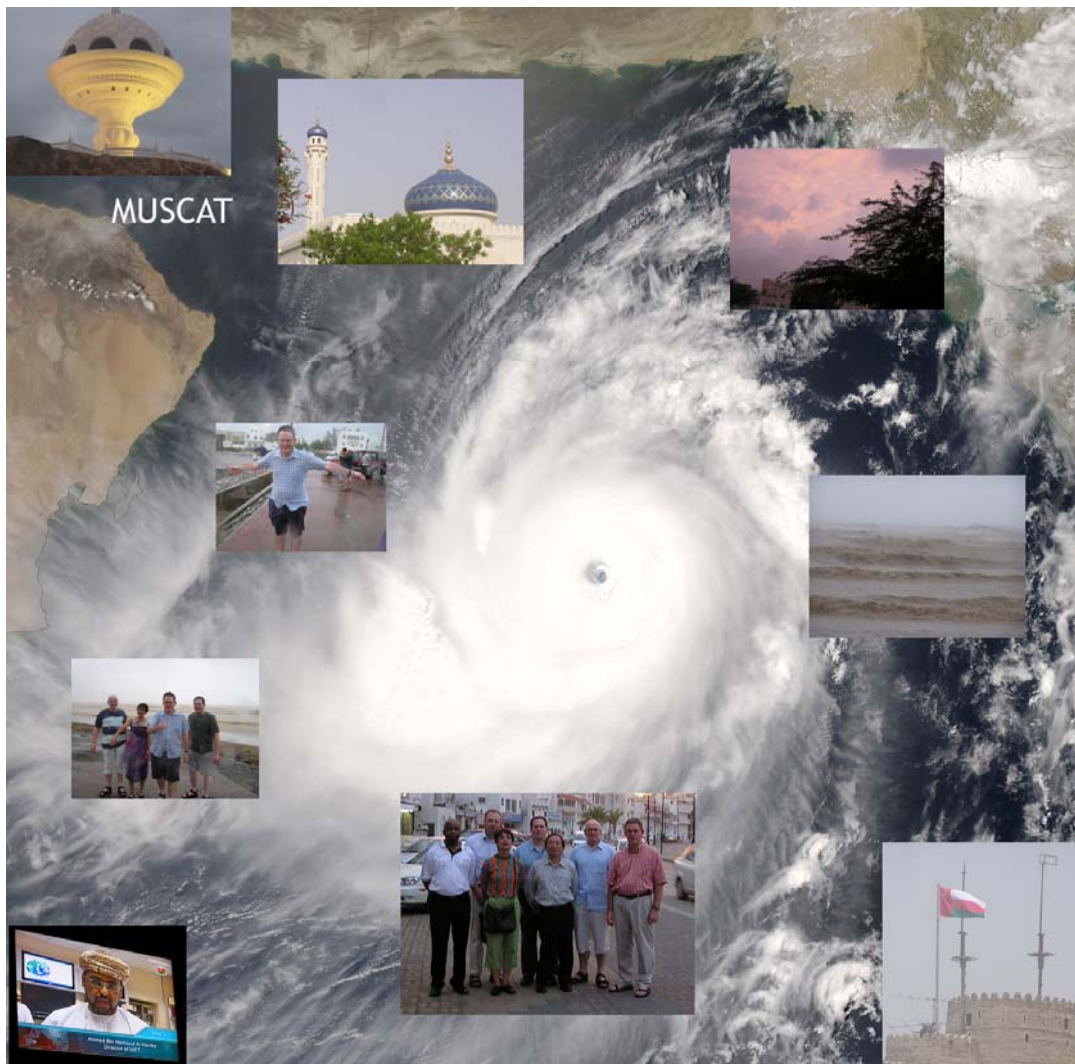


WORLD METEOROLOGICAL ORGANIZATION

PUBLIC WEATHER SERVICES IMPLEMENTATION COORDINATION TEAM

Muscat, Sultanate of Oman

4-8 June 2007



FINAL REPORT



Executive Summary

The ICT of the OPAG met in Muscat, Sultanate of Oman, from June 4th to 9th 2007. In addition to the Chair and the Co-Chair of the OPAG, the meeting was attended by the Chairs of the three Expert Teams active in the OPAG, together with the PWS Rapporteur for RA VI.

An unexpected “guest” at the meeting was Tropical Cyclone GONU which struck Oman on the night of June 5th/6th, and which brought very strong winds and torrential rain to the Muscat region, finally heading north towards Iran on the night of June 6th/ 7th. This was the worst Tropical Cyclone to hit Oman in 30 years. It was clear that the Meteorological Service of Oman had been very effective in issuing early warnings for this event, nevertheless, GONU was responsible for (at the time of writing) 61 deaths; 49 in Oman and 12 in Iran, mostly from flooding.

The meeting reviewed the decisions of both CBS-Ext.(06) and Cg-XV; it was pleased that the PWS Strategy which had been developed at the ICT meeting in Dublin (October 2005) had been approved (with minor modifications), along with the definitions of core and recommended elements of national PWS Programmes.

The ICT discussed the new and emerging issues of special importance to the work of the PWS Programme; these included the WMO Strategic Plan; the Madrid Conference, the work of the Task Force on the Socio-economic Applications of Meteorological and Hydrological Services, and the decision to hold an International Symposium on PWS. The meeting agreed that the demands on the PWS OPAG and Programme were increasing in complexity and scope.

Reports were presented to the ICT on the Severe Weather Forecast Demonstration Project (organised by the OPAG on DPFS) by the Chair of ET/SPI, who serves on the Project Steering Committee, and by the Co-Chair, who chairs the regional Sub-Project Management Team for South-Eastern Africa.

The meeting was briefed on some European initiatives of relevance to PWS, including the establishment of the “Climate Broadcasters Network – Europe” by DG-Environment of the EU.

The major decisions of the ICT are summarised below:

- That the OPAG initiate a PWS Pilot Project, focusing on “Learning through Doing”, aimed at a small number of countries and a defined range of sectors;
- That extra responsibilities for Outreach and Public Education be devolved onto ET/COM, now re-named ET/COPE;
- The bringing together of all responsibilities relating to the WWIS and SWIC websites which would henceforth lie with ET/DPM;
- That the ICT members would act as the Programme Committee for the forthcoming Symposium on PWS, tentatively scheduled for the coming December;
- That the ICT would support the constitution of the Task Force on Social and Economic Applications of PWS as an Expert Team within the OPAG;
- That a network of national PWS Focal Points would be established, to encourage the use of PWS resources and report on the effectiveness of PWS Programme activities;
- That the ICT of the OPAG on PWS were happy with the current name and with the current structural arrangements of the OPAG within CBS, reflecting the place of Public Weather Services as a fundamental part of NMHSs.

1. INTRODUCTION

1.1 At the kind invitation of the Directorate General of Civil Aviation and Meteorology of the Sultanate of Oman, a meeting of the Public Weather Services (PWS) Core Implementation Coordination Team (ICT) was held at the Coral Hotel in Muscat, Oman from June 4th to June 9th 2007. The meeting was chaired by Mr Gerald Fleming, the Chair of OPAG on PWS. The meeting was opened by Mr Fleming, who welcomed the participants, especially Mr Jon Gill, Chair of ET/COM, who was attending his first ICT meeting. Mr Fleming thanked the Director and staff of the Directorate General of Civil Aviation and Meteorology of Oman who had welcomed the participants individually upon arrival at Seeb Airport, and who had made excellent physical arrangements for the meeting. Mr Ahmed AlHarthy, speaking on behalf of the PR of Oman with WMO, welcomed the ICT to Oman, and expressed the wish that the meeting would be fruitful for all the participants. He explained that, as Cyclone "GONU" was approaching the south-east of Oman, he would not be able to spend as much time with the ICT as he would have liked. The emergency services of the country were on a state of high alert, and the staff of the Meteorological Service were extremely busy in providing forecasts and warnings, and co-ordinating with emergency managers. Ms Haleh Kootval of the WMO Secretariat welcomed the participants on behalf of the Secretary-General and briefed the participants on the objectives of the meeting and the most important events that have taken place since the ICT last met in Dublin in 2005. These included the Extraordinary session of CBS in 2006, the WMO International Conference on Safe and Secure Living, and the Fifteenth WMO Congress, recently concluded. She recalled the Team's Terms of Reference (TOR) as approved by CBS as follows:

- (a) Coordinate and keep under review the work of the PWS expert teams;
- (b) Identify and advise on the role of WMO's cross-cutting programmes relating to PWS, and keep under review the progress of GEOSS;
- (c) Continue with appropriate arrangements for consultation and collaboration with relevant technical commissions on cross-cutting issues, and with other CBS OPAGs to ensure coordination of services and systems;
- (d) Review and report on PWS support to WMO programme on disaster prevention and mitigation and also THORPEX;
- (e) Explore the mechanisms to strengthen dialogues between NMHSs and the private service providers;
- (f) Continue to provide guidance to Members on the issue of NMHSs as the sole authority in the provision of official severe weather warnings;
- (g) Review and report on the effectiveness of the information and guidance material produced by the PWS Programme among NMHSs and relevant media and user groups;
- (h) Review and report on the effectiveness of PWS training activities;
- (i) Review and report on the improvements in national PWS programmes and activities as a result of activities under the WMO PWS Programme;
- (j) Keep abreast of the developments in the application of economics to meteorology and hydrology and on the economic benefits of PWS; develop strategies for advising NMHSs as appropriate;

- (k) Explore the mechanism to strengthen dialog between WMO and International Olympics Committee (IOC) in the context of meteorological support for the Olympic Games;
 - (l) Devise means to optimize awareness and the dissemination of all relevant material arising from the work of the expert teams to the PWS community.
- 1.2 The ICT reviewed the TORs and deliverables for each expert team.
- 1.3 The list of participants is given in Annex I. The programme of the meeting is contained in Annex II. The TORs of the constituent Expert Teams of the OPAG are listed in Annex III.

2. Background and Objectives

2.1 The meeting was informed by Ms Kootval that the Extraordinary session of the Commission for Basic Systems (CBS) (Seoul, Republic of Korea, November 2006) had reviewed the work of the OPAG on PWS but that the TORs of the OPAG had remained unchanged. CBS had agreed that the work of the PWS Programme should continue to be coordinated through the Expert Team on Service and Product Improvement (ET/SPI); the Expert Team on Communication Aspects of PWS (ET/COM); the Expert Team on PWS in Support of Disaster Prevention and Mitigation (ET/DPM); and the Implementation/Coordination (IC) Team. All three Expert Teams have met in the period since the last meeting of the ICT in Dublin. (ET/SPI: New York, USA, May 2006; ET/COM: Dubrovnik, Croatia, May 2006; ET/DPM; Beijing, China, June 2006).

3. Review of decisions of Fifteenth WMO Congress (Cg-XV) and the Extraordinary Session of CBS (CBS-Ext.(06))

3.1 The meeting reviewed the decisions of both CBS-Ext.(06) and Cg-XV of relevance to the future development and the implementation of the PWS Programme. The meeting was pleased that the PWS Strategy which had been developed at the Dublin meeting had been approved by both CBS and Congress with minor modifications and that this Strategy would guide the detailed plans of action developed within the PWS Programme. Also approved with some small changes were the core and recommended elements of a national PWS Programme drafted at the Dublin meeting. The new initiatives taken by the PWS Programme with respect to nowcasting, probabilistic forecasting, public education and outreach, and socio-economic applications of PWS had all been welcomed by both CBS and Congress which also expressed satisfaction at the guidance materials published by the Expert Teams.

3.2 The meeting discussed the new and emerging issues of special importance to the work of the PWS Programme which would have influence over the structure and direction of the OPAG. These included the WMO Strategic Plan and how it would shape all of WMO Programmes and especially the future of the service delivery functions at all levels of WMO. In addition, discussions resulting from the Madrid Conference on the relationship between users and providers of information and services, and the work of the Task Force on the Socio-economic Applications of Meteorological and Hydrological Services in this area would no doubt have significant influence on the mode of operation of the PWS Programme and the OPAG. Of great relevance was the decision to hold an International Symposium on PWS; this suggestion has come from the Executive Council and had been agreed by both CBS and Congress. This Symposium was tentatively scheduled for the first week in December 2007, in Geneva.

3.3 The meeting agreed that the demands on the PWS OPAG and Programme were increasing in complexity and scope. It was likely that the areas of Water and Climate would

increasingly look to the PWS Programme for support and guidance in matters related to service delivery, giving the Programme a function beyond the traditional areas of “Weather”. In discussing these trends, the Team was of the opinion that terms like “Severe Weather” were becoming anachronistic, being replaced by the concept of “High Impact Weather” which implied an understanding of the effect, or impact, of weather on the public and on specialised user communities. The ICT agreed that part of its response to this increase in complexity and scope should be to go “back to basics” in focusing on the key elements of good Public Weather Services – quality in service delivery, effective communication, user focus and user-driven verification. Whilst the emerging vista encompassed both opportunities and threats, the OPAG should adopt a forward looking and anticipatory attitude towards the emerging trends and issues which would have influence on the implementation of the PWS Strategy. It accepted that there did not exist a clear definition of the boundary between Public Weather Services and Commercial Weather Services, and recognised that this boundary would vary from country to country and from one context to another.

4. ICT Work Programme

4.1 In the light of the review of the emerging and important issues for PWS, and of the discussions at and decisions of Congress, the ICT conducted an initial review of the TORs as defined by CBS. TOR (a) would be dealt with through consideration of the reports of the Chairs of the Expert Teams and the ensuing discussion on the work of each team. With regard to TOR (b), it was noted that Congress had agreed that PWS was itself a cross-cutting activity; that it interacted effectively with some of the other cross-cutting activities (for example ETR, DPM, CPA) but that its work did not require significant interaction with some of the other Programmes. With regard to GEOSS, there had been some interaction between the Programme and the GEO Secretariat, but it was difficult to identify what, if any, added value was to be gained from such interaction at present.

4.2 Turning to TOR (c), there was discussion of a brief survey conducted, through ET/SPI, of the other OPAG Chairs within CBS. There was openness among all the OPAGs to collaborate with the OPAG on PWS when it was appropriate; the OPAG with which this collaboration was likely to be most developed was with the OPAG on DPFS. The Chair of the OPAG briefed the ICT on some informal discussions he had held with the other OPAG Chairs during CBS Ext (06); they had agreed that the most effective mechanism for collaboration and communication was through Experts from one OPAG attending relevant ET meetings of another. The Chairs had decided that, where such opportunities were identified, requests for facilitation should be communicated through the Chairs of the OPAGs in question. In relation to the WIS, it was agreed that the Chair might consider writing to Mr S Mildner, who was retained as a consultant by WMO, to bring to his attention the need to ensure that the outputs from WIS were formatted in a manner compatible with user needs.

4.3 TOR (d), relating to support for the DPM (now DRR) Programme, would be discussed more fully under consideration of the relevant Expert Team; however, the Chair of ET/DPM, Dr M.C. Wong, informed the ICT that the work of the Team in producing explanatory documents relating to DPM was relevant to this TOR, as was the work of the Team in the area of Nowcasting. The Chair of the OPAG briefed the ICT on his involvement with THORPEX and in particular on the relevance of the work conducted within the Social and Economic Research and Applications Working Group (SERA-WG) of THORPEX. It was agreed that, when next the TORs came up for review, this TOR might usefully be merged with TOR (b).

4.4 There was a detailed discussion on the manner in which TOR (e) (relations with private sector service providers) might be addressed; the Congress document called for documenting “current successful partnerships”. It was agreed that a number of case studies should be gathered and documented; where unsuccessful partnerships were concerned,

these could be examined to see if any general guidance or advice could be deduced from them. It was recognised that “competition law” was a very significant factor bearing on relationships between the public and the private sector.

4.5 Turning to TOR (f), one of the key mechanisms for defining the responsibility of an NMHS in relation to warnings was to have a Meteorological Act, incorporating such definitions, passed in the national parliaments of member countries. However it was recognised that this was not a realistic option in many countries. It was recommended that the wording of the TOR might be improved by removing the word “sole” and also replacing the word “issue” with “benefits”.

4.6 TOR (g), along with TOR (l) was usually approached through either surveys of relevant user communities (normally conducted through NMHSs), or through the collection of anecdotal evidence in specific instances where the outputs of the Programme had resulted in improvements to public weather services. Ideally each NMHS should have a PWS focal point to ensure that the work of the national organisation benefited fully from the guidance provided through the OPAG and PWS Programme. It was agreed that the forthcoming Symposium might usefully address this topic.

4.7 TORs (h) and (i) were considered together; the Secretariat had undertaken some surveys of PRs of relevant Members following training and workshop activities in which their staff had engaged; these surveys could form the basis of a deliverable under this item. TOR (j), relating to the Social and Economic Applications (SEA) of PWS, would be considered under Item 7 below; the position of the Task Force on Social and Economic Applications of PWS (TF-SEA) vis-à-vis the OPAG would be considered under Item 10.

4.8 Mr John Guiney, Chair of ET/SPI, informed the members of the ICT that he had recently received information from the Hellenic National Meteorological Service relating to the support which they had provided for the Athens Games; he had also received information from the Bureau of Meteorology in Australia relating to the Sydney Games. He advised that the preparation of guidelines relating to specialised meteorological service provision for cities who bid to host the Olympic Games should be complete within the current year.

5. Report of the Coordinator of the RA VI Sub-Group on PWS

5.1 The Co-ordinator of the RA VI sub-group presented a report to the ICT on the activities undertaken by the sub-group.

5.2 The report highlighted that the Cross-Border Exchange of Warnings project had been well-received by the user community, and had demonstrated real benefit. This activity has now transitioned from a project to an operational service.

5.3 The role of Meteoalarm (formerly the EMMA project) as a future delivery mechanism for warnings within RA VI was also discussed. The sub-group noted that there may be some issues regarding Intellectual Property Rights (IPR) in respect to technology and information exchange, and in particular recognised that this may impact on Public Weather Service products and commercial exploitation in the future.

6. European Initiatives of Relevance to the Work of the OPAG on PWS

6.1 The RA VI sub-group continues to monitor the Global Monitoring and Environmental Security (GMES) activities taking place within the European Union so that they are, wherever possible, in alignment with PWS activities within Europe.

6.2 The Chair briefed the ICT on the establishment of the Climate Broadcasters Network – Europe (CBN-E). This was a network of weather broadcasters working in Europe who were active in raising awareness in regard to Climate Change and its impacts. The EU (through its Environment Directorate) will fund secretarial assistance for the network; this secretariat will help prepare and distribute information and materials which members can use in their own countries or regions when making presentations about Climate Change.

7. Socio-economic Applications of PWS

7.1 The ICT reviewed the outcomes of the recent WMO Conference on Secure and Sustainable Living, (Madrid, March 2007) and specifically the Madrid Action Plan (MAP), which encompassed the outcomes of the conference and provided a recommended series of actions which would promote the aims of the conference into the future.

7.2 Noting in particular Action 9 and Action 11 of the MAP, the ICT recognised that these Actions might be progressed through the establishment of a pilot project directed at improving service delivery in a small number of NMHSs and assessing the improvement, through increased recognition of the NMHS brand or otherwise. This pilot project is discussed in more depth in Section 10 below.

7.3 The ICT discussed the work of the Task Force on Social and Economic Applications of PWS (TF-SEA). It considered whether the Task Force might be constituted as an Expert Team, and was favourably disposed to the concept, provided that the members of the Task Force were agreeable. It was recognised that this would widen the scope of the work of the OPAG within the CBS structure. The ICT recognised the growing importance of the social and economic aspects of weather services, and noted that the work of the Task Force was aligned with the PWS Strategy as adopted at Cg-XV, in particular addressing point (g).

8. Severe Weather Forecasting Demonstration Project (SWFDP)

8.1 This project is organised under the OPAG on DPFS; the Chair of ET/SPI participates as a member of the Project Steering Group. An account of the project from the perspective of the Project Steering Group is given in Annex IV.

8.2 Following the field phase of the subproject, a comprehensive evaluation will be performed to assess the degree to which the enhanced severe weather forecasting process of the SWFDP has improved the detection and warning of severe weather events. The Project Steering Group strongly encouraged that the user communities, including the national disaster management and civil protection authorities/agencies, be involved with the evaluation of the national warning service provided by NMHSs during the project.

8.3 The ICT Co-Chair, who is also the Chair of the Sub-Project (SWFDP South-Eastern Africa) Management Team, provided some additional insight into the progress of the SWFDP for South-Eastern Africa from the perspective of the Sub-Project Management Team, as well as from that of RSMC Pretoria. The project has been successful, and can be used as a benchmark for future projects. Proper planning with defined time frames and commitment from the participating parties have been key to the success of the project. It was noted that significant efforts have to be made to gather feedback from participating countries. Feedback from the disaster management community is welcomed, and it should be maximised as it is viewed as a very important input within the context of OPAG/PWS. The report of the Co-Chair on the project is provided as Annex V.

8.4 A review of the project to-date has identified several gaps or limitations which should be examined for follow up, and taken into account for future related projects. These gaps include:

- Very limited understanding of nowcast applications in some countries, including limited understanding of NWP limitations;
- Transmission of data/products is extremely slow and unreliable in some countries; this limits the effectiveness of the use of these products when provided through the Internet;
- Lack of frequent feedback from NMHSs to RSMC on the usefulness of the guidance when severe weather is occurring, and on the observed weather conditions during the event.

8.5 The project recognised the importance of working closely with the media, as well as emergency managers, so as to derive the greatest benefit from the improvement in forecast capabilities. It recommended a stronger involvement of these sectors in future activities of the Project. The Project requested that its engagement with PWSP continue to be enhanced.

9. Review of the Expert Team activities.

9.1 The Chair of ET/DPM, Dr. M C Wong, reviewed the activities of the Team for the period from 2005 to mid-2007; the complete report is attached as Annex VI. The ICT noted with satisfaction the progress made, in particular in the following areas:

- (a) A PWS survey on severe weather warning services in various Members was conducted in collaboration with ET/SPI in 2006. The survey found that enhancing the predictability of rain would be the most effective improvement, helping to reduce the vulnerability of Members to heavy rain. Capacity building in nowcasting would thus be required for many Members.
- (b) A “Training Course on Design and Operation of Meteorological Warning Systems” was conducted in Hong Kong in December 2005. Ten participants from various Members attended the course.
- (c) The user guides for WWIS and SWIC were published on the PWSP website.
- (d) The document “Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management” was published as PWS-13.
- (e) The WWIS website has received continual support from Members and now operates in six different languages, namely, English, Arabic, Chinese, Portuguese, Spanish and French. As of 1 May 2007, 159 out of a total of 188 WMO Members participate in WWIS, the latest two being Lesotho and Algeria. A total of 115 Members provide forecasts for 1189 cities, while 159 Members provide climatological data for 1206 cities.
- (f) To enhance communication between host countries, a coordination meeting of the WWIS website hosts was held during January 2007 in Hong Kong, China. A roadmap for future WWIS activities was prepared. The meeting agreed on the eventual merging of the WWIS and SWIC websites.
- (g) Twenty WMO Members are presently participating in SWIC. The number of monthly page views reached a record high of 2,937,823 in September 2006.
- (h) SWIC is now cross-linked with EUMETNET’s Meteoalarm website (formerly known as the European Multi-service Meteorological Awareness (EMMA) project). The

public can now easily obtain information on severe weather warnings in Europe as well as around the world; and

- (i) The PWS Workshop on Warnings of Real-time Hazards by Using Nowcasting Technology was held in Sydney in October 2006 in collaboration with the WWRP Nowcasting Working Group. A business plan for a PWS Nowcasting Applications framework was prepared and a Joint (PWS-WWRP) Nowcasting Applications and Services (JONAS) Steering Committee was formed to further develop the framework and oversee its implementation.

9.2 The Chair briefed the ICT on the pilot project proposal entitled "Public Outreach Campaign in RA II About Meteorological and Hydrological Services in Disaster Risk Reduction" to be presented at the Asia Conference on Disaster Reduction 2007 later this June in Kazakhstan. The ICT was also briefed on the RA II pilot project to provide NWP city-specific forecasts in the medium-range to developing countries within the Region via the internet similar to those provided by ECMWF to some Members in RA I.

9.3 The Chair of the Expert Team on Services and Products Improvement (ET/SPI) provided a review of the Team's accomplishments since CBS XIII; this report is attached as Annex VII. The ICT noted with satisfaction the progress made, in particular in the following areas:

- (a) the production of supplementary guidelines on bio-meteorology to cover the mitigation of human disease outbreaks and prediction of the long-term spread of disease consequent upon climate change;
- (b) the survey conducted by ET/SPI, in conjunction with ET/DPM, related to early warning systems;
- (c) the survey, prepared by ET/SPI and distributed at CBS-XIV on relationships between NMHSs and other government agencies / media;
- (d) recognition of the benefits of improved seasonal forecasts, primarily forecasts of rainfall and temperature;
- (e) the continuing evolution and improvement of the WWIS and SWIC websites, and the preparation of a user guide to these websites;
- (f) the organisation of an Expert Meeting in September 2007 on the applicability of EPS probabilistic forecast products and services;
- (g) the continuing work on database forecast systems and next-generation forecast workstations.

9.4 ET/SPI continues to pursue collaboration opportunities with other CBS OPAGS. To expand and identify additional collaboration opportunities with other CBS OPAGs, the PWS OPAG distributed a brief questionnaire developed by ET/SPI at the CBS Extraordinary Session in Seoul, Republic of Korea in November 2006.

9.5 Mr Jon Gill, chair of ET/COM, reported on progress with the Team's current deliverables, including the preparation of 'best practice' examples in communicating weather information, and a set of Guidelines on Communicating Forecast Uncertainty. It was agreed that it would be very useful to present the Guidelines on Forecast Uncertainty to participants of the expert meeting on Applications of Probabilistic Forecasts to Public Weather Services, in Shanghai in September 2007.

9.6 The future directions of ET/COM were discussed, paying particular attention to the overall strategic focus of PWS. In this context, the current make-up of the Team and its

Terms of Reference were reviewed, with the aim of focussing the Team's future work in several areas, including:

- (a) communication aspects relating to the establishment of good relations between NMHSs and private providers of PWS;
- (b) addressing additional communication issues in PWS related to climate and water;
- (c) the need for the Team to actively engage with broadcasters in regions other than Europe and North America;
- (d) exploring ways to assist NMHSs to communicate to users the socio-economic benefits of public weather services, and also informing users of the NMHS's capabilities.

10. Consideration of the Future Expert Teams Structures and Roles

10.1 The ICT reviewed the deliverables agreed for itself, and for the constituent Expert teams within the OPAG. A matrix was drawn up, indicating the progress with each deliverable; this matrix is attached as Annex VIII.

10.2 In commencing their review of the future direction which the OPAG should take, the members of the ICT considered that;

- (a) Much work had been done in the recent past in gathering and setting down, in guideline documents, a considerable body of knowledge related to aspects of public weather services and service delivery;
- (b) These guideline documents had been widely distributed, and published on the PWS pages of the WMO website, but there was no real measure of the extent to which they had been used, and the knowledge contained within them applied, by Members;
- (c) The task of ensuring that, in so far as possible, those on the front line of delivering services in NMHSs were aware of, trained in, and putting into practice the advice and guidance which had been collected and published was a difficult challenge for WMO.

10.3 The ICT considered that the OPAG should embark on a Pilot Project whereby a coordinated training and mentoring programme might be devised which would focus on a small group of neighbouring countries, and which would draw on the expertise available through the Expert Teams as well as that provided through the Secretariat.

10.4 The focus of the Pilot Project would be on "Learning Through Doing"; the aim would be to work with the staff of the relevant NMHSs in assisting them to improve their communication with users in a defined range of sectors, and to develop and deliver an improved range of products and services which would enhance the socio-economic benefits provided through the NMHSs to Members.

10.5 The ICT defined the objectives and scope of the Pilot Project, developed a timeline for implementation, and set out actions (and related milestones) which would need to be undertaken. While the focus of the project would, in all likelihood, be in the developing world, the ICT established a number of criteria which a candidate country would need to meet in order to engage with the Pilot Project. An initial outline of the scope of the Pilot Project is given in Annex IX.

10.6 The ICT considered that, as the Pilot Project would absorb a considerable degree of time and effort on behalf of experts active within the OPAG, the individual Expert Team

deliverables to be agreed at the next CBS session might be streamlined, in order to maintain an acceptable workload for ET members.

10.7 The PWS Programme had taken the initiative to convene an Expert Group on Public Education and Outreach; this EG had, with the assistance of a consultant retained by WMO, produced an excellent set of Guidelines on the topic, published as PWS-14. While this Expert Group was not intended to have an ongoing existence, the ICT was of the opinion that this work was important to the overall goals of the OPAG, and that it should be taken within the OPAG in so far as possible. Accordingly, ET/COM was asked to take responsibility for ongoing work in these areas. In line with this development of responsibility, it was proposed that ET/COM be re-named the Expert Team on Communication, Outreach and Public Education aspects of PWS; to be known as ET/COPE.

10.8 All of the Expert Teams within the OPAG had TORs and deliverables related to WWIS and SWIC. The ICT was of the opinion that it would be more efficient to gather these together under one Team, who would assume overall responsibility for all matters relating to the websites within the OPAG. Accordingly, it was agreed that all matters to do with these websites would be responsibility of ET/DPM, with a clear understanding that this ET could draw on the expertise available within other Teams as appropriate.

10.9 A list of actions consequent upon the discussions at ICT was drawn up; this list is appended as Annex X.

11. Preparations for CBS-XIV (2008)

11.1 While CBS-XIV was still almost eighteen months away, the ICT would not have a meeting scheduled in the interim period. Accordingly, some initial preparations for the upcoming CBS were considered.

11.2 The TORs of all the constituent Expert Teams within the OPAG were reviewed, together with the TORs of the ICT. Adjustments were made to the TORs to reflect the completion of some tasks, and to reflect the decisions outlined under Section 10. These amended TORs are, as yet, in draft form; the Chairs of the Expert Teams will discuss them at the meetings of the ETs, scheduled for 2008, and may propose further changes. Members of the ICT will then agree on the final draft of TORs to be proposed to the Commission.

11.3 If possible, and depending on the availability of ICT members, a short meeting of the ICT may be held on the margins of CBS-XIV.

12. Tropical Cyclone "GONU"

12.1 An unexpected "guest" at the meeting was Tropical Cyclone GONU which struck Oman on the night of June 5th/6th, and which brought very strong winds and torrential rain to the Muscat region, finally heading north towards Iran on the night of June 6th/ 7th. This was the worst Tropical Cyclone to hit OMAN in 30 years.

12.2 It was clear that the Meteorological Service of Oman had been very effective in issuing early warnings for this event; they had been engaged in meetings with the civil authorities for some days prior to landfall, and the national TV station was dominated by news of the cyclone's progress and advice to citizens during June 4th and 5th. Nevertheless, GONU was responsible for (at the time of writing) 61 deaths; 49 in Oman and 12 in Iran, mostly from flooding. The members of the ICT toured some of the affected area on the evening of June 7th, seeing for themselves the devastation caused to the road network and the damage to property and infrastructure.

13. Adoption of the Report of the ICT/OPAG on PWS

13.1 The report was reviewed and adopted by the ICT.

14. Closure

14.1 The meeting closed at 1600 on Friday 8th June 2007

List of Annexes

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Annex III	TORs of OPAG on PWS: ICT & Constituent Teams
Annex IV	Report of Chair ET/SPI on SWFDP
Annex V	Report of Co-Chair on SWFDP
Annex VI	Report of Chair ET/DPM on ET activities
Annex VII	Report of Chair ET/SPI on ET activities
Annex VIII	Matrix of Deliverables and associated progress
Annex IX	Outline of the scope of Pilot Project
Annex X	Actions consequent on decisions taken at ICT

**Participants at the Meeting of the
OPAG/PWS Implementation Coordination Team (ICT)**

(Muscat, Sultanate of Oman, 4-8 June 2007)

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Meeting of the OPAG/PWS Implementation Coordination Team (ICT)

(Muscat, Sultanate of Oman, 4-8 June 2007)

PROGRAMME

	Monday 4 June	Tuesday 5 June	Wednesday 6 June	Thursday 7 June	Friday 8 June
0900	1. Opening and welcoming address. 2. Background information, review of Agenda and Objectives. (H.Kootval)	TORs and Deliverables for the next meeting of the ET/COM (J.Gill)	5. Report of the Coordinator of the RAVI Sub-Group on PWS (D. Robinson)	Preparation of ICT Report – Initial Drafts. (Chair)	Preparation of ICT Report: continue. (Chair / All)
1045					
1115	3. Review of decisions of Cg-XV, CBS-Ext.(06). Emerging and important issues. First discussions on future directions. (Chair, H.Kootval)	TORs and Deliverables for the next meeting of the ET/SPI (J. Guiney)	6. European Initiatives of relevance to the work of the OPAG on PWS (Meteoalarm, GMES, CBN-Europe,etc) (Chair, H. Kootval, D.Robinson)	9. Review of the Expert Teams structures and roles	Preparation of ICT Report: continue (Chair / All)
1245					
	Lunch	Lunch	Lunch	Lunch	Lunch
1400	4. ICT Work Programme (Chair, H. Kootval)	TORs and Deliverables for the next meeting of the ET/DPM (MC Wong)	7. Socio-Economic Applications of the PWS Madrid Conference; Task Force on Socio-Economic Applications (Chair, H.K)	10. Consideration of the future Expert Teams structures and roles	12. Adoption of ICT Report (Chair /All)
1530					
1600	Report on SWFDP (Co-Chair, J. Guiney) Outline of ICT Report (Chair)	Discussions on the work of ETs	8. Visit to the Department of Meteorology	11. Preparations for CBS-XIV (2008), including proposals for the structure and composition of the OPAG on PWS	13. Closure
1730					

Terms of Reference of OPAG on PWS Public Weather Services (OPAG-PWS)¹

Implementation Coordination Team on Public Weather Services (ICT)

- (a) Coordinate and keep under review the work of the PWS expert teams;
- (b) Identify and advise on the role of WMO's cross-cutting programmes relating to PWS, and keep under review the progress of GEOSS;
- (c) Continue with appropriate arrangements for consultation and collaboration with relevant technical commissions on cross-cutting issues, and with other CBS OPAGs to ensure coordination of services and systems;
- (d) Review and report on PWS support to WMO programme on disaster prevention and mitigation and also THORPEX;
- (e) Explore the mechanisms to strengthen dialogues between NMHSs and the private service providers;
- (f) Continue to provide guidance to Members on the issue of NMHSs as the sole authority in the provision of official severe weather warnings;
- (g) Review and report on the effectiveness of the information and guidance material produced by the PWS Programme among NMHSs and relevant media and user groups;
- (h) Review and report on the effectiveness of PWS training activities;
- (i) Review and report on the improvements in national PWS programmes and activities as a result of activities under the WMO PWS Programme;
- (j) Keep abreast of the developments in the application of economics to meteorology and hydrology and on the economic benefits of PWS; develop strategies for advising NMHSs as appropriate;
- (k) Explore the mechanism to strengthen dialog between WMO and International Olympics Committee (IOC) in the context of meteorological support for the Olympic Games;
- (l) Devise means to optimize awareness and the dissemination of all relevant material arising from the work of the expert teams to the PWS community.

Expert Team on Services and Products Improvement (ET-SPI)

(Formerly Expert Team on Product Development and Service Assessment)

- (a) Monitor and report on the progress of earlier initiatives of ET-SPI and make recommendations as appropriate to OPAG/PWS;
- (b) Monitor and report on aspects of services and products improvements that relate to support for major WMO cross-cutting activities such as Disaster Prevention and Mitigation, the WMO Space Programme and THORPEX;
- (c) Identify how best to meet the needs of developing countries in their efforts to improve services and products in support of their national PWS programme;
- (d) Identify, report and provide recommendations on emerging needs for new and improved products and services with emphasis on key PWS user groups;

¹ Extract from the Abridged Final Report of the Thirteenth Session of the Commission for Basic Systems

- (e) Provide guidance on the development of the World Weather Information Services (WWIS) and explore its potential both for conveying other information and for developing the web site in other languages, in addition to English, Arabic, Chinese and Portuguese;
- (f) Keep under review the development of user-oriented NMHS air quality and bio-meteorological forecasts and warnings;
- (g) Explore and advise on development of appropriate probabilistic forecasts products and services enabled by advances in ensemble prediction systems;
- (h) Keep under review developments in verification for PWS with a special emphasis on developing countries;
- (i) Keep under review the development of quality management procedures and practices;
- (j) Keep abreast of advances in and promote as appropriate the application of emerging technology to the delivery of public weather services, in particular with emphasis on the application of database concept and workstation and their implications for the changing role of the forecaster;
- (k) Report and advise on collaborative activities with other CBS OPAGs and technical commissions.

Expert Team on PWS in Support of Disaster Prevention and Mitigation (ET-DPM)

(Formerly Expert Team on Warnings and Forecasts Exchange, Understanding and Use)

- (a) Monitor and report on the progress of earlier initiatives of ET-DPM and make recommendations as appropriate to OPAG/PWS;
- (b) Monitor and report on aspects of disaster prevention and mitigation that relate to support of major WMO cross cutting activities such as Disaster Prevention and Mitigation, the WMO Space Programme and THORPEX;
- (c) Identify ways to assist developing countries in their efforts to improve disaster prevention and mitigation in the context of their national PWS programme;
- (d) Continue to provide guidelines on the development of Severe Weather Information Centre (SWIC) for improved international availability and access to NMHSs' official severe weather information via the Internet;
- (e) Define and clarify the role of PWS in early warning process and develop appropriate reference material based on current practices on early warning highlighting communication and technology aspects. Create general guidelines from reference materials for use by NMHSs;
- (f) Promote awareness of, and provide guidance to, Members on the exchange of public weather forecasts and warnings on the Internet;
- (g) Keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines;
- (h) Develop reference material on the application of nowcasting to the provision of public warnings associated with mesoscale weather phenomena;
- (i) Report and advise on collaborative activities with other CBS OPAGs and Technical Commissions.

Expert team on Communication Aspects of PWS (ET-COM)

(Formerly Expert Team on Media Issues)

- (a) Monitor and report on progress of earlier initiatives of ET-COM and make recommendations as appropriate to OPAG/PWS;
- (b) Monitor and report on communications aspects of PWS that relate to support of major WMO cross-cutting activities such as Disaster Prevention and Mitigation, the WMO Space Programme and THORPEX;
- (c) Identify ways to meet the needs of developing countries in their efforts to improve the communication of PWS products and services;
- (d) Examine, report and recommend on ways of continuing to develop positive partnerships with national and international media organisations, and of assisting NMHSs to improve relations with the media;
- (e) Examine, report and recommend on broader use of the Internet for early warnings and other public weather services products and the application of other new technologies that might enhance public weather services;
- (f) Report and advise on ways of assisting NMHSs to enhance the education of users with a view to ensuring more effective use of PWS and enhancing the usefulness of new products and services;
- (g) Promote awareness of the importance of the impact of high quality, well communicated and delivered public weather services on the image and visibility of the NMHS;
- (h) Assess the use of the information compiled for the WWIS and SWIC websites by the media, and develop strategies for the improved exploitation of authorised and official weather information through the use of new and emerging technologies;
- (i) Study and report on how to effectively communicate to end users the concepts of uncertainty and confidence that are increasingly available from the output of Ensemble Prediction Systems and other probabilistic forecasting systems;
- (j) Noting the ongoing difficulty in media attribution of the role of NMHSs in providing basic services and infrastructure to support weather presentation to the public, review how this matter might be more effectively addressed and to develop advisory material;
- (k) Noting the major media attention given to the increasing number of weather-related disasters and with a strong connection to the role of NMHSs in the affected countries, report on and develop preliminary guidance material on how NMHSs might more effectively communicate with emergency managers, the media, and the public on meteorological aspects of disasters;
- (l) Report and advise on collaborative activities with other CBS OPAGs and Technical Commissions.

REPORT BY THE CHAIR ET/SPI ON THE SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP)

Regional Subproject – RA I – South-Eastern Africa

Numerical Weather Prediction (NWP) systems have become increasingly relevant and indeed essential to the NMHS severe weather forecast process. NWP-producing centres are providing an increasing number and variety of sophisticated NWP outputs (e.g. from ensemble prediction systems) the availability of which could be beneficial to NMHS severe weather forecast operations. Recognizing the potential benefit of broadening the availability and applicability of such systems for high-impact weather forecasts and warnings, the CBS OPAG on DPFS formed the Severe Weather Forecasting Demonstration Project (SWFDP). The goal of the SWFDP is to improve severe weather forecast services in countries where sophisticated NWP model outputs are not currently utilized nor readily available. The principal foci of the SWFDP are on heavy precipitation that could cause life-threatening flooding, and on strong, potentially destructive, winds.

The SWFDP was organized as potentially the first of a series of regional subprojects aimed at exploring and testing the usefulness of the products currently available from NWP centres. Under the auspices of OPAG/DPFS, a SWFDP Steering Group was formed to guide project planning and development activities and to advise the Chair of the DPFS regarding potential projects and overall project goals. The Project Steering Group membership represents a cross section of programmatic specialties related to the Global Data-Processing and Forecasting System that are important to the process and tasks of severe weather forecasting and services. Mr. John Guiney, Chair of ET/SPI represents the OPAG/PWS on the SWFDP steering group. The initial meeting of the Project Steering Group was held on 14-16 December 2005 at WMO Headquarters.

The Project Steering Group reviewed the SWFDP goals and focused its work on several tasks, namely: establishing an overall project plan, development of a SWFDP guidebook for the planning of regional subprojects, and identifying potential/ recommended regional subprojects. In order to assess suitable regional subprojects, the Project Steering Group further clarified the general terms and criteria for participating NWP centres. In addition, the group qualified potential regional subprojects based on several conditions/ considerations:

- high likelihood of success (to test the overall Project Plan);
- potential for greatest benefits;
- nature of the risk/threat of severe weather;
- timing of severe weather season relative to lead time required for planning and implementation;
- capacity of participating NWP centres;
- availability of resources.

The Project Steering Group agreed that the primary areas of focus for SWFDP subprojects should be heavy precipitation that could cause serious flooding, and strong destructive winds. The Project Steering Group recommended that a heavy precipitation regional subproject focused on countries in Region I/South-East Africa was most suitable for implementation in 2006. The Project Steering Group proposed the following project participants:

- NMHSs: Botswana, Madagascar, Mozambique, Tanzania, Zimbabwe;
- Regional Centres: Pretoria, La Réunion, ACMAD;
- Global NWP Centres: UK Met Office, NWS/NCEP, ECMWF.

In addition to the recommended subproject for 2006, Project Steering Group drafted a list of six additional sub-projects from Regions II, III, IV, and V for possible consideration in 2007.

The Project Steering Group's recommendation was reviewed and accepted by the OPAG on DPFS. The initial kick-off meeting for the 2006 sub-project was held in July in Pretoria, South Africa and included experts from NWP centres and representatives from the NMHSs in Botswana, Madagascar, Mozambique, Tanzania, and Zimbabwe. Meeting activities included the establishment of a project timeline and the identification of preparatory actions, including training. The field phase of the project began in November 2006 and will conclude in November 2007.

**REPORT BY THE CO-CHAIR ON THE SUB-PROJECT
(SWFDP SOUTH-EASTERN AFRICA) MANAGEMENT TEAM**

Not available at present

**Report by the Chairman of the Expert Team on
PWS in support of Disaster Prevention and Mitigation (ET-DPM)
June 2007**

The work in 2005 to 2007 and future plans of the main areas of the terms of reference (TOR) of the Expert Team are summarized below:

I. TERMS OF REFERENCE

TOR (a) Monitor and report on the progress of earlier initiatives of ET-DPM and make recommendations as appropriate to OPAG/PWS;

The Commission for Basic Systems (CBS) at the 13th Session held in St. Petersburg, February 2005 approved the World Weather Information Service (WWIS) and Severe Weather Information Centre (SWIC) to become operational components of the Public Weather Services Programme. These websites were officially launched on 23 March 2005.

TOR (b) Monitor and report on aspects of disaster prevention and mitigation that relate to support of major WMO cross cutting activities such as Disaster Prevention and Mitigation, the WMO Space Programme and THORPEX;

The Team continued to pursue and support WMO cross-cutting activities and initiatives in the implementation of the Hyogo Framework for Action which was adopted by 168 Governments in January 2005. The Team in collaboration with the Expert Team on Service and Product Improvement (ET/SPI) developed and conducted a survey on WMO Members in 2006 with the following objectives:

- (a) To compile information on severe weather warning systems operated by Members with a view to publishing a handy reference on such system;
- (b) To assess the vulnerability of various Members to weather-related disasters with a view to developing workshops to address the gaps and weaknesses identified, and
- (c) To assess the PWS needs of National Meteorological and Hydrological Services with a focus on identifying opportunities to improve products and services, in particular, on severe weather warning services

The survey questionnaire was prepared in four different languages namely, English, French, Spanish and Russian. An electronic version of the questionnaire and a webform were also available on the WWIS website for downloading and submission of

return respectively by Members. A total of 170 questionnaires were successfully sent out. After analysing the initial returns from 76 Members, the Team published a report on the survey and proposed the following recommendations:

- (a) Using the contact information provided on each completed survey, it is proposed that an inventory of EWSs operated by Members be developed.
- (b) Based on the survey results identifying rain as the hazard of most concern hazard and some 40% of the responses cited “forecasting accuracy” as the primary challenge, the Team recommended enhancing the predictability of rain (as defined in this survey) as the most effective area to focus on to reduce the vulnerability of Members’ countries.
- (c) To improve on the warning of short-term severe weather phenomena, especially rainstorms, nowcasting as a decision-support tool, is called for. Workshops and capacity building on nowcasting should be considered, and
- (d) The success of a warning is to change people’s behaviour and education is the key issue. Workshops and capacity building on reaching out to decision-makers as well as the public to help them understand the meaning of warnings and enhance their ability to translate these into action should be considered.

The Chair of ET/DPM attended the Asia Conference on Disaster Reduction (ACDR) 2006 held in Seoul, Korea and delivered a presentation stressing the importance of both weather warnings and outreach work in total disaster risk reduction. The Chair will participate in the ACDR2007 to be held in Astana, Kazakhstan in June 2007 and present a pilot project proposal on “Public Outreach Campaign in RAII About Meteorological and Hydrological Services in Disaster Risk Reduction”.

Hong Kong, China conducted a year-long DPM out-reaching campaign, “Safer Living - Reducing Natural Disasters”, in Hong Kong running from March 2005 to April 2006 in collaboration with various government departments/agencies and NGOs. The objective of the campaign was to enhance the public’s understanding of natural hazards so that appropriate response actions could be taken to reduce loss of life and property in natural disasters. The campaign comprised a range of community education programmes, including TV programmes on safer living and meteorological topics, the “Tropical Cyclone Name Nomination Contest”, slogan and bookmark design contests, a seminar on “Safer Living - Reducing Natural Disasters”, popular science lectures and a month-long exhibition as well as rescue drill demonstrations. The campaign attracted over 30,000 participants and much media attention,

TOR (c) Identify ways to assist developing countries in their efforts to improve disaster prevention and mitigation in the context of their national PWS programme;

Hong Kong, China organized a “Training Course on Design and Operation of Meteorological Warning Systems” for WMO under the VCP Programme in December 2005. The objective is to provide participants with a better understanding of the key factors underlying the design and operation of meteorological warning systems. Ten participants from various Members attended the course.

TOR (d) Continue to provide guidelines on the development of Severe Weather Information Centre (SWIC) for improved international availability and access to NMHSs’ official severe weather information via the Internet;

The user guides for WWIS and SWIC have been completed and forwarded to WMO for promulgation on the Internet.

TOR (e) Define and clarify the role of PWS in early warning process and develop appropriate reference material based on current practices on early warning highlighting communication and technology aspects. Create general guidelines from reference materials for use by NMHSs

The “Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management” has been published as PWS-13.

TOR (f) Promote awareness of, and provide guidance to, Members on the exchange of public weather forecasts and warnings on the Internet;

In September 2006, the National Institute of Meteorology of Spain (INM) launched the WWIS Spanish language version. The French language version was launched in January 2007 by Météo-France. The WWIS website now operates in six different languages namely English, Arabic, Chinese, Portuguese, Spanish and French. Also, the Deutscher Wetterdienst has expressed a keen interest to prepare a German language version.

As of 1 May 2007, 159 out of a total of 188 WMO Members participated in WWIS, the latest two being Lesotho and Algeria. A total of 115 Members provide forecasts for 1189 cities, while 159 Members provide climatological data for 1206 cities.

The number of page views to WWIS for the first 4 months in 2007 is listed in Annex I.

The total access statistics of WWIS in the past 12 months, and since 2003 are shown in Annex II. The figures show the popularity of WWIS remains high.

To enhance communication between host countries, a coordination meeting of the WWIS website hosts was held in January 2007 at Hong Kong, China in which host countries took part to discuss and prepare a roadmap for future activities. The meeting agreed on the eventual merging of the WWIS and SWIC websites.

Efforts are continuing to enhance the city forecast webpages by adding city maps and scenic photographs when available from participating Members.

Twenty WMO Members are presently participating in SWIC. The number of monthly page views reached a record high of 2,937,823 in September 2006. The access statistics of SWIC in the past 12 months and since 2003 are shown in Annex III. The figures show an increasing popularity of the SWIC.

After a period of testing, the SWIC webpage showing “global distribution of thunderstorms”, decoded from SYNOP reports, was declared operational in March 2007. This additional feature augmented the display of existing severe weather phenomena such as tropical cyclones, heavy rain and snow.

The possibility of displaying “gales” information on WWIS instead of SWIC was being considered. However, the plan for a multiple-language version of SWIC is making little progress as there is currently no reliable software in the market that can be used to translate warning messages into different languages.

WMO Secretariat invited Hong Kong, China to participate in a demonstration project to incorporate the Common Alerting Protocol (CAP) in SWIC. This will enable the SWIC to promulgate weather warnings as CAP messages which can then be made available to the public with technologies like RSS over the Web. This is one way to increase the visibility and image of NMHSs in the eyes of the public.

TOR(g) Keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines;

The SWIC continue to issue information on heavy rain and snow and thunderstorms in addition to the tropical cyclone information, which has been issued

since inception in 2001.

Under the coordination of the WMO Secretariat and in support of cross-border exchange of warnings between NHMSs, SWIC was cross-linked with EUMETNET's Meteoalarm website (formerly known as the European Multiservice Meteorological Awareness (EMMA) webpages) which was launched in March 2007. The public can easily obtain information on severe weather warnings in Europe as well as around the world.

TOR (h) Develop reference material on the application of nowcasting to the provision of public warnings associated with mesoscale weather phenomena;

The PWS Workshop on Warnings of Real-time Hazards by Using Nowcasting Technology was held in Sydney in October 2006 in collaboration with the WWRP Nowcasting Working Group. The workshop drafted a business plan for a PWS Nowcasting Applications framework and recommended the formation of a Joint (PWS-WWRP) Nowcasting Applications and Services (JONAS) Steering Committee to further develop the draft framework. Subsequently the JONAS Steering Committee met in Geneva in March 2007 to consider the development of the Joint PWSP-WWRP Nowcasting Applications Implementation Plan. The Committee will formulate and implement a strategy to promulgate the PWS application of nowcasting technology in developing countries, in particular, the establishment of a pilot open testbed on nowcasting applications and services.

Hong Kong, China participated in the first trial run of the WMO Forecast Demonstration Project in association with the 2008 Olympic Games to be held in Beijing, China (B08FDP). Hong Kong, China will continue to enhance its nowcasting system and participate in the second trial run of the B08FDP this summer.

TOR (i) Report and advise on collaborative activities with other CBS OPAGs and Technical Commissions.

As discussed under TOR (b), the Team has conducted the PWS survey on severe weather warning services in collaboration with ET/SPI. A report on the survey has been published and is available on the PWSP website.

As reported under TOR(h), the Team will collaborate with WWRP in formulating and implementing a strategy to promulgate the PWS application of nowcasting technology in developing countries.

The RAI pilot project, with the participation of Hong Kong-China, Japan, and the Republic of Korea, currently provides via the internet site specific forecasts in the medium-range to 12 developing countries within the Region similar to those provided by ECMWF to some Members in RA I. Forecasts for 145 cities are provided twice daily.

II. DELIVERABLES & CURRENT STATUS OF IMPLEMENTATION

Deliverable 1: *Regional roving seminars on natural disaster management in the context of the PWS programme*

Regional roving seminars require a large investment of resources. The Team considers that a lower cost alternative to the seminars would be to develop presentation with the help of communication professionals summarizing the “Guidelines on integrating severe weather warnings into disaster risk management” (PWS- 13) updated with additional examples of applications of the documented procedures from developing countries. Results from the recently completed PWS Survey on Severe Weather Warning Services could also be incorporated. This PPT presentation and the associated speaker notes could be part of a resource kit which would also include PWS-. 9 “Guidelines for Cross-border exchange of Warnings”. The resource kit could be posted on PWS website and distributed to NMHSs on CD or DVD.

The resource kit would serve a dual purpose: a) inform decision makers on what their nation’s NMHS provides as regards forecasts, warnings and other meteorological information and b) how to integrate weather information into decision-making processes. This kit could serve as a starting point bringing together the NMHSs with stakeholders and decision-makers to begin building new or strengthening existing partnerships. The kit also offers opportunities to promote and highlight the work of the ET/DPM and PWS to Member countries.

The Team will prepare a short proposal for the development of the presentation and resource kit, possibly together with the ET/COM, for consideration of the submitted to the Secretariat, in particular,

for the identification of suitable resources.

Deliverable 2: *Resource kits (booklets, CDs, etc) for the public, esp. for school children, on DPM, preferably, using cartoon figures to help them understand the threats of natural hazards and protective actions to be taken*

The Team recommends that the feasibility of developing such resource kits should be explored jointly with the Expert Group on Public Education and Outreach.

Deliverable 3: *Publish "Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management*

The Guideline has been published as PWS-13.

Deliverable 4: *PWS survey on severe weather warning services in various countries*

The survey was conducted jointly with ET/SPI in 2006. The survey report has been posted onto the PWSP website.

Deliverable 5: *Enhanced SWIC Website to include multi-hazard warning pages, multiple language versions and more participation by Members. The ultimate objective is to develop the SWIC into a multi-hazard information and resource centre*

Under the coordination of the WMO Secretariat and in support of cross-border exchange of warnings between NHMSs, SWIC has been cross-linked with EUMETNET's Meteoalarm website (formerly known as the European Multiservice Meteorological Awareness (EMMA) webpages) which was launched in March 2007.

The Team recognizes the challenges in implementing multiple language versions and recommends to explore the technical feasibility of automatic translation of the warning messages into different languages as well as study the associated resource

implications.

Deliverable 6: *Workshop on advances in nowcasting and applications in early warnings of meteorological and hydrological hazards, involving system developers, forecasters as well as disaster management experts*

The nowcasting workshop was conducted in Sydney, Australia in October 2006 in collaboration with the WWRP Nowcasting Working Group bringing together meteorological experts and representatives of disaster management agencies. A Joint (PWS-WWRP) Nowcasting Applications and Services Steering Committee has been formed to oversee formulation and implementation of a strategy to promulgate the PWS application of nowcasting technology in developing countries, in particular, the establishment of a pilot open testbed on nowcasting applications and services.

Deliverable 7: Survey to assess the vulnerability of developing countries, including LDCs, to natural disasters and their needs, followed by a workshop to identify and address the areas where vulnerabilities can be reduced in the context of national PWS programmes

This survey activity has been folded into deliverable 4 to minimize duplication of effort. Please refer to **Deliverable 4** for status of the survey.

Deliverables 8 and 9: *Publication of success stories showing how disaster prevention and preparedness, in particular, effective warning systems, reduce vulnerability and Prepare examples of best practice in early warning systems*

The Team will compile examples of best practice and collect relevant cases of stories on successful application of effective warnings systems to disaster risk reduction, in particular, in developing countries. These will be published on the PWSP website for reference by WMO Members initially. After a sufficient number of cases have been accumulated, the relevant webpages will be made available to the public.

Deliverable 10: *An international conference on PWS in support of DPM to provide a forum for professionals of various disciplines (meteorologists, media and communications experts, social scientists, engineers, etc.) to discuss early warning systems in support of DPM, effective warning dissemination and disaster communication. The will also serve to facilitate building up of a coherent disaster reduction “community”*

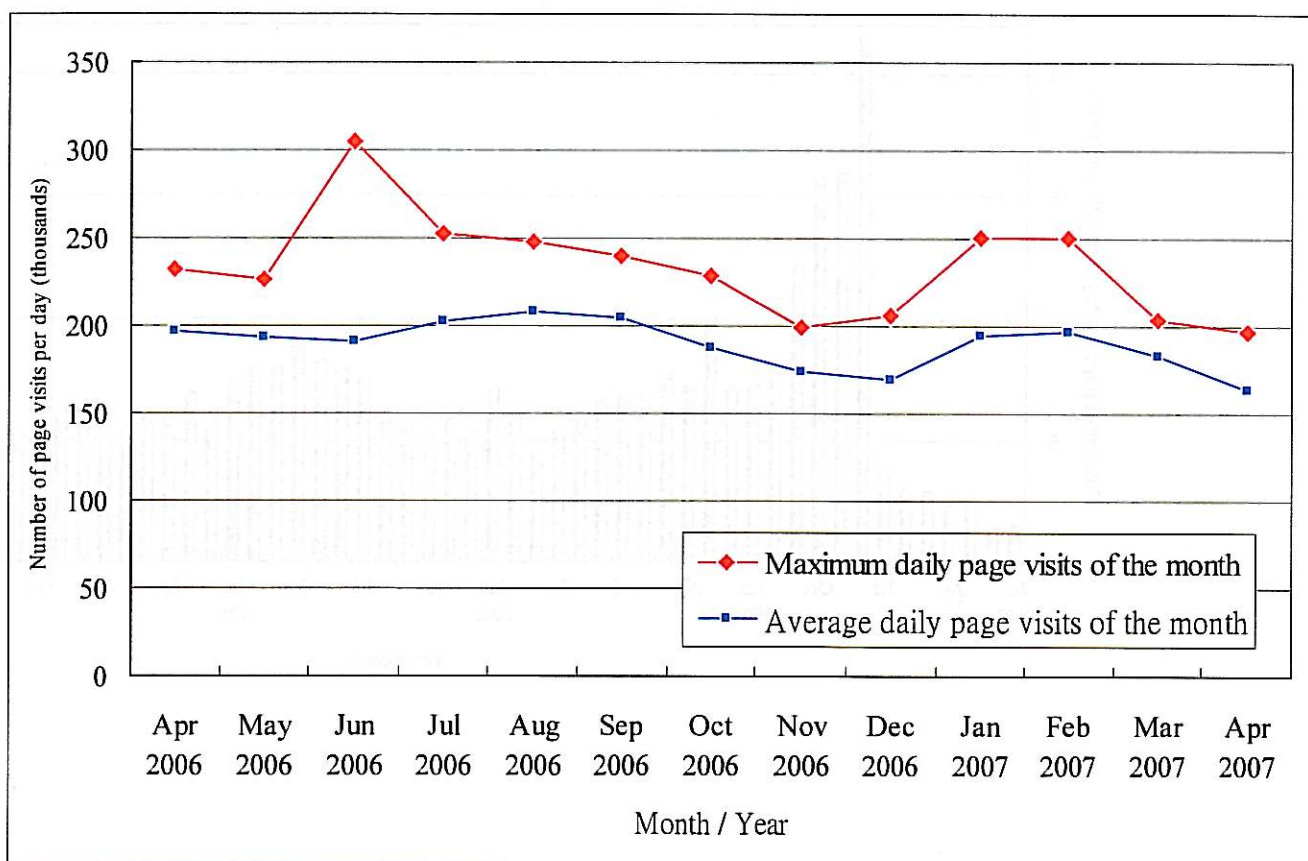
In view of recent conferences of similar nature, the Team recommends to keep this item on the list of its future deliverables and in the meantime explore the possibility of a joint conference with other Programmes/Bodies engaged in similar activities.

M C Wong,
Chair, ET/DPM
1 June 2007

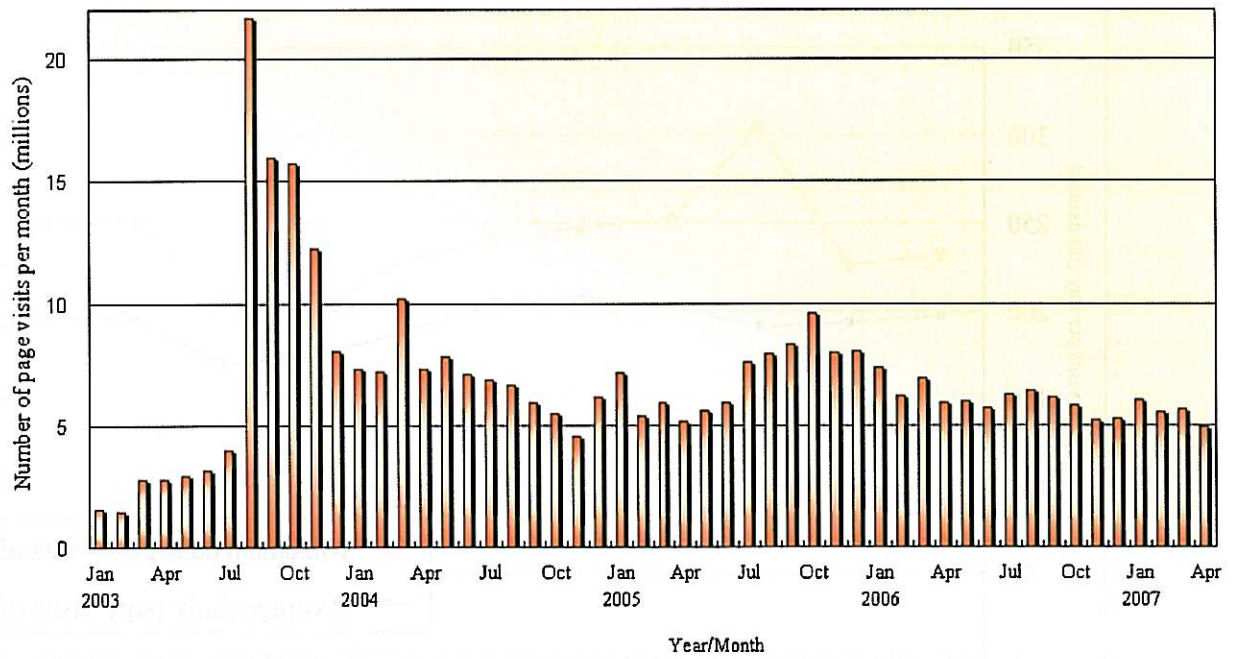
**Number of monthly page visits to WWIS
From January to April 2007**

Language	Number of page visits			
	January 2007	February 2007	March 2007	April 2007
English	6,030,389	5,520,259	5,661,821	4,915,470
Arabic	114,160	149,637	635,212	342,082
Chinese	610,535	939,792	1,115,242	1,043,599
Portuguese	141,967	184,607	136,604	100,914
Spanish	526,587	469,996	660,980	777,616
French	-	75,583	37,837	28,677

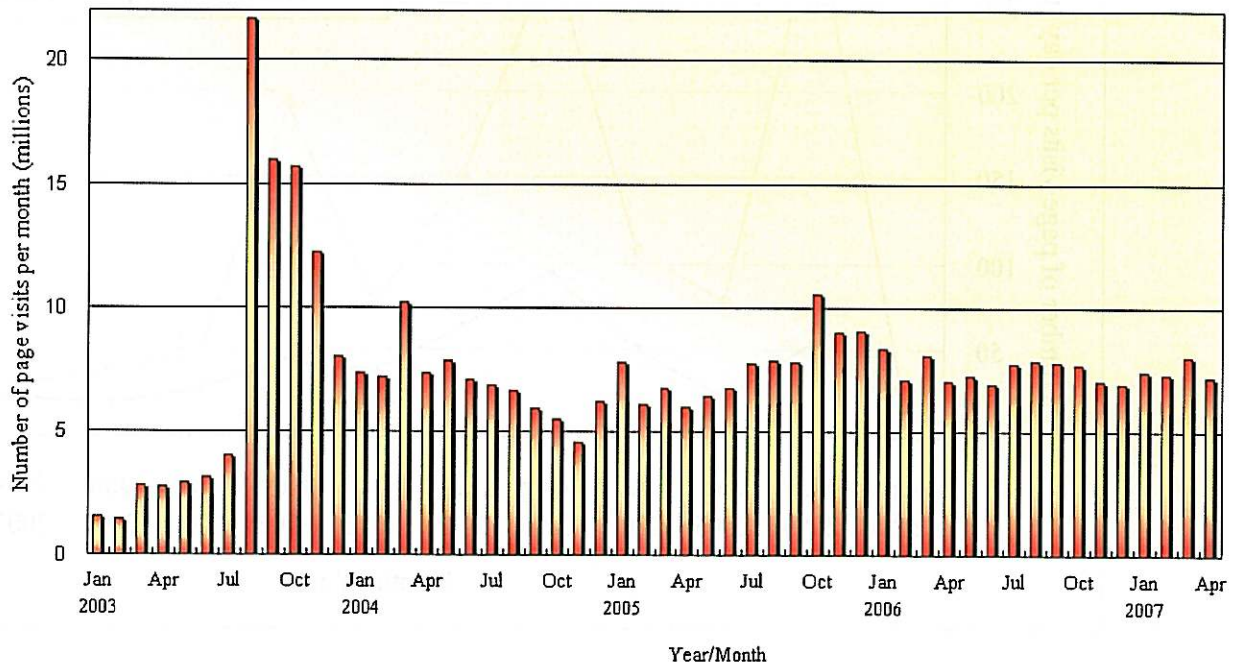
**Figure Annex II-1. Daily access statistics of WWIS (English version)
(Apr 2006 - Apr 2007)**



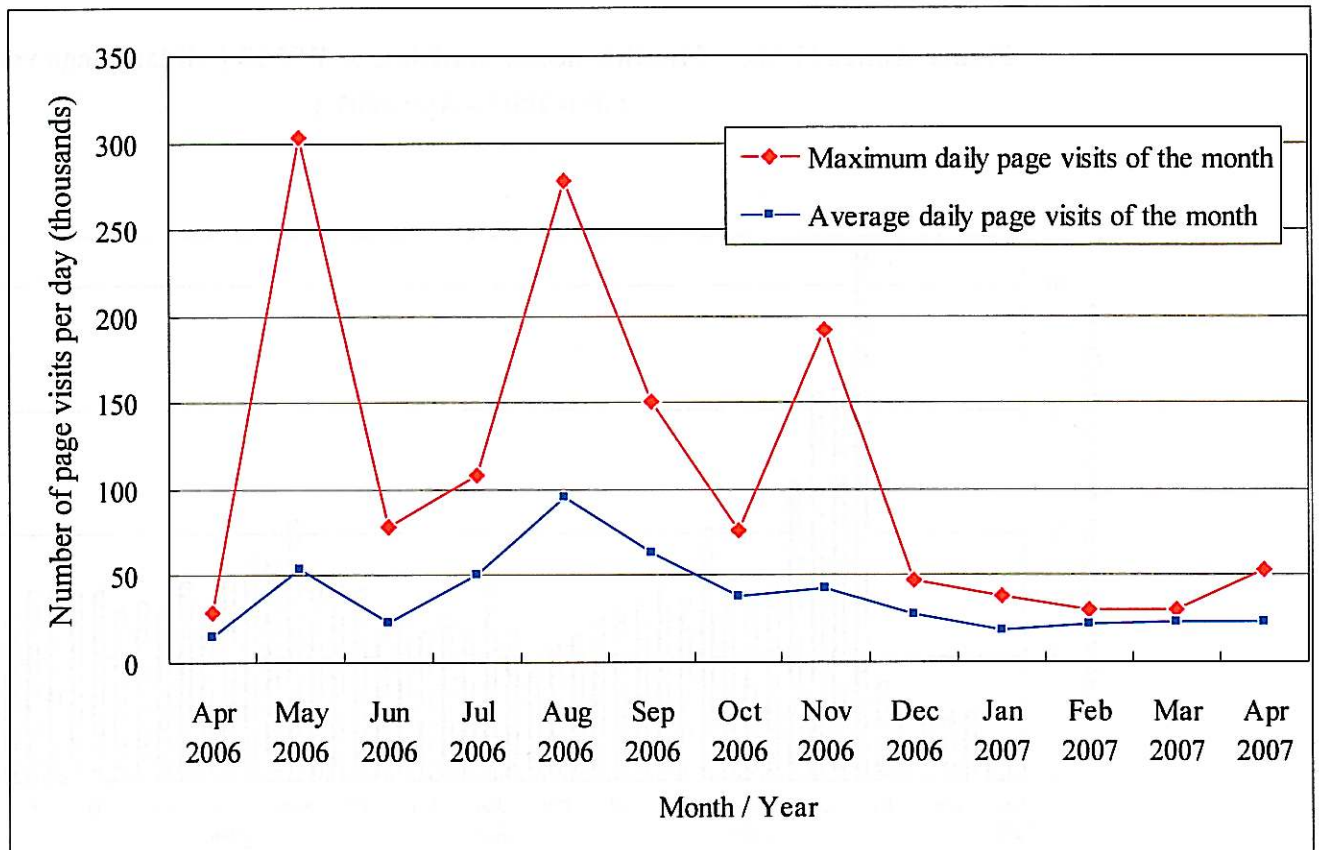
**Figure Annex II-2a. Monthly access statistics of WWIS (English version)
(Jan 2003 - Apr 2007)**



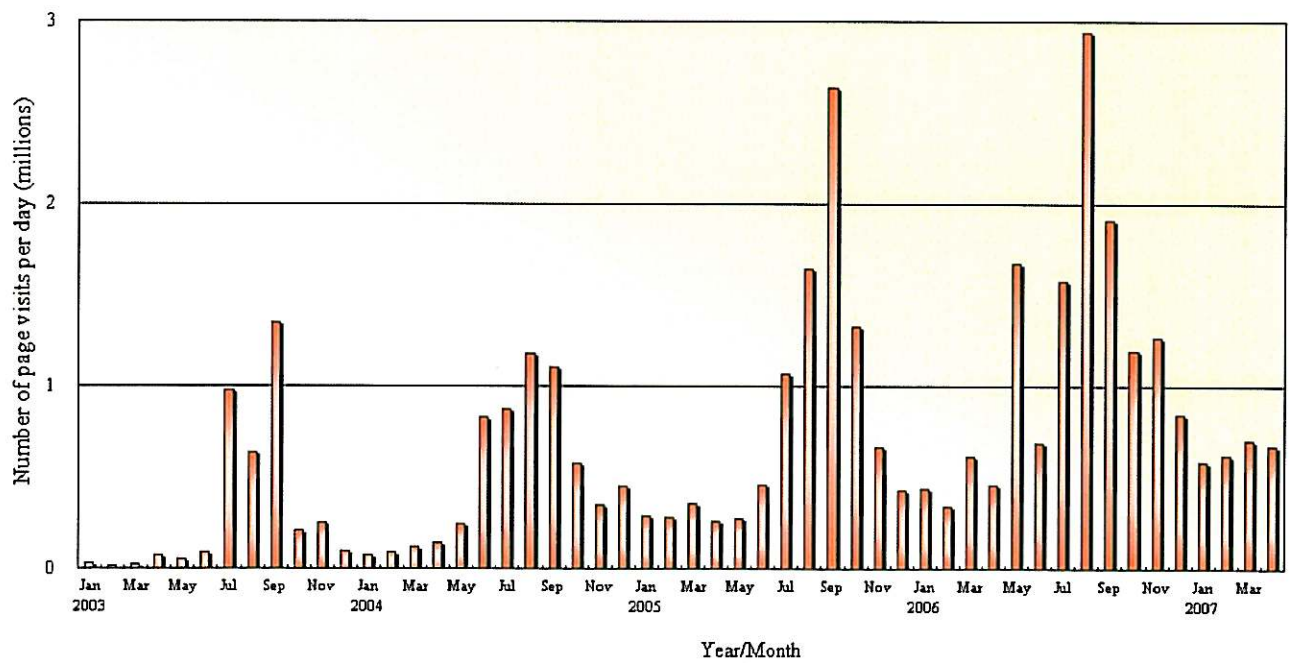
**Figure Annex II-2b. Monthly access statistics of WWIS (All language version)
(Jan 2003 - Apr 2007)**



**Figure Annex III-1. Daily access statistics of SWIC
(Apr 2006 - Apr 2007)**



**Figure Annex III-2. Monthly access statistics of SWIC
(Jan 2003 - Apr 2007)**



**REPORT BY CHAIR OF THE EXPERT TEAM ON SERVICES AND PRODUCTS
IMPROVEMENT (ET-SPI)**

June 2007

The Chair of the Expert Team on Services and Products Improvement (ET/SPI) provided a review of the Team's accomplishments since CBS XIII. The work in 2005 to 2007 and future plans of the Expert Team are summarized below:

ET/SPI first reviewed and discussed the work of three previous initiatives: standardized PWS product formats; incorporation of air quality and bio-meteorology information into PWS delivery; and performance assessment and quality management.

As a result of the review, and in support of TOR (f), the Team developed a supplementary guideline document to cover the issue of bio-meteorological services for the mitigation of human disease outbreaks, and the prediction of the long-term spread of human disease as a consequence of climate change. This guideline has been sent to the Secretariat for publication.

ET/SPI has continued to pursue and support WMO cross-cutting activities and initiatives with a focus on improving PWS products and services. ET/SPI, in collaboration with the Expert Team on Disaster Prevention and Mitigation (ET/DPM), developed and conducted a survey of NMHSs in 2006 to gather information on NMHS severe weather warning systems, vulnerability to weather-related disasters, and to identify opportunities to improve products and services with an emphasis on severe weather warning services. A total of 76 NMHSs responded to the survey. The results of the survey indicate that a small percentage of warnings are available for cross-border exchange. Additional information regarding the results of the survey are provided in the ET/DPM summary.

ET/SPI discussed a variety of issues focused on how to best meet the needs of developing countries in their efforts to improve products and services in support of their PWS programme. The Team also focused on key relationships with other government agencies, the emergency management community, and media partners.

ET/SPI developed a survey which was distributed by the OPAG PWS Chair at the CBS Extraordinary Session held in Seoul, Republic of Korea in November 2006. The survey results are currently under reviewed and evaluation by the Secretariat.

A study conducted by ET/SPI has identified the key users of PWS and has recognised the need for NMHSs to have a comprehensive understanding of their requirements. Surveys conducted by NMHSs from Members have indicated the need for improved precision and accuracy, and more timely warnings of severe weather. The benefit of improved seasonal forecasts, especially forecasts of rainfall and temperature, was also noted in those surveys. Major NWP centres producing seasonal forecasts should make these available to NMHSs.

The Expert Team noted the progress achieved in the WWIS web site and made the following strategic recommendations for its future development: inclusion of precipitation type, the introduction of more severe or abnormal weather information with a DPM emphasis; gradual merging of the WWIS and SWIC web sites; the establishment and hosting of more language versions on a voluntary basis. ET/DPM facilitated a meeting of WWIS hosts to coordinate and regulate SWIC/WWIS development activities. A WWIS user guide was produced for distribution to NMHSs.

The Expert Team discussed Ensemble Prediction Systems (EPS) and associated output products, and the need to raise the awareness of NMHS forecasters regarding the manner in which EPS output products can be used to improve forecasts and warning services.

Representatives from NWP centres will serve as EPS experts. ET/SPI also recognised the importance of educating the PWS user community on the use and interpretation of probabilistic forecast products. ET/SPI recommended that educational and outreach activities be organized to improve the communication and application of probabilistic information to the PWS user community.

The Team agreed that verification results are a powerful tool for assessing performance and improving PWS products and services. As part of a RA VI project, a basic verification of temperature forecasts from the WWIS Internet site started in January 2005. The Team agreed that such information could be very useful, especially for developing countries, and proposed to expand it to all WMO regions and communicate individual statistics to NMHSs.

ET/SPI discussed emerging forecasting techniques which offer new opportunities for integrating PWS forecast dissemination and service delivery. Several NMHSs have instituted a database forecast system while others are developing next-generation forecast workstations. ET/SPI also discussed existing and evolving information technology systems used to delivery PWS products and services, especially in the mobile communication arena. To the extent possible, NMHSs need to position themselves to capitalize on these new systems to enhance the distribution of PWS services

ET/SPI continues to pursue collaboration opportunities with other CBS OPAGS. The Chair of ET/SPI is a member of the Severe Weather Forecasting Demonstration Project Steering Group (SWFDP) sponsored by CBS OPAG on Data-Processing and Forecasting System (DPFS). To expand and identify additional collaboration opportunities with other CBS OPAGs, the PWS OPAG distributed a brief questionnaire developed by ET/SPI at the CBS Extraordinary Session in Seoul, Republic of Korea in November 2006.

Annex VIII

Deliverables relevant to the OPAG on Public Weather Services Status Report, June 2007

Deliverable	Team	Status
Reports of PWS activities to sessions of EC and CBS as appropriate.	ICT	On-going
Guidance on the needs of Public Weather Services as input to the design and implementation of THORPEX based on ideas and views from within the PWS community.	ICT	On-going, principally through the THORPEX Working Group on Social and Economic Research and Applications, of which Chair, OPAG/PWS is a member.
Surveys for assessing the effectiveness of national PWS programmes and activities.	ICT	Network of Focal Points for PWS to be established in Member NMHSs to assist with this task. Will also be addressed through the proposed Pilot Project.
Report on the potential contribution of the private sector to the work of the PWS programme and its constituent teams.	ICT	Renewed focus on links with the private sector following Congress. Chair, OPAG/PWS to request feedback from about 10 Member NMHSs regarding their experience in working with private sector service providers, with a view to circulating examples of positive interaction and best practice. One person from the private sector (media) active within the PWS Expert Teams.
Report on the coordination of activities of the PWS programme on the cross-border exchange of weather warnings with other initiatives in this field, notably the European EMMA project.	ICT	Done
Guidance on the (1) essential and (2) recommended components of a national PWS programme.	ICT	Done – guidance has been approved by CBS and Congress with minor modifications.
A definitive template for weather broadcast training in the context of PWS, developed and established in conjunction with ET-COM.	ICT	Done – published in PWS-12
A document defining the meteorological support required for Olympic Games.	ICT	In preparation by Chair of ET/SPI. Should be complete by end of 2007.

Deliverable	Team	Status
Advice and guidance to CBS on the possible involvement of WMO in accreditation schemes for weather broadcasters.	ICT	No mature proposals for global or regional accreditation schemes currently available. Will report to CBS-XIV
Users' guide on the World Weather Information Services (WWIS) Internet site for distribution to NMHSs.	ET/SPI	Done
Survey to assess the PWS needs of NMHSs in developing countries with a focus on identifying opportunities within PWS to improve products and services.	ET/SPI	Done – survey conducted during the CBS Extraordinary Session in Seoul, Korea in November 2006. Results currently being analysed in the Secretariat.
Survey to identify the emerging needs for new and improved PWS products and services with the emergency management community and media partners (jointly with ET/COM).	ET/SPI	Done – survey carried out in conjunction with that to assess the PWS needs of NMHSs in developing countries, immediately above.
Workshop (jointly with ET/DPM) to identify PWS product and service opportunities/links between DPM and PWS.	ET/SPI	Workshop on Nowcasting held in Sydney, Australia in October 2006, in conjunction with ET/DPM.
Expanded WWIS Internet site to include additional hydro-meteorological information and other languages.	ET/SPI	Website currently available in six languages. A coordination meeting of those hosting the different language versions was held in Hong Kong China in January 2007. On-going.
Participate in THORPEX International Conference on Decision Making and Decision Support in the Era of Probabilistic Weather Forecasting (06-08).	ET/SPI	Conference was merged into the Madrid conference “Secure and Sustainable Living”. Chair of OPAG/PWS participated in this conference.
Workshop on the applicability of probabilistic forecasts products and services facilitated by ensemble prediction systems on PWS (to include forecasters and representatives from the emergency management community) (06-08).	ET/SPI	Expert Meeting organised for September 2007 on the applicability of probabilistic forecasts products and services for forecasters, to be held in Shanghai, China.
Regional roving seminars on natural disaster management in the context of the PWS programme.	ET/DPM	To be provided within the context of the proposed Pilot Project. Also, Chair of ET/DPM has submitted a proposal to the meeting of the Asian Conference on Disaster Reduction (Kazakhstan, June 2007) which would address this deliverable in RA II.

Deliverable	Team	Status
Booklets for school children on DPM, preferably using cartoon figures to help them understand the threats of natural hazards and protective actions to be taken.	ET/DPM	This Deliverable is not strictly within the competency of the ET and we propose to drop it. The CPA Programme within the Secretariat has developed similar material in the area of Climate Change.
Publish "Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management".	ET/DPM	Done. Published as PWS-13
Survey on natural hazard warning systems in operation in various countries with a view to publishing a handy reference on such systems.	ET/DPM	Done. Survey carried out in early 2006; the survey results were analysed and the report published in the PWS pages of the WMO website in January 2007.
Survey to assess the vulnerability of developing countries, including LDCs, to natural disasters and their needs, followed by a workshop to identify the areas where vulnerability can be reduced in the context of national PWS programmes.	ET/DPM	Done. Survey carried out in conjunction with that immediately above.
Publication of success stories showing how disaster prevention and preparedness, in particular, effective warning systems, reduce vulnerability.	ET/DPM	Yet to be done.
Prepare guidance material on best practices in early warning systems.	ET/DPM	As above – yet to be done.
An international conference on PWS in support of DPM to provide a forum for professionals of various disciplines (meteorologists, media and communications experts, social scientists, engineers etc.) to discuss early warning systems in support of DPM, effective warning dissemination and disaster communication.	ET/DPM	This matter will be addressed by the Symposium on Public Weather Services proposed by Executive Council and endorsed by Congress; this Symposium is tentatively scheduled for the first week in December, 2007.
Workshop on advances in nowcasting and applications in early warnings of meteorological and hydrological hazards, involving system developers, forecasters as well as disaster management experts.	ET/DPM	Workshop on Nowcasting held in Sydney, Australia in October 2006, in conjunction with ET/SPI.

Deliverable	Team	Status
Enhanced SWIC Website to include multi-hazard warning pages, multiple language versions and more participation by Members. The ultimate objective is to develop the SWIC into a multi-hazard information & resource centre.	ET/DPM	On-going. Links established between SWIC website and Emma/Meteoalarm, a EUMETNET project in Europe with a similar focus.
Workshops for NMHS staff to enhance communication and presentation skills, focussing on interactions with the media and disaster managers during routine events as well as during natural disasters.	ET/COM	To be addressed in the context of the proposed Pilot Project.
A set of 'best practice' examples for circulation amongst NMHSs of effective methods of weather information presentation through all media.	ET/COM	Prepared in draft form; some examples still to be collected and some editorial work still required but scheduled to be complete by mid-2008.
Promotional information about the WWIS and SWIC websites, to be distributed by NMHS to relevant organisations (e.g. the media, tourism and travel organisations) in order to enhance the use and profile of official weather information from NMHS.	ET/COM	Yet to be done.
Report on the effectiveness of the WWIS and SWIC websites, including an analysis of website usage statistics.	ET/COM	Yet to be done.
Advisory material on how NMHSs may work with the media to ensure effective attribution of the role of NMHSs in the provision of basic services and infrastructure to support weather presentation to the public.	ET/COM	To be addressed in the context of the proposed Pilot Project.
Guidelines on the effective use of confidence and uncertainty information in PWS.	ET/COM	Draft prepared. Some illustrations still to be finalised and some editorial work required, but scheduled to be complete by September 2007.

ICT Pilot Project 001: PROJECT RUNWAY? (LEARNING-THROUGH-DOING?)

Objective:

To assist developing Members, through learning-by-doing, and through maximizing their existing capabilities, to make potential end-users aware of the range of both available and potential new products and services, and the likely benefits for users.

Actions:

1. Identify Members requirements and capabilities for them to participate.
2. Confirm/identify target sectors as follows: agriculture, health, emergency response.
3. Identify candidate Members (2 or 3) and get agreement to participate.
4. Refine proposal, including definition of project scope, duration, milestones and deliverables, in consultation with TF-SEA, Secretariat and participating Members.
5. Develop implementation plan.
6. Review progress in the project and prepare an interim report for submission to CBS XIV.

Key outcomes and deliverables:

- (n) Initial survey to benchmark the NMHS brand;
- (o) Socio-economic assessment of target sectors;
- (p) Assistance to participating Members to establish dialogue with target sectors;
- (q) Generate marketing plan for target sectors;
- (r) Improved service delivery;
- (s) Enhanced brand of participating Members;
- (t) Post project survey to assess impact.

TIME-LINE:

Steps 1&2: to be completed before 10/7/07 by Secretariat and ICT.

Step 3: to be completed before 31/10/07 by Secretariat.

Step 4: to be completed before 31/12/07 by Secretariat, ICT and TF-SEA.

Step 5: Implementation plan to be ready by first quarter of 2008 by Secretariat/ICT/TF-SEA/participants; Site visits by second quarter of 2008.

Step 6: to be completed before CBS session by Secretariat/ICT.

Target project completion: 2009.

**** Expansion of Point 1 above: capabilities of potential candidate Members – criteria

1. All 2/3 from the same region.
2. Have an operational forecast office.
3. Working language of the pilot project will be English.
4. Demonstrable level of commitment – both physical and otherwise.
5. Can identify potential users in the target sectors.
6. Ideally, co-operation of the relevant RSMC / define a coordinating centre.

List of Actions from meeting of the ICT on PWS; Muscat, Sultanate of Oman, June 2007

Action	Responsible	Time-frame
Collect benefit studies from a range of countries so as to aid the Task Force on Social and Economic Applications of Public Weather Services (TF-SEA) in compiling a library of case studies.	All	On-going.
Commence work on a template for the preparation of economic assessments of NMHSs	(TF-SEA)	2007
Publish an annotated index or roadmap to the PWS Guidelines.	Secretariat to initiate and circulate for comment to ICT.	To be published prior to CBS.
Make results of training feedback available to Chair ICT.	Secretariat	Prior to CBS.
Approach a range of Members regarding relationships with the Private Sector, and collect/collate information regarding their experiences. Contacts from PWS network. UK, USA, Canada, Germany, New Zealand, Australia, Netherlands, Japan, Sweden, China.	All; feedback to be supplied to Secretariat and Chair.	Feedback by end of 2007. Report collated prior to CBS
Set up national Focal Points for PWS, as an aid to encouraging the use of PWS resources and to assist collection of information on the effectiveness of the PWS Programme activities.	Secretariat	Focal Point network established during Q3 and Q4 of 2007.
ET/COM – best practice examples in the presentation of forecast information. Consider publishing one-page sheets for use in training.	Chair ET/COM	By CBS-XV
Letter to Dr Stefan Mildner, consultant with WMO, regarding the design of WIS and the necessity to keep end-users in mind when defining data formats etc.	Chair	Q3 2007
Bring comments concerning the redesign of the WMO website and the consequent difficulty in easily finding and accessing the Public Weather Service Pages to CBS-MG.	Chair	CBS-MG meeting, June 2007.
Commence work on the Programme for the PWS Symposium tentatively scheduled for December 2007.	Secretariat and ICT	Q3 2007
Collect examples of forecasts expressed in a probabilistic fashion for transmission to Chair of ET/COM	All	Q3 2007