working with respective regional offices on organizing a European Conference on Aviation for Meteorology (ECMA-15) tentatively scheduled for October 2015 in Vienna. RA I also requested such a conference for Africa most likely in the Q2 of 2016; similar request came from RA III, but there has been no follow up for the time being.

8.2 A smaller scale event – a Regional Forum on Meteorology for Aviation Safety is being organized for the South-East Asia involving 11 countries from RA II and RA V. The meeting will be hosted by the Indonesian Meteorological Agency (BMKG) from 29 to 30 April 2015. The event will discuss lessons learned from the recent Air Asia accident and ways to improve the MET services in this part of the world which is prone to a number of MET aviation hazards.

8.3 Other regional activities are planned in coordination with ICAO, such as a MET/ATM workshop in Tokyo in June this year, and a SIGMET training in RA IV supported by the US NWS. The meeting agreed that all these regional events should be used to promote and raise awareness of the foreseen changes in the MET service provision as a result of GANP and ASBU.

9. COMMUNICATION STRATEGY (IN PARTICULAR THROUGH THE CAEM WEBSITE)
9.1 The meeting agreed that the WMO AEMP website provides good opportunities for outreach and for collaborative working. Dimitar Ivanov will investigate further the option for a password protect page for each ET, where working materials could be shared and worked on collaboratively.

9.2 ET-ISA agreed that there was a lot of useful material on their legacy website that need to be preserved and updated. Dimitar Ivanov is requested to arrange the transfer of such legacy material on the new website. **Action ET-ISA/1/8**

9.3 Dimitar Ivanov informed that other groups (e.g., TT-QMS) use some platforms for collaboration and sharing, such as Yammer. Michael Berechree will investigate the possibility for using Yammer by ET-ISA members. **Action ET-ISA/1/9**

10. **ANY OTHER BUSINESS**

10.1 PW LI raised the issue of future provisions about visualization would be regulated in future Annex3 and/or PANS-MET, since the Model charts in the Annex 3 have been maintained by the WMO. It should be decided whether these model charts should be changed according to the new data format (AvXML). Neil Halsey advised that with the creation of the PANS-MET it would be possible to expand the current Appendix 1 in the Annex 3, as the Annex itself will not go into details anymore. Regulation on visualization could be developed by using the Acceptable Mean of Compliance format. ET-ISA could be tasked in the future to provide new examples. It would also be worthwhile to revisit the Attachments to Annex 3 (the green pages).

10.2 Matt Hort – role of the ET-ASC: Requirement for the group – where they come from? Further coordination of the work plan is necessary. Need to review some texts in the draft work programme before presenting the programme to the MG. In particular if this is the right direction.

11. **CLOSURE OF THE MEETING**

    After the customary exchange of courtesies, the meeting closed at 13:00 on 1 April 2015.
AGENDA

1. ORGANIZATION OF THE SESSION
   1.1 Opening of the session
   1.2 Adoption of the Agenda
   1.3 Working arrangements

2. REVIEW METEOROLOGICAL COMPONENTS OF THE GANP AND ASBU IN ACCORDANCE WITH THE ET TORS AND WORK PLANS
   2.1 Mapping of ET ToRs and tasks to MET DIV recommendations
   2.2 Timelines vis-a-vis ASBU time blocks

3. REVIEW AND UPDATE OF ET WORK PLANS

4. ASBU CONCEPTS & ROADMAPS
   4.1 Service-related components (ET-ISA focus)
   4.2 Science and research requirements (ET-ASC focus)
   4.3 WAFS, IAVW, Space Weather:
   4.4 MET information exchange in support of SWIM

5. UPDATE ON REGIONAL OR NATIONAL MET/ATM PROGRAMS: NEXTGEN, CARATS, SESAR
   • Scientific developments (ET-ASC)
   • Implementation guidance and support (ET-ISA)

6. CLIMATE CHANGE IMPACT ON AVIATION (ET-ASC)

7. COORDINATION WITH RELEVANT ICAO GROUPS
   • Interface to MET Panel, possible input mechanisms, WMO coordination of MET expertise - ET-ISA lead, ET-ASC support (all)
   • Membership in or contributions to suitable teams and structures as appropriate
   • Contribution to the Committee on Aviation Environmental Protection (CAEP)

8. SUPPORT TO REGIONAL AVIATION MET ACTIVITIES (ALL)

9. COMMUNICATION STRATEGY (IN PARTICULAR THROUGH THE CAEM WEBSITE)

10. ANY OTHER BUSINESS (ALL)

11. CLOSURE OF THE SESSION
LIST OF PARTICIPANTS

1. **EXPERT TEAM ON AVIATION, SCIENCE AND CLIMATE (ET-ASC)**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>NAME</th>
<th>E-MAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA (CHAIR)</td>
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</tr>
</tbody>
</table>

2. **EXPERT TEAM ON INFORMATION AND SERVICES FOR AVIATION (ET-ISA)**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>NAME</th>
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</tr>
</thead>
<tbody>
<tr>
<td>FRANCE (CO-CHAIR)</td>
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<td><a href="mailto:stephanie.desbios@meteo.fr">stephanie.desbios@meteo.fr</a></td>
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<tr>
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</tr>
</tbody>
</table>

3. **OBSERVERS**

<table>
<thead>
<tr>
<th>COUNTRY / ORGANIZATION</th>
<th>NAME</th>
<th>E-MAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERMANY</td>
<td>BECKMANN, Björn-Rüdiger</td>
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<tr>
<td>FRANCE</td>
<td>SIMON, Patrick</td>
<td><a href="mailto:patrick.simon@meteo.fr">patrick.simon@meteo.fr</a></td>
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<td>HALSEY, Neil</td>
<td><a href="mailto:nhalsey@icao.int">nhalsey@icao.int</a></td>
</tr>
</tbody>
</table>
4. **WMO SECRETARIAT**

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>E-MAIL</th>
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</thead>
<tbody>
<tr>
<td>IVANOV, Dimitar Ivanov</td>
<td>C/AEM</td>
<td><a href="mailto:divanov@wmo.int">divanov@wmo.int</a></td>
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<tr>
<td>FOREMAN, Steve</td>
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</tbody>
</table>
# List of Actions

**Agreed by ET-ISA during the conjoint ET-ISA/ET-ASC meeting, Toulouse, 30.03-01.04.2015**

*(Status of actions on 21 May 2015)*

<table>
<thead>
<tr>
<th>Action Item</th>
<th>Action</th>
<th>Responsibility</th>
<th>Deliverables</th>
<th>Deadline</th>
<th>Status</th>
<th>Note</th>
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</table>
| 1/1         | Organize 2nd Teleconference.                                            | Co-chairs, Michael     | • review the draft report of the 1st meeting to be sent to the MG meeting  
• debrief the outcomes of the ICAO METP 1st meeting (by Michael Dimitar and Jun)  
• refine the tasks under the work plan to suit the Job Card developed by the METP | April 28      | 2nd teleconference on May 4. 3rd sub-action to be continued                  | The teleconference will be started at 10 UTC. |
| 1/2         | Update the ET-ISA work plan according to ET-ISA/1 discussion, and ICAO MET Panel's 1st meeting outcomes and WG job cards and work programs. | Co-chairs, Dimitar     | • Map the ET-ISA tasks and milestones to the ICAO WG work program activities  
• Develop such job cards for each team task or activity | MG meeting, 12-14 May (first draft) | First draft available after MG meeting. | To be continued gradually as WG work programs are developed. |
| 1/3         | Provide input to the METP meeting in regards of job card on ATM requirements | Dimitar                | • suggest change the title of the job card as “ATM requirement for ATM operation”  
• propose inclusion of the meteorological services for the terminal area in the job card  
• propose inclusion of clear linkage with WMO ET-ISA in the job card | METP Complete | WP should be prepared? |                                                                  |
| 1/4         | Provide input to the Appendices A and B of the TBO concept document     | Stéphanie, Bart, Jun   | • consolidate views of members and provide revised version of the Appendices A & B to Dennis Hart (two steps : one with comments on US feedback, one as a cleaned-up version)  
• provide further comments on the TBO main document, if any | 10 April Complete on May 13 |                      |                                                                  |
| 1/5 | Adding example(s) of verification methodology to the TBO concept document | Stéphanie, Bart, Michael | • ask ET members to provide examples of verification methodology hopefully regarding “impact-based” analysis  
• propose addition of the example(s) to the Appendix A & B of the TBO document to Dennis Hart | 30 June |
| 1/6 | Input to the METP meeting in regards of future availability of AMHS | Dimitar | • raise the issue at the METP, in regards of keen need to determine future availability of the AMHS for the digital data exchange of MET information. | April 20, Complete |
| 1/7 | WP to the METP regarding issues with XML | Dimitar, TT-AvXML | • consolidate questions to be raised at the METP/1 meeting  
• submit WP to the meeting | April 20, Complete |
| 1/8 | Information about Australian new ATM System “One Sky” | Michael | • Information paper for ET members | Oct 2015 |
| 1/9 | Update contents on the legacy ET’s web-site | Dimitar | • ask Members to check the contents and update information on “Demonstration Project” on the previous ET’s web-site  
• upload updated on the current ET-ISA web-site with ID/Password setting | 30 Sep 2015 |
<p>| 1/10 | Use of Yammer as a sharing platform for ET-ISA members | Michael | • Study the feasibility and inform | June 2015 |</p>
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<tr>
<td>1/1</td>
<td>Ensure close coordination of ET-ASC activities with other relevant WMO bodies, such as VASAG and ICTSW</td>
<td>Chair, Dimitar</td>
<td>• propose ET-ASC experts participation in VASAG and ICTSW</td>
<td>MG/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>Update the ET-ASC terms of reference</td>
<td>Chair, Dimitar</td>
<td>• Propose appropriate wording to clarify the scope of the expected work in the field of nowcasting and VSRF</td>
<td>MG/1</td>
<td></td>
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<tr>
<td>1/3</td>
<td>Publication on State-of-the-art of nowcasting methodology that would also reflect the situation in different regions and needs for observations</td>
<td>Chair</td>
<td>• “Issue paper” on nowcasting for aviation</td>
<td>Mid 2016</td>
<td>Coordinate with AvRDP and WWRP</td>
<td></td>
</tr>
<tr>
<td>1/4</td>
<td>Contribute to WWRP workshop on nowcasting and VSRF in 2016</td>
<td>Peter</td>
<td>• Information to ET members on the plans for the WWRP workshop in order to plan appropriate contribution on aviation aspects</td>
<td>June 2015</td>
<td></td>
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</tr>
<tr>
<td>1/5</td>
<td>Prepare questions for the AMDAR community and verification community on the use of and the need of data for verification/validation</td>
<td>Herbert, Bob</td>
<td>• Questionnaire • Use the AMDAR expert network for gathering more information</td>
<td>Dec 2015?</td>
<td></td>
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</tr>
<tr>
<td>1/6</td>
<td>Prepare an information document on data needs for high-resolution models</td>
<td>Matt, Bob, Cory, PW</td>
<td>• Information document for ET members</td>
<td>Dec 2015?</td>
<td></td>
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</tr>
<tr>
<td>1/7</td>
<td>Develop a “white paper” (scoping paper) on climate change impacts on infrastructure and design, demand, hazards, operations.</td>
<td>Chair</td>
<td>• Engagement of climate experts to support the task • Draft white paper • Submit to ICAO CAEP</td>
<td>Dec 2015?</td>
<td></td>
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<tr>
<td>1/8</td>
<td>Review of aerodrome climatology requirements included in the WMO Technical Regulations, Volume II</td>
<td>Anna</td>
<td>• Initial review and report to ET Members on further action needed</td>
<td>30 Sep 2015</td>
<td></td>
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</tr>
<tr>
<td>1/9</td>
<td>“Issue paper” for future WAFS development</td>
<td>Bob</td>
<td>• “Issue paper”</td>
<td>??</td>
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</table>