

WORLD METEOROLOGICAL ORGANIZATION

MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME AREA GROUP ON PUBLIC WEATHER SERVICES EXPERT TEAM ON SERVICES AND PRODUCTS IMPROVEMENT (CBS/OPAG-PWS ET/SPI)

**STONY BROOK, NEW YORK, UNITED STATES OF AMERICA
13-17 AUGUST 2012**



FINAL REPORT

EXECUTIVE SUMMARY

The “Meeting of the Commission for Basic Systems (CBS) Open Programme Area Group (OPAG) on Public Weather Services (PWS) Expert Team on Services and Products Improvement (ET/SPI)” was held in Stony Brook, New York, United States of America, from 13 to 17 August 2012. The meeting was chaired by the Chairperson of the ET/SPI, Mr John Guiney (USA). Under its Terms of Reference (TORs) and associated deliverables, the Expert Team had to work on several areas which broadly included: the requirements for new and improved products and services for key PWS user groups, especially in developing countries.

The Meeting discussed the changes that have been implemented within the OPAG/PWS as part of its re-structuring at the request of CBS-Ext.(10) (Windhoek, Namibia, November 2010). Since the Team last met “The WMO Strategy for Service Delivery”, which was a primary theme of ET/SPI and the OPAG/PWS, was adopted by the Sixteenth Session of the World Meteorological Congress (Cg-XVI, Geneva, Switzerland, May - June 2011).

The following important issues were discussed during the Team’s deliberations:

1. The Chairperson of ET/SPI provided a review and status update on the ET/SPI deliverables identified during its last meeting in May 2010. To date, three of the ten deliverables have been completed, with various levels of progress on the remaining seven. The Team reviewed the incomplete deliverables and agreed to either revise, merge, or carry forward those deliverables that best match the Team’s work plan for the 2012-2014 inter-sessional period;
2. Since the Team last met, the service delivery theme has garnered considerable interest in WMO, culminating with the approval of “The WMO Strategy for Service Delivery” at Cg-XVI in 2011. While service delivery has historically been a focus area for the ET/SPI, the Team reviewed its existing TORs and proposed a new set which more fully emphasizes the service delivery theme. To complement the changes to the TORs, the Team proposed changing its name to the “Expert Team on Services and Products Innovation and Improvement (ET/SPII)”;
3. Following the lead of the OPAG on PWS Implementation/Coordination Team (ICT), the Team had an in-depth discussion on the proposal for the establishment of the “Competency Requirements for a Public Weather Service (PWS) / Weather Forecaster”. The Team carefully reviewed the draft competency requirements for persons engaged in PWS activities, with a noted emphasis on service delivery, and proposed a number of changes to the draft document. The Meeting also discussed the changing emphasis of the role of the forecasting profession as a service oriented approach is adopted and as technology evolves;
4. Several areas for possible future work and development by the ET/SPI were noted during the Team’s deliberations. These included: i.) promoting the incorporation of a service-driven approach into the design of new nowcasting systems; ii.) supporting the impact-based forecasts and warning products and services concept document drafted by the ET/DPM; iii.) recommending a stronger linkage with all relevant partners; and, iv.) connecting the future / changing service delivery role of the forecaster to the PWS forecaster competencies;
5. As part of the discussions at the ICT of the OPAG on PWS meeting in April 2012, it was decided that the sole oversight responsibility for both the World Weather Information Service (WWIS) and Severe Weather Information Centre (SWIC) websites will be consolidated under the ET/SPI.

The Team defined five new Deliverables as part of its work plan for the 2012-2014 inter-sessional period:

1. Publish guidance on the adoption of a service-driven approach to development of nowcast systems;
2. Provide comments / input on impact-based forecasting document developed by the ET/DPM;
3. Coordinate with the WMO Education and Training (ETR) Programme to develop training material on forecast uncertainty for use by National Meteorological and Hydrological Services (NMHSs) and WMO training activities;
4. Assess the needs and interest in verification of WWIS max / min temperature forecasts from participating NMHSs; and,
5. Enhance WWIS and SWIC websites.

1. INTRODUCTION

At the kind invitation of the Government of United States of America, the “Meeting of the Commission for Basic Systems (CBS) Open Programme Area Group (OPAG) on Public Weather Services (PWS) Expert Team on Services and Products Improvement (ET/SPI)”, organized through the NOAA/NWS Eastern Region Headquarters, was held in Stony Brook (Bohemia), New York, USA, from 13 to 17 August 2012. The meeting was chaired by Chairperson of the ET/SPI, Mr John L. Guiney (USA). Ms Haleh Kootval, the WMO Secretariat representative, thanked NOAA/NWS on behalf of the Secretary-General, and provided information on the objectives and expected outcome of the meeting of the ET/SPI. The ET had slightly modified its TORs at its meeting in Hong Kong, China in 2010 to better reflect the status of its work as follows:

- a. Monitor and report on the progress of previous ET/SPI initiatives and make recommendations, as appropriate, to the ICT/PWS;
- b. Monitor and report on aspects of services and products improvements that relate to support of major WMO activities;
- c. Report and advise on how to best assist developing countries with building an integrated approach to PWS products and services to improve service delivery;
- d. Keep abreast of the development and application of probabilistic forecasts;
- e. Keep under review the needs for new and improved products and services with emphasis on key PWS user groups;
- f. Continue to encourage the use of verification for PWS with an emphasis on user oriented methods;
- g. Identify and promote opportunities for improving service delivery in PWS with particular reference to the application of a Quality Management System (QMS);
- h. Report and advise on collaborative activities with other CBS OPAGs and other WMO Technical Commissions (TCs); and,
- i. Keep abreast of advances in, and promote as appropriate, the application of emerging technology to the delivery of public weather services, and the changing role of the forecaster.

The “List of Participants” is given in Annex I to this report. The “Meeting Programme” is contained under Annex II.

2. ORGANIZATION OF THE MEETING

The Meeting agreed on its working hours as 0900 to 1700 hours. Appropriate time was allowed for coffee and lunch breaks.

3. REVIEW OF THE RELEVANT DECISIONS OF CBS-EXT.(10), SIXTEENTH WORLD METEOROLOGICAL CONGRESS (CG-XVI), AND THE CBS/OPAG-PWS IMPLEMENTATION / COORDINATION TEAM (ICT/PWS) MEETING

3.1 Ms Kootval briefed the participants on the most important events that had taken place since the last meeting of the ET in Hong Kong, China in 2010. These included the Extraordinary Session of CBS (CBS-Ext.(10)), the Sixteenth Session of the World Meteorological Congress (Cg-XVI) and the meeting of the ICT/PWS in Montreal in 2011.

3.2 In relation to the CBS Ext.(10) Session, the Meeting noted the decision of the Session that the OPAG on PWS should have four Expert Teams (ETs), each to be aligned with one of the four components of “The WMO Strategy for Service Delivery”. However, due to financial constraints, the establishment of a fourth ET within the OPAG would not be possible, so that the task of “Monitoring and Evaluation (M&E)”, the fourth component of the Strategy, would be shared between the three existing ETs and coordinated through the ICT.

3.3 The discussion at Congress on PWS matters indicated that most NMHSs are fully aware of the need to strengthen user interaction, improve service delivery, and exploit fully the latest media technologies. There was a keen interest among Members in the concept of Societal and Economic Benefits studies.

3.4 The ICT discussed in depth the proposal for the establishment of the “Competency Requirements for a Public Weather Service (PWS) / Weather Forecaster”. The ICT decided to prepare one set of core competencies for PWS forecasting with additional sets of specialized competencies relating to work in the media, in the area of disaster mitigation and cooperation with Disaster Management Authorities (DMAs), and in the development and improvement of products and services. It agreed to expedite work on the Competency Framework with a view to presenting it to the forthcoming CBS Session in September 2012 for consideration.

4. IN-DEPTH REPORT OF THE CHAIRPERSON OF THE ET/SPI

4.1 *Review of the current Terms of Reference (TORs) of the ET*

4.1.1 The Terms of Reference (TORs) of the ET/SPI, as approved by CBS for the 2010-2012 inter-sessional period, are as follows:

- a. Monitor and report on the progress of previous ET/SPI initiatives and make recommendations, as appropriate, to the ICT/PWS;
- b. Monitor and report on aspects of services and products improvements that relate to support of major WMO activities;
- c. Report and advise on how to best assist developing countries with building an integrated approach to PWS products and services to improve service delivery;
- d. Keep abreast of the development and application of probabilistic forecasts;
- e. Keep under review the needs for new and improved products and services with emphasis on key PWS user groups;
- f. Continue to encourage the use of verification for PWS with an emphasis on user oriented methods;
- g. Identify and promote opportunities for improving service delivery in PWS with particular reference to the application of Quality Management System (QMS);
- h. Report and advise on collaborative activities with other CBS OPAGs and other WMO Technical Commissions; and,
- i. Keep abreast of advances in, and promote as appropriate, the application of emerging technology to the delivery of public weather services, and the changing role of the forecaster.

4.1.2 The ET/SPI reviewed the TORs and the progress on the associated Deliverables. It agreed to propose to CBS, for its consideration and approval, new TORs for the forthcoming inter-sessional period as outlined under Section 8 of this report.

4.2 Review of the deliverables from the 2010 meeting of the ET (Hong Kong, China)

4.2.1 The Chairperson of the ET/SPI provided a review and status update on the ET/SPI deliverables identified during its last meeting in May 2010. To date, three of the ten deliverables have been completed, with various levels of progress on the seven others. The status of the deliverables is summarized below.

4.2.2 Deliverable 1 was *to develop an inventory of probabilistic training material for forecasters to deliver and communicate uncertainty and probabilistic weather products to the public / media and to request the sharing of such material*. The Team collected probabilistic forecast training material from eight NMHSs. The Team also documented a collection of relevant training materials from academia and university-government consortia. This information has been placed on a resource page developed by the WMO PWS Programme. A second deliverable (Deliverable 2) was focused on *using these materials to develop training resources to complement WMO/TD No. 1422 (PWS-18), "Guidelines on Communicating Forecast Uncertainty"*. The Team discussed this deliverable and agreed to that it was important to complete the development of training materials to complement this Guideline. It was determined that a new deliverable would be defined to develop training material on forecast uncertainty for use by NMHSs and in WMO training activities.

4.2.3 Deliverable 3 was *to develop a pilot project, following the PWS "Learning-Through-Doing (LTD)" Project concept, to improve the service delivery process*. The Team chose to leverage the Severe Weather Forecasting Demonstration Project (SWFDP) - Eastern Africa sub-project as the LTD Pilot Project for this deliverable. Deliverable 6 was *to contribute to the PWS verification and evaluation aspects of SWFDP*, also involves interaction with the SWFDP. This deliverable is considered an on-going activity consistent with Deliverable 5 and TOR (f) of the ICT/PWS. As such, the Team will continue to pursue opportunities to collaborate with the SWFDP and provide input to the ICT, as appropriate.

4.2.4 The ET/SPI has made only minor progress on Deliverable 4, which was *to collaborate with the CBS/OPAG-PWS ET/COPE to develop a supplement to WMO/TD No.1422 to describe best practices for user-oriented forecast products*. The Team identified and discussed a study from Sweden about how to use ensemble predictions for operational flood forecasting undertaken under the auspices of the European Union (EU) Project PREVIEW. The study indicates that effective training and communication are clearly necessary to overcome the substantial institutional and communicative challenges in the application of Ensemble Prediction System (EPS). The Chair discussed this deliverable with the Chair of ET/COPE at the ICT meeting in April 2012 and agreed that aspects of this deliverable, the study from Sweden, in particular, will be incorporated into a follow-up deliverable focused on the development of training materials on forecast uncertainty.

4.2.5 The ET/SPI had completed Deliverable 5, which was *to provide guidance for NMHSs on developing user surveys and interpreting their results, through providing a collection of existing tried-and-tested surveys*. The Team collected examples of user surveys from nine NMHSs. The WMO PWS Programme prepared a summary guide on the development of surveys, which was sent along with samples of questions from all the surveys to all Permanent Representatives (PRs) of WMO, PWS experts and Focal Points identified by NMHSs. The surveys have been posted on the WMO PWS Website, which can be located at the following link: <http://www.wmo.int/pages/prog/amp/pwsp/surveys.htm>.

4.2.6 The ET/SPI continues to look for opportunities to enhance the WWIS Website. Under Deliverables 7 and 8, focus on developing *and providing WWIS standard verification reports*, and build on work done by Deutscher Wetterdienst (DWD) to implement a verification scheme for WWIS temperature forecasts for Region VI (Europe). The Team agreed to recast these deliverables as part of its new work plan. The revised deliverable will focus on an assessment of

need and interest in verification of WWIS max/min temperature forecasts from participating NMHSs.

4.2.7 The ET/SPI identified the need *to develop and maintain a list of subject matter experts in five skill areas within PWS* as Deliverable 9. The Team identified the following skill areas: verification; quality management; application of probabilistic forecasting for PWS; service delivery; and emerging technology / application. The elements under this deliverable have been expanded to cover all competencies required by a PWS forecaster and related areas of specialization within NMHSs' national PWS programmes. The PWS competencies were discussed extensively at the ICT meeting in April 2012. The Team had an in-depth discussion on the draft PWS competencies, with particular attention to the competency requirements for personnel engaged in the improvement, innovation, and delivery of hydro-meteorological services and products. A summary of the Team's review and suggested modifications are provided in Section 5 and Annex V.

4.2.8 The ET/SPI's last deliverable, Deliverable 10, focuses on *the implementation of "The WMO Strategy for Service Delivery"*. Shortly following the ET/SPI meeting in May 2010, the WMO Secretariat informed the Team that the draft entitled, "The WMO Strategy on Service Delivery" was being revised based on discussions during the Sixty-second Session of the WMO Executive Council (EC-LXII, Geneva, Switzerland, June 2010). The Strategy was approved by Cg-XVI in 2011; the associated Implementation Plan is currently under executive review. One of the actions associated with Deliverable 10 was to publish guidelines for using (QMS) to improve service delivery. One of the members of the Team, Dr William Lang, will lead the Team's efforts on this deliverable. The resulting draft guideline, which provides examples of service delivery metrics used in NMHSs, along with suggestions on how to develop them, has been incorporated into "The WMO Strategy for Service Delivery".

4.3 Restructuring of the ET

Since the Team last met, the service delivery theme has garnered considerable interest in WMO, culminating with the approval of "The WMO Strategy for Service Delivery" at Cg-XVI in 2011. While service delivery has historically been a focus area for the ET/SPI, the Team reviewed its existing TORs and proposed a new set which more fully emphasizes the service delivery theme. The Team also used this review as an opportunity to streamline the TORs, and combine those that had a common focus or scope. In association with these changes to the TORs, the Team reviewed its name and proposes to change it to the "Expert Team on Services and Products Innovation and Improvement (ET/SPII)".

5. DISCUSSIONS AND DECISIONS ON THE DEFINITIONS OF EXPERTISE / COMPETENCIES REQUIRED FOR SERVICES AND PRODUCTS IMPROVEMENTS RELATED TO PWS DELIVERY, AND HARMONIZATION WITH COMPETENCIES DEFINED BY THE ET/COPE AND ET/DPM

5.1 The Meeting noted the recent discussions at various fora such as Congress, CBS-Ext.(10) and EC on the issue of the definitions of competencies especially with reference to aeronautical meteorology. It noted the work done within the OPAG on PWS to develop definitions for competencies of NMHSs staff engaged in PWS-related activities.

5.2 In examining the draft competency requirements for persons engaged in PWS activities, the Meeting discussed the changing emphasis of the role of the forecasting profession as a service oriented approach is adopted and as technology evolves. The Meeting paid particular attention to service delivery, in the framework of "The WMO Strategy for Service Delivery" and proposed a number of changes to the draft document. These changes are noted in Annex V.

6. FUTURE DIRECTIONS

6.1 During its discussions of “The WMO Service Delivery Strategy”, the Team noted the importance of incorporating a service-driven approach into the design of new systems for use in forecasting, with an emphasis on nowcasting systems. The Team will conduct a survey of existing nowcasting systems utilized by WMO Members. The results will be summarized and published to enable those contemplating the development of new systems to benefit from the experience of others in the WMO Community.

6.2 The Meeting considered the growing demand on NMHSs to provide impact-based forecast and warning products and services to assist the public and other users with decision making processes. It agreed that impact-based forecasting required close collaboration with relevant partner agencies. The Team reviewed the impact-based information, forecasts, and warning products and services document drafted by the ET/DPM that has been forwarded to CBS for consideration and approval. The Meeting agreed that the impact-based forecasting and warning is an important area of development. The Team recommended that the document could be strengthened with the addition of partnership tie-in.

6.3 As part of the Team’s in-depth discussion on PWS competencies, it recognized the importance of connecting the future / changing service delivery role of the forecaster to the competencies. Once the competencies are approved by CBS, the Team will re-examine this issue as part of its work plan for the 2012-2014 inter-sessional period.

7. DISCUSSIONS ON THE ET TORS AND IDENTIFICATION OF CLEAR AND CORRESPONDING DELIVERABLES

7.1 The Team reviewed its current TORs and discussed modifications to align them with the service delivery theme, as appropriate. In particular, an overarching TOR was drafted on contributing to the implementation of “The WMO Strategy for Service Delivery”. Within this TOR, several areas are highlighted including building an integrated approach to improving service delivery, probabilistic forecasting, and verification. The TORs also include a focus on the implication of the service delivery paradigm on the future role of the forecaster.

7.2 As part of the discussions at the ICT meeting in April 2012, it was decided that the sole oversight responsibility for both the WWIS and SWIC websites will be consolidated under the ET/SPI.

7.3 Following its review and the identification of seven new TORs for the 2012-2014 inter-sessional period, the Team considered possible deliverables which align with the new TORs. As it reviewed the new TORs, and its previous work, the Team identified priorities and areas of focus for its upcoming work plan. For each deliverable, the Team carefully considered the purpose of the deliverable and clearly defined what the Team aims to accomplish. As a result, the ET/SPI defined five new Deliverables:

Deliverable 1: Publish guidance on the adoption of a service-driven approach to development of nowcast systems. (TOR b)

Deliverable 2: Provide comments / input on impact-based forecasting document developed by the ET/DPM. (TOR b)

Deliverable 3: Coordinate with the WMO ETR Programme to develop training material on forecast uncertainty for use by NMHSs and WMO training activities. (TOR b)

Deliverable 4: Assess the needs and interest in verification of WWIS max/min temperature forecasts from participating NMHSs. (TOR b)

Deliverable 5: Enhance WWIS and SWIC websites (TOR i)

These deliverables, along with the associated actions, responsible team member assignments, and due dates, are fully documented in Annex IV.

8. FINALIZATION OF THE ET TORS, DELIVERABLES, AND THE TITLE OF THE ET

8.1 The TORs of the ET/SPI for the period 2012-2014, which will be proposed to the forthcoming Session of CBS for approval, were agreed upon and are presented in Annex III to this report. The corresponding Deliverables were also agreed upon and these are outlined in Annex IV.

8.2 In order to more fully align itself with the WMO Service Delivery theme, the Team proposed to change its name to the "Expert Team on Services and Products Innovation and Improvement (ET/SPII)".

9. PREPARATION FOR THE CBS-15 SESSION

9.1 The Meeting reviewed the items which would need to be brought to the attention of the forthcoming CBS-15 Session for information and / or decision. It was noted that this Session would be very short, comprising five working days. The major issues the ET/SPI will be focused on during the 2012-2014 inter-sessional period are highlighted in the five new deliverables outlined in Annex IV.

9.2 The Team agreed that the following issues needed to be presented at the CBS Session, consistent with those noted by the ICT in April 2012:

9.2.1 New TORs and Deliverables for the ET/SPI - to be presented and approved;

9.2.2 Proposed re-naming of the ET/SPI - to be proposed for approval;

9.2.3 Presentation of the draft comments on the "Competency Requirements for a Public Weather Services (PWS) / Weather Forecaster" - to be proposed for approval,

10. VISIT TO THE FORECAST CENTRE

10.1 On Wednesday, 15 August 2012, the Team visited the National Weather Service (NWS) Eastern Region Regional Operations Centre (ROC) located at NWS Eastern Region Headquarters. The NWS Eastern Region is comprised of 30 field offices serving 98 million residents in 16 states from Maine to South Carolina west to Ohio, and the District of Columbia. The Team attended the daily ROC map briefing which provides an overview of both the current and forecast hydrometeorological conditions across the eastern United States for the next seven days.

10.2 Following the briefing, the Team was given a presentation on ROC operations, including event-based activations, staffing profiles, and support activities for Eastern Region field offices and federal partners. The NWS Decision Support Services (DSS) was also highlighted.

10.3 The Team was also provided an operational overview of the New York Central Weather Service Unit (CWSU ZNY), co-located with the Federal Aviation Administration New York Air Route Traffic Control Center (ARTCC). The CWSU ZNY is one of four units in the NWS Eastern Region, and one of 21 in the NWS. Mr Gordon Straussberg, a forecaster at CWSU ZNY, made a presentation to the Team on CWSU ZNY operations and associated support activities they provide to the ARTCC. Mr Straussberg discussed the forecast products produced by CWSU ZNY, their coordination / collaboration with the New York Weather Forecast Office and the Aviation Weather Center, and their decision support role with the ARTCC especially during convective weather events. Many of their forecast products incorporate a stoplight-based uncertainty component. He highlighted the CWSU ZNY Severe Weather Avoidance Plan (SWAP). The Internet-based SWAP Graphical Forecast provides users with a stoplight departure route planning tool detailing

when thunderstorm activity may impact departure routes out of the New York ARTCC. This impact-based product was designed to allow critical aviation partners and customers to make more informed decisions regarding the air traffic flow through the U.S. National Airspace System. This topic was particularly germane to the Team's discussion on impact-based products and services, and probabilistic forecasts/communicating forecast uncertainty to users.

11. CLOSING

The meeting of the ET/SPI closed at 1600 hours on Friday, 17 August 2012.

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LIST OF ANNEXES TO THE FINAL REPORT

- ANNEX I:** “List of Meeting Participants”;
- ANNEX II:** “Meeting Programme”;
- ANNEX III:** “Revised Terms of Reference (TORs) of the ET/SPI”;
- ANNEX IV:** “ET/SPI Team Deliverables and Action Sheets for the Inter-sessional Period 2012-2014”
- ANNEX V:** “Draft Comments on “Competency Requirements for Public Weather Services (PWS) Forecasters, Advisors, Broadcasters and Communicators””

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“LIST OF MEETING PARTICIPANTS”

| NO.: | COUNTRY: | NAME AND TITLE: | ADDRESS: |
|-------------|--------------------------|---|--|
| 1. | United States of America | Mr John L. GUINEY <i>Chairperson of the CBS OPAG/PWS ET/SPI, Member of the CBS/OPAG-PWS ICT/PWS, and Chief, Meteorological Services Division, National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), Eastern Region Headquarters</i> | NOAA/NWS Eastern Region Headquarters 630 Johnson Avenue, Suite 202 BOHEMIA, New York, 11716-2618 United States of America Tel.: +1 631 244 0121 Fax: +1 631 244 0167 E-mail: John.Guiney@noaa.gov |
| 2. | Kenya | Mr Ayub Shaka MWADALI <i>Vice-Chairperson of the CBS OPAG/PWS ET/SPI, and Assistant Director, Public Weather Services, Kenya Meteorological Department</i> | Kenya Meteorological Department Dagoretti Corner, Ngong Road P.O. Box 30259, 00100 NAIROBI, Kenya Tel.: +254 20 387 6957 Fax: +254 20 387 6955 E-mail(s): mwadali@meteo.go.ke ayubshaka@ymail.com |
| 3. | Australia | Mr Alasdair HAINSWORTH <i>Member of the CBS/OPAG-PWS ET/SPI, and Section Head, Public, Marine and Agricultural Weather Services, Australian Bureau of Meteorology</i> | Regional Forecasting Centre Bureau of Meteorology GPO Box 1289 MELBOURNE, VIC 3001, Australia Tel.: +61 3 9669 4510 Fax: +61 3 9669 4695 E-mail: a.hainsworth@bom.gov.au |
| 4. | China | Mr Jun LIAO <i>Member of the CBS/OPAG-PWS ET/SPI, and Director, Division of Public Services, Department of Emergency Response, Disaster Mitigation and Public Services of the China Meteorological Administration</i> | Department of Emergency Response, Disaster Mitigation and Public Services, China Meteorological Administration No. 46, Zhongguancun Nandajie BEIJING 100081, China Tel.: +86 10 5899 4471 Fax: +86 10 6218 8520 E-mail: liaojun@cma.gov.cn |
| 5. | Germany | Mr Axel THOMALLA <i>Member of the CBS OPAG/PWS ET/SPI, and Deputy Head, Office of the President and International Affairs, Deutscher Wetterdienst</i> | Deutscher Wetterdienst (DWD) Frankfurter Strasse 135 63067 OFFENBACH, Germany Tel.: +49 69 8062 4310 Fax: +49 69 8062 4130 E-mail: Axel.Thomalla@dwd.de |

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| 6. | Hong Kong, China | Mr Armstrong YC CHENG Member of the CBS/OPAG-PWS ET/SPI, and Senior Scientific Officer, Hong Kong Observatory | Hong Kong Observatory 134A Nathan Road KOWLOON, HONG KONG Hong Kong, China Tel.: +852 2926 8358 Fax: +852 2311 9448 E-mail: yccheng@hko.gov.hk |
| 7. | Russian Federation | Dr Evgeny (Eugene) VASILYEV Nominated Expert, and Weather Forecaster of the Department of Short-Range Weather Forecasts and Dangerous Phenomena on the Territory of the Russian Federation, Hydrometeorological Centre of the Russian Federation | Hydrometeorological Centre of the Russian Federation B. Predtechensky per. 11-13 MOSCOW, 123242, Russian Federation Tel.: +7 903 249 1007 Fax: + E-mail: syno@inbox.ru |
| 8. | United Kingdom | Dr William LANG Member of the CBS OPAG/PWS ET/SPI, FRMet s, CMet / Chief Hydrometeorologist, Flood Forecasting Centre | Met Office FitzRoy Road EXETER EX1 3PB, United Kingdom Tel.: +44 1392 88 4836 Fax: +44 1392 88 5681 E-mail: will.lang@metoffice.gov.uk |
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| 9. | Switzerland | Ms Haleh KOOTVAL Chief, Public Weather Services Division | Public Weather Services Programme Weather and Disaster Risk Reduction Services Department (WDS) Tel.: +41 22 730 8333 Fax: +41 22 730 8128 E-mail: HKootval@wmo.int |

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“MEETING PROGRAMME”

Monday, 13 August 2012

| DAY 1 | | | |
|--------------------------------|--|--|-------------------|
| 0900-0930 | 1. Opening 2. Organization of the Meeting <ul style="list-style-type: none"> • Adoption of the agenda • Working arrangements | <ul style="list-style-type: none"> • Host • Ms Haleh Kootval (WMO Secretariat) | 30 minutes |
| 0930-1030 | 3. Review of relevant decisions of CBS-Ext.(10), Sixteenth World Meteorological Congress (Cg-XVI), and the CBS/OPAG-PWS Implementation / Coordination Team (ICT/PWS) Meeting | <ul style="list-style-type: none"> • Mr John Guiney • Ms Haleh Kootval | 60 minutes |
| 1030-1100 | COFFEE / TEA BREAK | | 30 minutes |
| 1100-1200 | 4. In-depth report of the Chairperson of the ET/SPI | <ul style="list-style-type: none"> • Mr John Guiney | 60 minutes |
| 1200-1330 | LUNCH BREAK | | 90 minutes |
| 1330-1430 | 4.1 Review of the current Terms of Reference (TORs) of the ET | <ul style="list-style-type: none"> • Mr John Guiney • Ms Haleh Kootval | 60 minutes |
| 1430-1530 | 4.2 Review of the deliverables from the 2010 meeting of the ET (Hong Kong, China) | <ul style="list-style-type: none"> • Mr John Guiney • Ms Haleh Kootval | 60 minutes |
| 1530-1600 | COFFEE / TEA BREAK | | 30 minutes |
| 1600-1700 | 4.2 Review of the deliverables from the 2010 meeting of the ET (Hong Kong, China) - Continued 4.3 Restructuring of the ET | <ul style="list-style-type: none"> • Mr John Guiney | 60 minutes |
| <i>Tuesday, 14 August 2012</i> | | | |
| DAY 2 | | | |

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|----------------------------------|--|--|-------------------|
| 0900-1030 | 5. Discussions and decisions on the definitions of expertise / competencies required for services and products improvements related to PWS delivery, and harmonization with competencies defined by the ET/COPE and ET/DPM | <ul style="list-style-type: none"> Mr John Guiney Ms Haleh Kootval All participants | 90 minutes |
| 1030-1100 | COFFEE / TEA BREAK | | 30 minutes |
| 1100-1230 | 5. Discussions and decisions on the definitions of expertise/competencies required for services and products improvements related to PWS delivery, and harmonization with competencies defined by the ET/COPE and ET/DPM - Continued | <ul style="list-style-type: none"> All participants | 90 minutes |
| 1230-1400 | LUNCH BREAK | | 90 minutes |
| 1400-1530 | 6. Future directions | <ul style="list-style-type: none"> All participants | 90 minutes |
| 1530-1600 | COFFEE / TEA BREAK | | 30 minutes |
| 1600-1700 | 7. Discussions on the ET TORs and identification of clear and corresponding deliverables | <ul style="list-style-type: none"> All participants | 60 minutes |
| Wednesday, 15 August 2012 | | | |
| DAY 3 | | | |
| 0900-1030 | 7. Discussions on the ET TORs and identification of clear and corresponding deliverables - Continued | <ul style="list-style-type: none"> All participants | 90 minutes |
| 1030-1100 | COFFEE / TEA BREAK | | 30 minutes |
| 1100-1130 | 8. Finalization of the ET TORs, deliverables, and the title of the ET | <ul style="list-style-type: none"> All participants | 30 minutes |
| 1130-1230 | 9. Work on deliverables | <ul style="list-style-type: none"> All participants | 60 minutes |
| 1230-1400 | LUNCH BREAK | | 90 minutes |
| 1400-1530 | 9. Work on deliverables - Continued | <ul style="list-style-type: none"> All participants | 90 minutes |
| 1530-1600 | COFFEE / TEA BREAK | | 30 minutes |
| 1600-1700 | 9. Work on deliverables - Continued | <ul style="list-style-type: none"> All participants | 60 minutes |
| Thursday, 16 August 2012 | | | |
| DAY 4 | | | |
| 0900-1030 | 9. Work on deliverables - Continued | <ul style="list-style-type: none"> All participants | 90 minutes |
| 1030-1100 | COFFEE / TEA BREAK | | 30 minutes |

| | | | |
|-------------------------------|--|-------------------------------------|-------------------|
| 1100-1200 | 10. Preparation for the CBS-15 Session | • All participants | 60 minutes |
| 1200-1330 | LUNCH BREAK | | 90 minutes |
| 1330-1700 | 11. Visit to the Forecast Centre | • All participants | 210 minutes |
| Friday, 17 August 2012 | | | |
| DAY 5 | | | |
| 0900-1030 | 12. Preparation of the Report of the meeting and the Executive Summary | • All participants | 90 minutes |
| 1030-1100 | COFFEE / TEA BREAK | | 30 minutes |
| 1100-1230 | 12. Preparation of the Report of the meeting and the Executive Summary - Continued | • All participants | 90 minutes |
| 1230-1400 | LUNCH BREAK | | 90 minutes |
| 1400-1530 | 13. Review and adoption of the Report | • All participants | 90 minutes |
| 1530-1600 | COFFEE / TEA BREAK | | 30 minutes |
| 1600-1700 | 13. Review and adoption of the Report - Continued | • All participants • Chairperson | 60 minutes |
| 1700 | 14. Closure of the Meeting | | |

**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME
AREA GROUP ON PUBLIC WEATHER SERVICES EXPERT TEAM ON
SERVICES AND PRODUCTS IMPROVEMENT (CBS/OPAG-PWS ET/SPI)**

STONY BROOK, NEW YORK, UNITED STATES OF AMERICA, 13-17 AUGUST 2012

“REVISED TERMS OF REFERENCE (TORS) OF THE ET/SPI”

- (a.) Monitor and report on the progress of recent ET/SPI initiatives;
- (b.) In collaboration with other CBS OPAGs and other WMO Technical Commissions, contribute to the implementation of “The WMO Strategy for Service Delivery” through:
 - i. Reporting and advising on how to best assist members, especially developing countries, with building an integrated approach to PWS products and services to improve their service delivery;
 - ii. Keep under review the needs for new and improved products and services with emphasis on key PWS user groups;
 - iii. Advise on the development, application and communication of probabilistic forecasts; and,
 - iv. Continue to encourage the use of verification for PWS with an emphasis on user oriented methods;
- (c.) Review and advise on the implications of the Strategy for the future role of the forecaster; and,
- (d.) Advise on and keep under review the development of World Weather Information Service (WWIS) and Severe Weather Information Centre (SWIC) websites.

**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME
AREA GROUP ON PUBLIC WEATHER SERVICES EXPERT TEAM ON
SERVICES AND PRODUCTS IMPROVEMENT (CBS/OPAG-PWS ET/SPI)**

STONY BROOK, NEW YORK, UNITED STATES OF AMERICA, 13-17 AUGUST 2012

“ET/SPI TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTER-SESSIONAL PERIOD 2012-2014”

| DELIVERABLE 1: PUBLISH GUIDANCE ON THE ADOPTION OF A SERVICE-DRIVEN APPROACH TO DEVELOPMENT OF NOWCAST SYSTEMS | | | | |
|---|---|---|--|----------------|
| | Actions: | Responsible Member(s): | Due Date: | Status: |
| 1. | Gather data/information on selected nowcast systems representing various levels of technological development and in varying climate regimes: a. Develop questionnaire on nowcasting systems for Members b. Check on any existing questionnaire related to owcasting c. Distribute questionnaire to team members for final review d. Distribute to selected countries e. Collect and send all input to Lead | Lead...WL a...All b...HK c...WL d...All e...WL | a...01/10/2012 b...10/09/2012 c...01/10/2012 d...10/10/2012 e...10/12/2012 | |
| 2. | Analyze and summarize questionnaire responses | WL/AC | 15/02/2013 | |
| 3. | Finalize report based on review by all team members | Lead...WL | 01/05/2013 | |
| 4. | Circulate final report to Commission on Instruments and Methods of Observations (CI MO), Commission on Atmospheric Sciences (CAS), and OPAG on DPFS for information and guidance via the OPAG PWS Chairperson | JG | 01/05/2013 | |
| 5. | Circulate the Final Report to all WMO Members | HK | 01/06/13 | |

| DELIVERABLE 2: PROVIDE COMMENTS / INPUT ON IMPACT-BASED FORECASTING DOCUMENT DEVELOPED BY THE ET/DPM | | | | |
|--|--|-------------------------------|------------------|----------------|
| | Actions: | Responsible Member(s): | Due Date: | Status: |
| 1. | Team members review and provide comments | All...with input to AT | 15/09/2012 | |
| 2. | Finalize review document | AT | 31/10/2012 | |
| 3. | Send comments to the ET/DPM | HK | 15/11/12 | |
| DELIVERABLE 3: COORDINATE WITH THE WMO ETR PROGRAMME TO DEVELOP TRAINING MATERIAL ON FORECAST UNCERTAINTY FOR USE BY NHMS AND WMO TRAINING ACTIVITIES | | | | |
| | Actions: | Responsible Member(s): | Due Date: | Status: |
| 1. | Summarize training inventory developed by ET (resource web page) | JG/AH | 01/02/2013 | |
| 2. | Identify new resources / training materials for inclusion in inventory | All | 01/01/2013 | |
| 3. | Synthesis information into summary document including justification for this work | JG/AH | 01/03/2013 | |
| 4. | Share summary document with WMO ETR Programme and decide on appropriate mechanism to develop training material | HK | 01/03/2013 | |
| DELIVERABLE 4: ASSESS THE NEEDS AND INTEREST IN VERIFICATION OF WWIS MAX/MIN TEMPERATURE FORECASTS FROM PARTICIPATING NMHSs | | | | |
| | Actions: | Responsible Member(s): | Due Date: | Status: |
| 1. | Contact WWIS focal points to identify interest in project | AT/AC | 15/09/2012 | |
| 2. | Depending on response, establish pilot project | AT | 01/12/2012 | |
| 3. | If a pilot project is established, share results with Team at next meeting for evaluation / further action | AT | TBD | |
| DELIVERABLE 5: ENHANCEMENT OF WWIS AND SWIC WEBSITES | | | | |
| | Actions: | Responsible Member(s): | Due Date: | Status: |
| 1. | Increasing of the MyWorldWeather language versions | AC | 31/12/12 | |
| 2. | Launch of Android version of MyWorldWeather | AC | 31/12/12 | |
| 3. | Re-vamp of the WWIS Website | AC | 30/06/13 | |
| 4. | Revision of the SWIC Website and add social media component | AC | 30/06/13 | |

Responsible Team Member Key: Alasdair Hainsworth ... AH
Armstrong Cheng ... AC
John Guiney ... JG
Haleh Kootval ... HK
William Lang ... WL
Axel Thomalla ... AT

**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME
AREA GROUP ON PUBLIC WEATHER SERVICES EXPERT TEAM ON
SERVICES AND PRODUCTS IMPROVEMENT (CBS/OPAG-PWS ET/SPI)**

STONY BROOK, NEW YORK, UNITED STATES OF AMERICA, 13-17 AUGUST 2012

**“DRAFT COMMENTS ON “COMPETENCY REQUIREMENTS FOR PUBLIC WEATHER
SERVICES (PWS) FORECASTERS, ADVISORS, BROADCASTERS AND COMMUNICATORS””**

**“COMPETENCY REQUIREMENTS FOR
A PUBLIC WEATHER SERVICES (PWS) / WEATHER FORECASTER”**

The competency requirements for the work of an operational forecaster can be divided into five top level competency areas. Taking into consideration the following:

- (a) The geographical area of responsibility;
- (b) Weather, water and climate impacts on society; and,
- (c) Weather, water and climate user requirements, local procedures and priorities,

a PWS/weather forecaster should have successfully completed the BIP-M (As defined in the revised WMO-No. 49, Volume I); and, in taking into account conditions a to c, should be able to perform the work indicated in the seven top level competencies below:

1. Analyze and continually monitor the evolving hydrometeorological situation;
2. Interpret observational and model data output to forecast hydrometeorological phenomena and parameters;
3. Use sound judgement and effective decision-making in the application of hydrometeorological knowledge in diverse forecasting scenarios;
4. Produce forecasts, and warnings of hazardous and high impact phenomena;
5. Ensure the quality of hydrometeorological information, systems and services;
6. Communicate weather, water and climate information to internal and external users; and,
7. Apply team working and self management.

Each of these top-level competency areas is expanded, below, into second-level competencies that are expressed and structured in such a manner as to facilitate the clear application of an assessment procedure. Each is also associated with a range of background knowledge and skills which may not be particular to meteorology but are nonetheless essential discharge of the forecaster's duties.

1. Analyze and continually monitor the evolving hydrometeorological situation

- a. *Analyze and interpret all available data to correctly identify weather features relevant to (or, likely to be relevant to) the area of forecast responsibility.*

Background knowledge and skills

- a. *Has knowledge of the theory, methods and practices of meteorological analysis and diagnosis;*
- b. *Can visualise/conceptualize meteorological information in multiple dimensions (spatial, temporal);*
- c. *Demonstrates an understanding of the influence of topography, land cover, and (if relevant) bodies of water and/or snow fields on local meteorology;*
- d. *Demonstrates an understanding of synoptic, dynamical, and physical meteorology;*
- e. *Can correctly interpret remote-sensed observation and data;*
- f. *Demonstrates an understanding of capabilities and limitations of meteorological instruments; and,*
- g. *Demonstrates familiarity with the acquisition, processing and assimilation of meteorological data, including quality control*

2. Interpret observational and model data output to forecast meteorological phenomena and parameters

- a. *Evaluate model predictions against observations and imagery and make adjustments to the model forecast parameters;*
- b. *Interpret model forecasts at different time ranges; and, (ask Gerald what this means)*

- c. *Utilize Ensemble Prediction System (EPS) output to estimate forecast uncertainty, especially for hazardous conditions.*

Background knowledge and skills

- a. *Demonstrates an understanding of the methods used in Numerical Weather Prediction (NWP), including EPS;*
- b. *Understands the strengths and limitations of the NWP models used in the forecast office; and,*
- c. *Can critically examine a variety of forecast models and make a reasoned estimation of the most likely evolution of the weather.*

3. Use sound judgement and effective decision-making in the application of hydrometeorological knowledge in diverse forecasting scenarios

- a. *Show sound judgement and flexibility in determining which observational, model and contextual information is most relevant in a wide variety of circumstances; and,*
- b. *Through effective decision-making, demonstrate an appreciation of the consequences of high-impact weather and of the format, content and timeliness of forecasts of such weather.*

4. Produce forecasts and warnings of hazardous and high-impact phenomena

- a. *Use the forecast production systems to produce and disseminate forecasts and warnings;*
- b. *Be aware of responsibilities for operational continuity plans in the event of a system failure; and,*
- c. *Issue, cancel or amend forecasts and warnings according to documented thresholds, criteria and regulations.*

Background knowledge and skills

- a. *Demonstrates an overview knowledge of the information communications systems in use in the forecast office;*
- b. *Shows a working knowledge of the visualization systems used for weather information and forecast production, and an ability to recover/view all of the information contained therein; and,*
- c. *Demonstrates a thorough knowledge of the criteria for issuing warnings.*

5. Ensure the quality of hydrometeorological information, systems and services

- a. *Develop and monitor all hydrometeorological products based on sound scientific principles;*
- b. *Assess and interpret meteorological information objectively;*
- c. *Organize the work required on each shift to ensure that forecasts and other output are issued in good time;*
- d. *Verify forecasts and warnings;*
- e. *Contribute to the preparation and maintenance of operational manuals.*

Background knowledge and skills

- a. *Works in a cooperative fashion with colleagues and with external stakeholders;*
- b. *Deals with confrontational situations, demonstrating respect and consideration for differing points of view;*
- c. *Has the flexibility and drive to respond to changing work pattern and demand to ensure continuation of service to users and to the public;*
- d. *Makes sound decisions under the pressure of deadlines and high workloads;*
- e. *Demonstrates an appreciation for the varied technical knowledge and methodologies necessary across a multi-disciplinary team;*
- f. *Has the ability to respond to changing user requirements, embrace innovations techniques and technologies; and,*
- g. *Has the ability to learn from and apply past experiences to improve quality of forecasts and warnings.*

6. Communicate weather, water and climate information to internal and external users

- a. *Prepare forecasts products;*
- b. *Prepare warnings products including information on likely impacts and possible mitigation activities;*
- c. *Prepare information on hydro-meteorological forecasts and warnings for communication through all media;*

- d. *Communicate forecast uncertainty to users;*
- e. *Provide briefings in support of operational continuity to colleagues;*
- f. *Create training resources and deliver training as required; and,*
- g. *Create and deliver presentations on meteorological topics to external agencies and to the public.*

Background knowledge and skills

- a. *Demonstrates an understanding of users' needs for, and use of, hydrometeorological information; and,*
- b. *Demonstrates an understanding of the application of hydrometeorology to human activities.*

7. Apply team Working and self management

- a. *Promote a team oriented environment which encourages continuous improvement and positive work dynamic in the forecast office, while providing support and advice as required; and,*
- b. *Manage workload effectively with consideration to relevant deadlines, given changing circumstances..*

COMPETENCY REQUIREMENTS FOR WEATHER BROADCASTERS AND COMMUNICATORS

These competency requirements are for PWS/weather broadcasters who specialize in media work and routinely present weather information on radio or television, or prepare material for weather websites. They build upon, and should be read in conjunction with, the competency requirements for a PWS/weather forecaster, although it is recognized that some people engaged in weather broadcasting may not come from a forecasting background.

There are three top-level competency elements for the work of weather broadcasters, which are as follows:

- a. Oral, written and graphical communication;
- b. Use of appropriate tools and systems required for the delivery of meteorological information to end users; and,
- c. Self-management and team-working.

Each of these areas is expanded below into second-level competencies that are expressed and structured in a manner that facilitates the clear application of an assessment procedure. Not all of these second-level competencies will be relevant to each weather broadcaster; the individual context of each weather broadcaster will need to be considered when establishing relevancy.

8. Oral, Written and Graphical Communication

- a. *Is aware of the range of users reached through media forecasts;*
- b. *Understands the likely impact of upcoming weather on users and their activities;*
- c. *Identifies the key points in the weather story and develops these into a coherent narrative or presentation;*
- d. *Articulates the weather story in clear and natural language, using correct grammar and achieves a well-paced delivery of information during weather broadcasts;*
- e. *Prepares effective weather graphics that visually communicate the weather story;*
- f. *Communicates the concept of forecast uncertainty to viewers and listeners;*
- g. *Presents warnings of hydro-meteorological hazards clearly and effectively, including information on possible mitigating actions where appropriate and context relevant to past events;*
- h. *Understands the working environment of journalists and other media professionals; and;*

- i. *Prepares and delivers educational material to a wide range of audience, from children to fellow-professionals.*

9. Effective use of tools and systems

- a. *Has a thorough knowledge and understanding of the function and operation of the different technological elements (PCs, servers, mixers, amplifiers, cameras, etc.) commonly employed in weather broadcasting;*
- b. *Has a thorough knowledge of the weather graphics software packages used to prepare weather bulletins, and an ability to exploit this knowledge effectively;*
- c. *Knows the routine production protocols appropriate to their own service provision environment and understands the requirements of such production; and,*
- d. *Knows how to design and incorporate new graphic elements into a weather bulletin while maintaining alignment with broader editorial policies.*

10. Self-management and team-working

- a. *Works in a cooperative fashion with colleagues from an NMS and, where appropriate, with the broadcast organization's editorial and production staff;*
- b. *Has gained knowledge of the editorial policy applied to weather broadcasting, and is capable of developing and proposing revisions to such policies in response to changing circumstances, both meteorological and otherwise;*
- c. *Delivers weather broadcasts reliably and on-time in accordance with broadcast schedules;*
- d. *Implements, where relevant, the "Single Official Voice" policy in respect to warnings of severe weather and other public safety messages;*
- e. *Is suitably groomed towards an acceptable on-screen presence, taking relevant social and cultural norms into account. Presents an appearance which enhances the brand value both of the NMS and the broadcaster, and does not detract from, or conflict with, the proper tone of the weather message;*
- f. *Has the confidence to express personality in a manner that facilitates the authoritative delivery of the weather forecast;*
- g. *Contributes to the promotion of weather presentation services to broadcast companies, understands the concept of branding, and has the ability to articulate the benefits of good weather broadcasting practices both within the NMS and to broadcasters;*
- h. *While appreciating the role of commercial sponsorship in weather broadcasting, does not allow such sponsorship to obscure, or conflict with, the weather message;*

- i. Critiques their own and other broadcasters performances, and communicates these to others in a constructive and positive manner; and,*
 - j. Mentors junior colleagues and provides support and advice as required.*
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COMPETENCY REQUIREMENTS FOR PWS ADVISORS ENGAGED IN MEDIA LIAISON AND OUTREACH ACTIVITIES

These competency requirements are for PWS Advisors who specialize in media liaison work and in education/outreach. They build upon, and should be read in conjunction with, the competency requirements for a PWS/weather forecaster, although it is recognized that some people engaged in media liaison and outreach on behalf of NMHSs may not come from a forecasting background.

There are three top-level competency areas for the work of media liaison and outreach, which are as follows:

- a. Oral and written communication;
- b. Use of appropriate tools and systems required for the delivery of meteorological information to end users; and,
- c. Self-management and team-working.

Each of these areas is expanded below into second-level competencies that are expressed and structured in a manner that facilitates the clear application of an assessment procedure. Not all of these second-level competencies will be relevant to each PWS Advisor; the individual context of each weather broadcaster will need to be considered when establishing relevancy.

11. Oral and Written Communication

- a. *Is aware of the range of users reached through media forecasts;*
- b. *Understands the likely impact of upcoming weather on users and their activities;*
- c. *Presents warnings of hydro-meteorological hazards clearly and effectively, and in the context of past events, including information on possible mitigating actions where appropriate;*
- d. *Understands the working environment of journalists and other media professionals;*
- e. *Communicates in an effective and timely manner;*
- f. *Works closely with colleagues responsible for Communication and Public Affairs in the NMS to assist in preparing press releases or interviews as required; and,*
- g. *Prepares and delivers educational material in a clear language to a wide range of audience, from children to fellow-professionals.*

12. Use of appropriate tools and systems required for the delivery of meteorological information to end users

- a. *Has thorough knowledge of the channels used to communicate weather and related information, and an ability to exploit this knowledge effectively; and,*
- b. *Knows the routine production protocols appropriate to their own service provision environment.*

13. Self-management and team-working

- a. *Works in a cooperative fashion with colleagues from an NMS and, where appropriate, with journalists and other media staff;*
- b. *Presents a professional appearance which enhances the brand value of the NMS;*
- c. *Demonstrates appropriate levels of trust, integrity, consideration of media needs, timeliness, confidentiality and discretion in all work activities;*
- d. *Is able to ensure consistency of message across the NMS and stakeholders both internally and externally; and,*
- e. *Mentors junior colleagues and provides support and advice as required.*

COMPETENCY REQUIREMENTS FOR A DISASTER PREVENTION AND MITIGATION WEATHER ADVISOR

These competency requirements are for weather advisors who work in the area of Disaster Prevention and Mitigation (DPM) and engagement with the Emergency Management (EM) community. They build upon, and should be read in conjunction with, the competency requirements for a PWS/weather forecaster, although it is recognized that some people engaged in liaison and outreach in EM on behalf of NMHSs may not come from a forecasting background. In such cases, the DPM Advisor needs to work closely with the PWS/weather forecaster to develop the products and services indicated in the following sections. A DPM Advisor, taking into consideration the conditions a to c:

- (a) The geographical area of responsibility;
- (b) Weather, water and climate impacts on society; and,
- (c) Weather, water and climate societal requirements, local procedures and priorities,

should be able to perform the work (in close association with the PWS/weather forecaster if needed) indicated in the five top level competencies below:

1. Communicate warnings and associated information to users;
2. Develop products, procedures and services to meet community and user needs;
3. Develop and manage DPM stakeholder relationships;
4. Promote and implement impact assessments and community outreach; and,
5. Ensure the quality of information, services and procedures.

Each of these top-level competency areas is expanded, below, into second-level competencies that are expressed and structured in such a manner as to facilitate the clear application of an assessment procedure. Each is also associated with a range of background knowledge and skills which may not be particular to meteorology but are nonetheless essential for the discharge of the weather advisor's duties.

14. Communicate warnings and associated information to users

- a. Present information during severe weather events through the mass media, and in particular television, radio, and the press; and,*
- b. Tailor weather warning products for communication to disaster management decision support and for other key users.*

15. Develop products, procedures and services to meet community and user needs

- a. *Identify and demonstrate a knowledge of the weather, climate and water information requirements of the disaster management and civil protection community;*
- b. *Ensure formatting and timely dissemination of warnings in order to facilitate the actions of disaster management community to safeguard life and property;*
- c. *Ensure the use of appropriate language and terminology in NMHSs warnings;*
- d. *Inform the development of very short-range forecasting and nowcasting methods and products tailored for the disaster management community based on user needs;*
- e. *Inform the development of the Ensemble Prediction System (EPS)-based probabilistic forecasts of weather related threats, based on user needs for such products;*
- f. *Inform the development of impact-based forecast products to assist the emergency management and civil protection agencies with their decision making processes based on user needs for such products;*
- g. *Assist in improving dissemination of warning information through utilisation of new communication technologies; and,*
- h. *Apply new technology and scientific research in Multi-Hazard Early Warning Systems (MHEWS), including meteorological and hydrological observations and telecommunication networks (experience sharing with success stories, and detailed synthesis of these good practices).*

16. Develop and manage DPM stakeholder relationships

- a. *Be able to establish and maintain working relationships at operational and technical levels with the emergency management and civil protection community, including identification of points of contact;*
- b. *Be able to build and maintain relationships to enable optimal dissemination of warnings prior to and during weather events;*
- c. *Facilitate the coordination between the NMS and relevant agencies and public service providers to improve the emergency planning, preparedness and responses to weather threat, with particular emphasis on the unique needs of megacities;*

- d. *Assist in the design of effective warning systems for coordinated emergency response to hydrometeorological hazards; and,*
- e. *Contribute in close coordination with the disaster management and civil protection authorities to the development of response advice and call-to-action statements based on the potential impact of the hazards in the region of concern.*

17. Promote and implement impact assessments and community outreach

- a. *Participate in the assessment of the socio-economic impacts of hydrometeorological events, in collaboration with relevant experts;*
- b. *Foster coordination with socio-economic experts in order to evaluate the benefits of Early Warning Systems (EWS) of weather, hydrological and climate hazards;and*
- c. *Promote community awareness and preparedness for hydrometeorological - related disasters through public education and outreach.*

18. Ensure the quality of information, services and procedures

- a. *Enable sustainable and formalised feedback mechanisms, including user-based service assessment and product verification, for evaluating and improving the NMS's warnings;*
- b. *Work with the disaster management authorities to strengthen the role of the NMS in the national disaster management structures as the "Single Official Voice" for warnings of severe weather;*
- c. *Contribute to the development of a communication strategy to foster the authority of the NMS, as the "Single Official Voice" for warnings of severe weather, to ensure credibility of, and effective public response to, these warnings;*
- d. *Coordinate internal standard operational procedures to facilitate multi-agency and multi-hazard risk management and emergency plans;*
- e. *Advise on the development of improved documentation and archiving systems for hydrometeorological hazard and impact data, including data retrieval, quality assurance and data management; and,*
- f. *Engage with international projects including World Weather Information Service (WWIS), Severe Weather Information Centre (SWIC), METEOALARM and Severe Weather Forecasting Demonstration Project (SWFDP) and other WMO initiatives.*

COMPETENCY REQUIREMENTS FOR PERSONS ENGAGED IN THE IMPROVEMENT, INNOVATION AND DELIVERY OF METEOROLOGICAL SERVICES AND PRODUCTS

These competency requirements are primarily aimed at NMHSs personnel who are engaged in the area of improvement, innovation and delivery of meteorological services and products. They should be read in conjunction with the competency requirements for a PWS/weather forecaster, although it is recognised that many people engaged in these aspects of NMHSs work may not come from a forecasting background.

- a. Sound knowledge of meteorology and the models and systems used in operational forecasting;
- b. Effective application of existing and new technologies;
- c. User focus, knowledge of requirements for sectoral applications of meteorological and hydrological information, oral and written communication; and,
- d. Team-working and effective self-management.

Each of these areas needs to be expanded into second-level competencies that must be expressed and structured in a manner that facilitate the clear application of an assessment procedure.

19. Sound knowledge of meteorology and the models and systems used in operational forecasting

- a. *Demonstrates knowledge of applying meteorology in improving existing services and the creation of new products;*
- b. *Demonstrates an understanding of the methods used in modelling; and,*

- c. *Understands the strengths and limitations of the models used in the forecast process.*

20. Effective application of existing and new technologies

- a. *Demonstrates a knowledge of the production systems in use in the forecast office, and the optimum employment of these systems in producing and disseminating forecasts and warnings;*
- b. *Shows a thorough knowledge of user visualisation and display systems utilized for weather information;*
- c. *Keeps abreast of the science of meteorology and related technological advances, and can specify and lead the development of meteorological products and services relevant to his/her own NMS to meet user needs; and,*
- d. *Demonstrate an ability to respond quickly to users' changing needs and/or changing technologies.*

21. User focus, knowledge of requirements for sectoral applications of meteorological and hydrological information, oral and written communication

- a. *Demonstrates an understanding of the application of hydrometeorological services to meet user requirements;*
- b. *Maintains an awareness of users' current and future requirements for meteorological services;*
- c. *Demonstrates an ability to work with the users to understand the nature of their business and their needs for improved or new products and services;*
- d. *Demonstrates an ability to provide clear, structured briefings to both users and colleagues;*
- e. *Demonstrates an ability to create and deliver presentations on topics related to service improvements to users, to external agencies and to the public;*
- f. *Demonstrates effective communication skills to both internal and external stakeholders and is able to adjust key messages and content for different audiences;*
- g. *As required, contributes to the development of training material relating to service innovations and improvements; and,*
- h. *Demonstrates the ability to articulate the user needs to guide the development of new or improved services.*

22. Team-working and effective self-management

- a. *Works in a cooperative fashion with colleagues and with external stakeholders;*
- b. *Makes sound decisions under the pressure of deadlines;*
- c. *Manages differences in approach and values, deals effectively with confrontational situations, demonstrating respect and consideration for differing points of view;*
- d. *Demonstrates an understanding of the technical knowledge and methodologies necessary to work in a multi-disciplinary team;*
- e. *Demonstrates appropriate levels of trust, integrity, consideration of user needs, timelines, confidentiality and discretion in all work activities;*
- f. *Communicates in an effective and timely manner;*
- g. *Has the ability to provide vision, leadership and guidance in the development of service improvement;*
- h. *Serves as a role model through consistent demonstration of integrity and professional values; and,*

- i. *Holds others accountable to their professional obligations.*
