

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR AERONAUTICAL METEOROLOGY

**3rd Meeting of the CAeM Expert Team on
Education and Training
(ET/ET/3)**

Kelowna, BC, Canada

9 to 13 August 2010

FINAL REPORT



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3. Report of the Chairman
4. Final Version of the 2nd Level Competency Requirements for AMP
5. Revised Work-plan for the ET-ET

PICTURE



Participants – ET/ET/3 Meeting

From left to right : C. Miner, R. Windmolders, CC. Lam, K. Johnson, C. Webster, L. Neitiniemi- Upola, S. Baig (Chair), D. Whittle, H. Puempel, L. Sutton.

1. OPENING OF THE MEETING

1.1 The meeting was opened on Monday 9 August by Mr Kent Johnson, representing the Permanent Representative of Canada, Mr David Grimes, at whose kind invitation the meeting could be held at the facilities of the University of British Columbia Okanagan. Mr Shakeer Baig, Chair of the ET-ET outlined the dense workplan for the meeting, stressing that the main goal was the finalization of the 2nd level competencies for aeronautical meteorological personnel that had been started by the last meeting of the team in November 2009 in Barbados. Words of thanks were extended to the Meteorological Service of Canada (MSC) for their hospitality and support in the hosting of the meeting. The efforts of Mr Kent Johnson in organizing the meeting were recognized. The WMO Secretary-General's representative, Dr H. Puempel (C/AEM), encouraged the meeting to work on the basis of the 1st level competencies that had been undergone a thorough process of refinement and approval by the CAeM Management Group, the 14th session of the Commission for Aeronautical Meteorology in February 2010 and finally by the 62nd session the WMO Executive Council in June 2010. In view of this priority task and the dense schedule for the meeting, it was decided to defer some originally planned Agenda Items to future teleconferences of the group

1.2 Adoption of the Agenda

The provisional agenda was adopted by the team with some amendments, and is now reproduced in Annex 1.

2. REPORT OF THE CHAIR OF THE ET/ET

The Chair summarized the work done by the team since the last meeting of the team in April 2008. A Power-point presentation of the Chair's report can be viewed at (<http://forum.14.caem.wmo.int/post14web/eboard/>). A list of participants of the meeting is attached to this report in Annex 2.

3. IMPORTANT ITEMS ARISING FROM CAeM-XIV (Hong Kong, China, February 2010)

In a brief report, C/AEM reported on the main issues debated by CAeM-XIV, in particular those items that had repercussions for the work and scope of the ET-ET. In particular, the adoption of the First Level Competencies as part of a new competency-based approach for personnel in aeronautical meteorology was welcomed by the team. It was noted with satisfaction that the AEMP was way ahead of most other programs in this respect, but also that in aviation, meteorology was only following a trend to regularly assessed competency of all personnel, in line with the safety-orientation of the entire industry, where currency and competency of all key staff was seen as pre-requisite for safe operations.

The necessary implementation of Quality Management Systems by all service providers was also seen as a key driver for the need to have demonstrably competent staff in all positions.

The plans to create new services for the Terminal Area, with a focus on Air Traffic Management, as well as the trial introduction of new regional SIGMET Advisory Centers would all affect the necessary competency of staff working in these areas.

4. REVIEW OF 2ND LEVEL AERONAUTICAL METEOROLOGICAL PERSONNEL COMPETENCE DESCRIPTIONS AND ASSESSMENT AND COLLABORATION WITH TT-CAT

The meeting undertook a very thorough and detailed review of the 20th version of the draft 2nd level competencies that had been kindly prepared by Chris Webster (NZ) over the last few

months. The document was structured in competencies, regional variations and underlying knowledge and skills. Intense discussions and a very focussed and structured debate, with Chris Webster providing the on-line editing of the group's comments and contributions produced a very high quality document as given in Annex 3 of this report. It is understood that this document will be considered a living document that can and will be adapted to changing requirements and conditions, but is considered mature enough to form the basis for the Assessment Toolkit currently being developed by the TT-CAT under the leadership of Kent Johnson.

5. REVIEW OF CAeM ET/ET TRAINING WEBSITE

The ET Chair reported that the www.caem.wmo/moodle training website, which had seen a steady growth of material, will require a regionally-based exercise to become more widely used and visible. The responsibility for maintaining the site will be transferred from the previous ET Chair and now VP of CAeM, Ian Lisk, to Raf Windmolders at Belgocontrol in the near future. Each ET member will be tasked to establish contact to regional Focal Points of the AEMP to this end, and to discover and integrate any useful national or regional training material in particular if available in other WMO languages. The Chair will present a Poster at the upcoming ETR Symposium in Indonesia advertising the Website.

6. ET/ET WORKPLAN 2010-14 REVIEW

The meeting reviewed the 2010-2014 workplan under the current priorities, considered which of the tasks could be regarded as completed or no longer necessary, and agreed on the updated version of the plan given in Annex 4

7. ET/ET 2010-14 WORKPLAN IMPLEMENTATION

The Chair assigned regional responsibilities to core members of the ET, stressing the importance of widely advertising our website and obtaining training material and resources. The ET agreed that the core team should hold quarterly conference calls to discuss progress against the objectives listed in the Work-plan.

8. ANY OTHER BUSINESS

No issues were raised under this agenda item.

9. CLOSURE OF THE MEETING

The ET Chair congratulated the team for the remarkable team spirit developed over the short period of the meeting and repeated his deep felt appreciation and thanks to MSC and in particular Mr Kent Johnson for his sterling efforts.

After the customary exchange of courtesies, the meeting closed at 11:45 on Friday 13 September 2010.

WORLD METEOROLOGICAL ORGANIZATION

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3RD MEETING OF THE CAeM EXPERT TEAM ON EDUCATION AND TRAINING

KELOWNA, BC, CANADA

9 TO 13 AUGUST 2010

REVISED AGENDA

Meeting Aim – “To define deliverables and assign actions/responsibilities, estimated required resources and appropriate timelines for implementing the proposed WMO CAeM ET/ET Work Plan 2010-14”.

- 1. OPENING OF THE MEETING**
(Organization and opening, delegate introductions and instructions)
 - 2. REPORT OF THE CHAIR OF ET/ET**
 - 3. IMPORTANT ITEMS ARISING FROM CAeM-XIV (Hong Kong, China, February 2010)**
 - 4. REVIEW OF 2ND LEVEL AERONAUTICAL METEOROLOGICAL PERSONNEL COMPETENCY STANDARDS AND ASSESSMENT AND COLLABORATION WITH TT-CAT**
 - 5. REVIEW OF CAeM ET/ET TRAINING WEBSITE**
(Structure of website, conceptual framework for curriculum/course structure built on the basis of the site, language questions (translation) and resource requirements)
 - 6. ET/ET WORKPLAN 2010-14 REVIEW**
(Review of work done so far, links made, project priorities)
 - 7. ET/ET 2010-14 WORKPLAN IMPLEMENTATION**
(Agreeing actions, responsibilities and deadlines to take forward from the meeting)
 - 8. ANY OTHER BUSINESS**
 - 9. CLOSURE OF THE MEETING**
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List of Participants
3rd Meeting of the CAeM Expert Team on
Education and Training
(ET/ET/3)

Kelowna, BC - Canada
9-13 August 2010

Name and Address	Tel., Fax., Cell And Email
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‘Secondary Level’ AMP Competence Descriptions and Related Criteria

The following guidelines relate to the AMP Competence Standards endorsed by EC-LXII in Geneva in June 2010.

Background

EC-LXI in June 2009 had requested the Commission for Aeronautical Meteorology to review and refine the competence requirements in Supplement No.1 to WMO-No.258 (through the ET-ET) and, in coordination with the EC Panel of Experts on Education and Training, submit to EC-LXII a set of ‘top level’ competencies for inclusion in WMO-No. 49, Volume I Technical Regulations.

CAeM-XIV in Hong Kong, China in February 2010 noted the review by the ET-ET (Barbados, Dec 2009) of a draft ‘secondary-level competence description document’ produced as one of the outcomes from the Aeronautical Meteorology Curriculum Development Workshop held in Alanya, Turkey, in October 2009. The session agreed that the aim of this document was to assist Members in mapping their national personnel assessment practices to the ‘top level’ Competence Standards approved by EC-LXII in June 2010.

The Commission suggested that work on the ‘secondary level document’ should be continued including further review at the 24th Session of the EC Panel of Experts on Education and Training in Boulder, USA in March 2010. Following a further period of review and discussion by correspondence, the ET-ET finalized this document in Kelowna, Canada in August 2010 for endorsement by the CAeM MG.

During the development of these descriptions, the ET/ET has worked closely with the Task Team on the Competency Assessment Toolkit set up at CAeM-XIV.

Implicit in the background knowledge and skills is the requirement that Aeronautical Meteorological Forecasters will meet qualification requirements of WMO-No.258 “Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology” Volume I: Meteorology.

Format of the Descriptions

The text is structured according to the following format:

Position title: Aeronautical Meteorological Forecaster (AMF) or Aeronautical Meteorological Observer (AMO)

Application conditions: (from WMO-No. 49, Volume I)

- A. *for the area and airspace of responsibility,*
- B. *in consideration of the impact of meteorological phenomena and parameters on aviation operations, and*
- C. *in compliance with aviation user requirements, international regulations, local procedures and priorities.*

Top-level competence standard (also from WMO-No. 49, Volume I)

- Competence descriptions for each standard
- Performance criteria for each standard

Regional variations

Background knowledge and skills

The importance of the preamble to the top-level competence standards is emphasized. There will be considerable variation in the legitimate functions of aeronautical meteorological offices worldwide, and it is not possible to write a document that exactly matches every office’s function. Therefore the performance criteria should be applied in a way that is consistent with these variations. For example, it is recognized that

meteorological offices in the tropics will not have a responsibility to forecast blowing snow (Performance criterion 2.1). The conditions A, B and C provide for this.

Current developments in service delivery to international civil aviation include plans for more regional centers providing advisories for aviation impact parameters along the model of Volcanic Ash Advisory Centers, and Tropical Cyclone Advisory Centers. Furthermore, the planning for regionally coordinated Air Traffic Management projects such as NextGen in the USA, SESAR in Europe may soon be followed by similar tendencies in Asia for very dense airspace.

New concepts such as dedicated services for the wider Terminal Area, uplink of data with high refresh rate containing severe weather information such as weather radar- or satellite-based information are likely to complement, if not eventually replace the legacy, product-oriented services as currently prescribed in the ICAO Annex 3. This development will require a regular review of the required competencies of forecasters working either in a traditional Meteorological Watch Office or Aerodrome Meteorological Office, with more stringent criteria likely to be required for experts working at the regional advisory centers.

The role of most forecasters is expected to change from a production-oriented model to a supervisory and consultative role, which again will likely require high standards of competency and underlying knowledge. The guidelines presented in this document attempt to anticipate as far as possible imminent changes, but a review cycle of not more than 3-5 years as part of the overall Quality Management and Risk Management approach is strongly suggested.

Aeronautical Meteorological Forecaster

The descriptions apply

- A. for the area and airspace of responsibility,
- B. in consideration of the impact of meteorological phenomena and parameters on aviation operations, and
- C. in compliance with aviation user requirements, international regulations, local procedures and priorities.

1. ANALYSE AND MONITOR CONTINUOUSLY THE WEATHER SITUATION

Competence description

Observations and forecasts of weather parameters and significant weather phenomena are monitored to determine the need for issuance, cancellation or amendment/update of forecasts and warnings according to documented thresholds and regulations.

Performance criteria

1. Analyse and diagnose¹ the weather situation as required in forecast and warning preparation.
2. Monitor weather parameters and evolving significant weather phenomena (as defined in ICAO Annex 3) and validate current forecasts and warnings based on these parameters.
3. Appraise the need for amendments to forecasts and updates of warnings against documented criteria and thresholds.

¹ "Analysis" may be defined as answering the question "what is happening?", and "diagnosis" as answering "why is it happening?"

2. FORECAST AERONAUTICAL METEOROLOGICAL PHENOMENA AND PARAMETERS

Competence description

Forecasts of meteorological parameters and phenomena are prepared and issued in accordance with documented requirements, priorities and deadlines.

Performance criteria

1. Forecast the following weather phenomena and parameters:
 - temperature and humidity
 - wind including temporal and spatial variability (wind-shear, directional variability and gusts)
 - QNH
 - cloud (types, amounts, height of base and vertical extent)
 - precipitation (intensity, onset and duration, amount and types), and associated visibilities
 - fog or mist, including onset and duration, and associated reduced visibilities
 - other types of obscuration, including dust, smoke, haze, sand-storms, dust-storms, blowing snow, and associated visibilities
 - hazardous weather phenomena listed in Performance criterion 3.1
 - wake vortex advection and dissipation, as required.

2. Ensure that forecasts are prepared and issued in accordance with ICAO Annex 3, WMO-No.49, regional and national formats, codes and technical regulations on content, accuracy and timeliness.
3. Ensure that forecasts of weather parameters and phenomena are consistent (spatially and temporally) across boundaries of the area of responsibility as far as practicable, whilst maintaining meteorological integrity. This will include monitoring forecasts issued for other regions, and liaison with adjacent regions as required.

3. WARN OF HAZARDOUS PHENOMENA

Competence description

Warnings are issued in a timely manner when hazardous conditions are expected to occur or when parameters are expected to reach documented threshold values, and updated or cancelled according to documented warning criteria.

Performance criteria

1. Forecast the following hazardous weather phenomena, including spatial extent, onset, duration, and intensity:
 - thunderstorms, particularly organized systems, including associated turbulence, in-flight icing, hail, heavy precipitation with poor visibility, electrical phenomena, down-burst/microburst or gust front, tornadic activity
 - turbulence (moderate or greater), including onset and duration, intensity, spatial extent, type (orographic, mechanical, convective and clear air turbulence).
 - moderate and severe low-level wind shear
 - aircraft icing (moderate or greater), including onset and duration, intensity, accumulation rate, spatial extent, type (rime or opaque, glaze or clear, freezing rain, hoar frost, mixed ice)
 - hazardous phenomena affecting aerodromes such as: strong surface winds including cross-winds and squalls, frost, freezing precipitation, snowfall, lightning, wake vortices
 - sand- and dust storms
 - volcanic ash based on observations and/or advisory products
 - tropical cyclones.
2. Ensure that warnings are prepared and issued in accordance with thresholds for hazardous weather, and with ICAO Annex 3, WMO-No.49, regional and national formats, codes and technical regulations on content, accuracy and timeliness.
3. Ensure that warnings of hazardous weather phenomena are consistent (spatially and temporally) across boundaries of the area of responsibility as far as practicable, whilst maintaining meteorological integrity. This will include monitoring forecasts issued for other regions, and liaison with adjacent regions as required.

4. ENSURE THE QUALITY OF METEOROLOGICAL INFORMATION AND SERVICES

Competence description

The quality of meteorological forecasts, warnings and related products is ensured at the required level by the application of documented quality management processes.

Performance criteria

1. Apply the organization's quality management system and procedures.

2. Assess the impact of known observational error characteristics (e.g. bias, achievable accuracy of observations and sensing methods) on forecasts and warnings.
3. Validate aeronautical meteorological data, products, forecasts and warnings (timeliness, completeness, accuracy), using real-time checks..
4. Monitor the functioning of operational systems and take remedial actions when necessary.

5. COMMUNICATE METEOROLOGICAL INFORMATION TO INTERNAL AND EXTERNAL USERS

Competence description

User requirements are fully understood and are addressed by communicating concise and complete forecasts/warnings in a manner that can be clearly understood by the users.

Performance criteria

1. Ensure that all forecasts/warnings are disseminated through the authorized communication means and channels to designated user groups.
2. Explain² aeronautical meteorological data and information, deliver weather briefings and provide consultation to meet specific user needs.

² In accordance with national implementation of ICAO Annex 1 English language proficiency requirements.

Regional variations

Locally agreed and documented criteria and thresholds.
 The range of weather phenomena.
 Risk assessment and estimation of forecast uncertainties.
 Types and use of forecast guidance.
 Designated offices responsible for advice on volcanic ash, tropical cyclones and other phenomena.
 Regional regulations.
 Boundaries of forecast areas.
 Extent, scope and exclusions of QMS implementation.
 Communication language(s).
 Communications technology for forecast and warning transmission, and for weather briefing.

Background knowledge and skills

- WMO meteorologist requirements of WMO-No.258.
- the generation mechanisms of low-level jet-streams, boundary layer turbulence and gusts, and their effects on aircraft
- the formation and dissipation, characteristics, occurrence and effects of fog and other forms of obscuration, and low-level cloud, and associated diagnostic and prognostic parameters
- mechanisms for generating different types of cloud and precipitation, and local enhancement mechanisms for cloud and precipitation
- volcanic ash cloud displacement and dispersion
- formation mechanisms and characteristics of other aeronautical meteorological phenomena, such as dust-storms, sand-storms, dust devils, waterspouts.

- the International Standard Atmosphere (ISA)
- meteorological hazards to aviation, including thunderstorms and associated phenomena, aircraft icing, turbulence, poor visibility, low-level cloud, tropical cyclones, wind shear and volcanic ash.
- local topography and its effects on weather, such as gap flows, downslope windstorms, orographic turbulence, sea breezes and upslope fog
- the topographic influence on cloud, precipitation, fog and reduced visibility in typical wind and moisture regimes
- areas of likely volcanic activity within the region of responsibility (for offices with responsibility for issuing volcanic ash advice).
- interpretation of:
 - radar and satellite imagery to identify fog and stratus, gravity waves in cirrus cloud and jet streams, inference of icing potential in layer cloud, and of volcanic ash and wind-shear.
 - numerical weather prediction guidance and other forms of objective guidance, and assimilate them into forecast/warning preparation
 - observed parameters when variations result from differences between automatic sensor technologies and manual observing techniques.
- ability to interpret all observational products (e.g. METAR), and encode forecast products (e.g. TAF, SIGMET) into Traditional Alphanumeric Codes (TAC).
- airport climatologies, including occurrence of significant cloud, thunderstorms, precipitation, high winds, low-level windshear, reduced visibility, fog and, where applicable, volcanic ash
- local forecasting guides and techniques, including diagnostic and prognostic parameters, for forecasting significant cloud, thunderstorms, turbulence, aircraft icing, precipitation, high winds, low-level windshear, reduced visibility, fog and, where applicable, volcanic ash
- ability to carry out a routine, high quality self-briefing (which may include a shift hand-over briefing) of the recent and current weather situation, and integrate all available data to produce a consolidated diagnosis
- international, national and local aeronautical forecast/warning/monitoring procedures, directives and instructions
- local diagnostic and forecast tools and aeronautical forecast preparation systems, including basic operating system functions, data processing and visualization technologies
- ability to explain the meteorological and procedural reasons behind a forecast and warning decision.
- the likely impact of forecasts of meteorological parameters and phenomena on aviation operations.
- the significance of warning thresholds on aviation operations, and describe the likely impact of warnings of hazardous phenomena on these operations.
- applicable TAF verification system(s) and verification statistics.
- latest developments in aeronautical weather monitoring and observing technologies, and aeronautical forecasting techniques in use at the service provider.
- quality management systems
- aviation safety management systems, as required.
- standards (as defined in ICAO Annex 3, WMO-No.49) and Quality Management System procedures (as defined in ISO 9001 standards, national regulations):
 - procedures for checking and identifying errors and omissions
 - significant differences between factual and forecast data
 - when to ignore information and where to go to resolve points of contention
 - desirable accuracy of forecasts as in ICAO Annex 3, WMO-No.49 and national regulations
 - priorities and schedules
 - actions to be taken in the event of repeated cases of discrepancies, inconsistencies and malfunctions
 - fall-back procedures in the case of computer failure

- contingency arrangements in case of emergencies such as fire, bomb alerts and natural disasters.
- relevant ICAO and WMO documents, including ICAO Annex 3 and WMO-No.49
- ICAO, WMO and national aeronautical meteorological codes and forms of data representation.
- aviation user requirements, including:
 - the effects on aircraft performance of air density, humidity, icing, low-level wind-shear, turbulence and wind, and the meteorological factors related to fuel consumption
 - the requirements for enroute wind, temperature and significant weather forecasts and aerodrome forecasts for pre-flight planning and in-flight re-planning
 - meteorological aspects of flight planning; definitions; procedures for meteorological services for international air navigation; types of meteorological information required for Air Traffic Services (ATS), aerodrome control towers, approach/area control, and flight information centers
 - low visibility runway operating procedures
 - effects of unfavourable meteorological conditions on aeronautical operations, including air traffic disruption, holding and diversions
 - meteorological effects on aerodrome ground services, such as snow clearing, the effect of wet runways, and the effect of thunderstorms and strong winds on apron operations
 - aerodrome operating minima, the need for alternates and impacts on fuel consumption
 - altimeter setting procedures
- common terms relevant to aeronautical meteorology, including:
 - (Special) Visual and Instrument Flight Rules and Conditions
 - Flight Information Region (FIR) / Functional Airspace Block (FAB)
 - final approach, missed approach
 - cruising and transition level, transition layer, transition altitude, Flight Level
 - Minimum Safe Altitude, Indicated Altitude, True Altitude
 - Category II and III operations, Aeronautical Information Publication (AIP)
 - NOTAMs / ASHTAMs
 - ATIS / VOLMET
- the use and interpretation of products from the World Area Forecast System (WAFS); products provided by the Volcanic Ash Advisory Centers (VAACs), Tropical Cyclone Advisory Centers (TCACs) and other such centers.
- means of dissemination of aeronautical meteorological data and information
- local aeronautical meteorological telecommunications
- local Air Traffic Service and flight planning meteorological requirements.

Aeronautical Meteorological Observer

The descriptions apply

- A. for the area and airspace of responsibility,
- B. in consideration of the impact of meteorological phenomena and parameters on aviation operations, and
- C. in compliance with aviation user requirements, international regulations, local procedures and priorities,

1. MONITOR CONTINUOUSLY THE WEATHER SITUATION

Competence description

Weather parameters are appraised to identify the significant and evolving weather phenomena that will likely affect the area of responsibility throughout the watch period.

Performance criteria

1. Analyse and describe the existing local weather conditions.

2. OBSERVE AND RECORD AERONAUTICAL METEOROLOGICAL PHENOMENA AND PARAMETERS

Competence description

Observations of weather parameters and phenomena, and their significant changes, are made according to documented thresholds and regulations.

Performance criteria

1. Perform and record routine and non-routine observations of the following:
 - surface wind direction and speed, including spatial and temporal variations
 - visibility for aeronautical purposes, including spatial and temporal variations
 - RVR, including spatial and temporal variations
 - significant weather phenomena (as defined in ICAO Annex 3)
 - cloud amount, height of base, and type, including spatial and temporal variations
 - vertical visibility
 - temperature and humidity
 - pressure; determining QFE and QNH
 - supplementary information, wind shear and special weather phenomena.
2. Interpret automatic observed parameters to ensure that observations remain representative of local conditions when variations result from differences between automatic sensor technologies and manual observing techniques.
3. Ensure that observations are prepared and issued in accordance with ICAO Annex 3, WMO-No.49, regional and national formats, codes and technical regulations on content, representativeness and timeliness.

3. ENSURE THE QUALITY OF THE PERFORMANCE OF SYSTEMS AND OF METEOROLOGICAL INFORMATION

Competence description

The quality of meteorological observations is maintained at the required level by the application of documented quality management processes.

Performance criteria

1. Apply the organization's quality management system and procedures.
2. Check and confirm the quality of meteorological observations before issuance, including relevance of content, time of validity and location of phenomena.
3. In accordance with prescribed procedures:
 - identify errors and omissions in meteorological observations
 - correct and report errors and omissions
 - make and disseminate corrections in a timely manner.

4. COMMUNICATE METEOROLOGICAL INFORMATION TO INTERNAL AND EXTERNAL USERS

Competence description

All meteorological data and information are concise, complete and communicated in a manner that will be clearly understood by the users².

Performance criteria

1. Alert forecasters to observed or imminent significant changes in the weather within the local area.
2. Present² aeronautical meteorological data and information in a clear and concise manner using suitable terminology.

² In accordance with national implementation of ICAO Annex 1 English language proficiency requirements.

Regional variations

The range of significant weather phenomena.
Extent of automation of observing and sensing systems.
Thresholds for significant weather changes.
Local climatology.
Extent, scope and exclusions of QMS implementation.
Regional regulations.
Communication language(s).
Available communication technologies.

Background knowledge and skills

- the key characteristics of the troposphere and tropopause
- properties of air pressure, temperature, density and water vapour
- atmospheric stability, inversions
- the generation mechanisms of wind
- fog and cloud formation and dissipation
- precipitation types and intensities
- the general circulation of the Earth's atmosphere.

- the International Standard Atmosphere (ISA)
- the characteristics, occurrence and effects of meteorological hazards to aviation, including low-level cloud ceiling, poor visibility, thunderstorms and associated phenomena, aircraft icing, freezing precipitation, turbulence, tropical cyclones, wind shear and volcanic ash.
- interpretation of surface weather maps, satellite and radar imagery
- region-specific weather phenomena, and likely weather sequences that are expected to affect the station
- local topography and climatology.
- procedures for performing routine and non-routine aeronautical meteorological observations and reports
- impacts of weather on aircraft and airport operations
- strengths and weaknesses of manual observations and automatic observing systems.
- observer directives, procedures and instructions
- operationally validated sources of weather information
- quality management systems
- aviation safety management systems, as required.
- standards (as defined in ICAO Annex 3, WMO-No.49) and Quality Management System procedures (as defined in ISO 9001 standards, national regulations):
 - procedures for checking and identifying errors and omissions (in automatically and manually derived data)
 - how to identify significant differences between observational and forecast data
 - when to ignore information and where to go to resolve points of contention
 - desirable accuracies of measurement and observation as in ICAO Annex 3, WMO-No.49 and national regulations
 - priority tasks and time constraints
 - actions to be taken in the event of repeated cases of discrepancies, inconsistencies and malfunctions
 - fall-back procedures in the case of computer failure
 - contingency arrangements in case of emergencies such as fire, bomb alerts and natural disasters.
- key ICAO and WMO documents, including ICAO Annex 3 and WMO-No.49
- ICAO definitions of relevance to meteorology
- WMO Traditional Alphanumeric Codes (TAC) and national aeronautical meteorological codes and forms of data representation.
- how weather information is disseminated at the aerodrome
- local aeronautical meteorological telecommunications
- local Air Traffic Services meteorological requirements
- local flight planning meteorological requirements.

Updated Work-Plan ET-ET 2010-14

WP No.	Objective	Accountability	Time line	Actions/Progress
1	<p>a) Email ET/ET introduction to all ET members ;</p> <p>b) Individually contact all ET/ET members to determine level of commitment and resource support.</p> <p>c) Establish respondents' ability to provide resources especially regional case studies.</p> <p>d) Assign regional responsibilities for the core team members- to be done during first telecom.</p> <p>e) To hold quarterly conference calls to discuss progress against objectives, commencing April 2010 utilizing suitable Teleconferencing system.</p>	<p>a, b, c) ET Chair</p> <p>d) Chair</p> <p>e) Carl Weiss (US.) and Chair or Kent Johnson (TT-CAT) and Chair.</p>	Feb 10 – Dec 11.	<p>a) Introduction letter e-mailed to core members.</p> <p>b) Done.</p> <p>c) Done.</p> <p>d) Done at ET-Et 3 Meeting.</p> <p>e) Team agreed.</p>
2	a) To decide on the location and timing of and agree resources for the ET/ET 'start-up' meeting.	a) ET Chair, C/AeMP.	July 2010.	a) ET-ET 3, Kelowna, BC – Canada 9-13 August 2010.
3	a) Development of CAeM 'Training and Competence Requirements for Aeronautical Meteorological Personnel' publication to replace Supplement No. 1 to WMO-No. 258 to include 'secondary level' competence standards descriptions and those elements of Supplement 1 that need to be retained e.g. revised AMF, AMO training syllabi, in close collaboration with the TT-CAT (High Priority).	a) ET Members, C/AeMP.		a) ET-Et 3 produced an 'agreed' version of 2 nd level competence descriptions.
4	a) Hand-over of responsibility of http://www.caem.wmo.int/moodle/ website from Ian Lisk to designated member of ET/ET (High Priority);	a) ET/ET and RW	2010	a) To be done by Mr. Ian Lisk, former Chair of ET-ET and now vice-President of CAeM.
5	a) In coordination with TT-CAT conduct a gap analysis of resources available on http://www.caem.wmo.int/moodle/ to support the AMP competence Standards assessment framework (competence assessment tool-kit) (High Priority);	a) ET/ET.	2010	a) outstanding.
6	<p>To make available, reviewed training and guidance material on the http://www.caem.wmo.int/moodle website to include:</p> <ul style="list-style-type: none"> • Training material to support AMF and AMO training syllabi. 	a) Chair and ET Members.	2010-14	Ongoing.

	<ul style="list-style-type: none"> • COMET and EUMETCAL aviation training resources • Training and guidance material on the application and best use of WAFS products and AMDAR data; • AMP Competence Assessment Framework guidance material. • Provision of Quality Management guidance material; • Provision of examples of cost recovery best practice; • Provision of forecast verification guidance material; • Inclusion of material and links pertaining to the development of new services to aviation; • Consideration to be given to addressing the basic met training needs of the aviation user (this could be linked into existing/developing resources available through ICAO). 			
7	<p>Investigation of accessing/translating website training materials in other WMO languages.</p> <p>Also, advising on and where possible assisting the Secretariat with:</p>	Chair and ET Members.	2010-14	Ongoing.
8	Publication of meteorological aviation guidance material.	ET(core)	2010-14	Outstanding.
9	<p>Organization and facilitation of training events:</p> <p>-ET to become more active in all training events within AeMP establishing, where feasible, clear learning objectives, evaluation criteria for the course and the participants and completing those evaluations;</p>	C/AeMP ET Chair & members	2010-14	Ongoing.
10	Provision (where possible) of expertise to conduct training.	ET Chair & members	2010-14	Ongoing.

Work-Plan will be further reviewed and revised by end of December 2010.